BLOOMBERG SCHOOL

Louisiana's 'Cancer Alley' Is More Deadly Than Previously Imagined

New research shows that the industrial pollution—and the risk to human health—on Louisiana's Cancer Alley have been significantly underestimated.

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Chemical plants and factories line the roads and suburbs of the area known as Cancer Alley. October 15, 2013. *Giles Clarke/Getty Images*

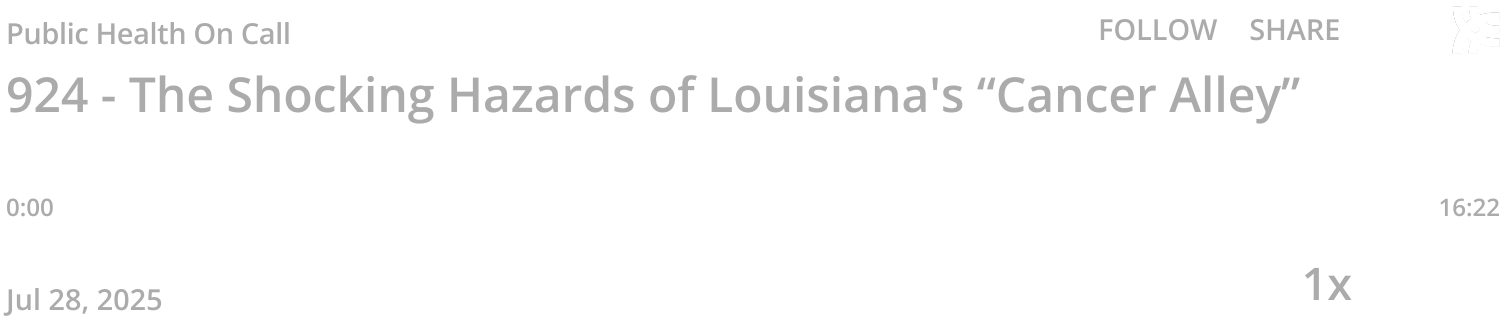
On an 85-mile stretch of the Mississippi River between New Orleans and Baton Rouge, communities exist alongside some 200 fossil fuel and petrochemical production plants. Since the 1980s, the area has been known as Cancer Alley.

These plants process about 25% of the U.S.'s petrochemical products, Peter DeCarlo (https://engineering.jhu.edu/faculty/peter-decarlo/), PhD, associate professor in Environmental Health and Engineering (https://publichealth.jhu.edu/departments/environmental-health-and-engineering), said in the July 2 episode (https://johnshopkinssph.libsyn.com/924-the-shocking-hazards-of-louisianas-cancer-alley) of Public Health On Call (https://publichealth.jhu.edu/headlines/public-health-on-call-podcast)—with many of the byproducts and emissions winding up in nearby communities' air, water, and soil.

Residents of these communities suffer the effects of extreme air pollution (https://www.hrw.org/report/2024/01/25/were-dying-here/fight-life-louisiana-fossil-fuel-sacrifice-zone), including increased rates and risks of maternal, reproductive, and newborn health harms; respiratory illnesses; and cancer. One area has the highest risk of cancer from industrial air pollution in the U.S.—more than seven times the national average (https://www.nbcnews.com/news/us-news/toxic-school-government-failed-black-residents-louisianas-cancer-alley-rcna72504).

But new research (https://www.pnas.org/doi/10.1073/pnas.2504770122) from DeCarlo, Keeve Nachman (https://publichealth.jhu.edu/faculty/2394/keeve-e-nachman), PhD '06, MHS '01, professor in Environmental Health and Engineering (https://publichealth.jhu.edu/departments/environmental-health-and-engineering), and their teams shows that the pollution—and the risk to human health—has been significantly underestimated.

In this Q&A, adapted from that podcast episode, DeCarlo and Nachman discuss their work measuring levels of pollutants in Louisiana and explain what these conclusions mean for how the U.S. should regulate carcinogens.



Describe this research project and the work you're doing.

Keeve Nachman: We want to understand what it means to live in the shadows of large industrial or petrochemical facilities. To do that, we measure the pollution in the air and translate that information into an estimate of how likely a person or population is to get sick if they live in a place where they breathe all these different chemicals over their lifetime.

Pete and his team have built a mobile laboratory on wheels: Imagine a fancy chemistry lab in the back of a very large van. The van collects air measurement data in real time, measuring levels of pollution in the air over space and time. Based on that data, the team delivers estimates to me of what people are breathing.

You took this mobile van to what's known as "Cancer Alley" in Louisiana. Why is it called Cancer Alley?

Peter DeCarlo: Cancer Alley is an 85-mile stretch of the Mississippi River between Baton Rouge and New Orleans. This area processes about 25% of the U.S. petrochemical industry's products, including refining oil and making chemicals.

Because of that concentration of industry, a lot of byproducts get emitted into the air, water, and soil. Those chemicals at low concentrations can cause a host of effects, most notably cancer, which is why it's called Cancer Alley.

KN: This area has some of the highest cancer and other disease risks in the country.

Given the sources [of the pollution], this was a really important place for us to measure and try to understand what population exposures look like. Without a doubt, the people living in the communities surrounding these facilities are at the greatest risk of people anywhere in the U.S.

Please visit our website to view the embedded video.

Before your research, what data was available about pollution in this area?

PD: Air quality measurement is often done at the state level with funding from the EPA, so states decide where they want to place monitors, and they typically put them in populated areas.

In Louisiana, the majority of monitors are located in places like New Orleans or Baton Rouge, which are at either end of Cancer Alley. But there aren't many monitors in the middle, especially for criteria pollutants (https://www.epa.gov/criteria-air-pollutants). There are a couple of measurement stations which measure a subset of hazardous air pollutants (https://www.epa.gov/haps)—gases that are associated more with industrial emissions that you'd find in an urban area. But that's one or two monitors in an 85-mile stretch housing 200 or so facilities. It's not nearly enough monitoring to really understand what people are breathing.

What we've found through our work is that many of the most critical air pollutants—the ones causing the highest cancer risk and the most non-cancer impact to health—are not being measured by those facilities.

What are some examples of air pollutants you found in Cancer Alley?

PD: One of the key pollutants we wanted to focus on is ethylene oxide, which is used in medical sterilization and sterilization for foodstuffs. In 2016, the designation for its cancer risk increased due to new studies and evidence.

There are five or six facilities in the area of Cancer Alley where ethylene oxide is produced, and it isn't surprising that whenever our van was near one of the facilities, we saw the highest concentrations of ethylene oxide in the air. This means the cancer risk is not uniform throughout Cancer Alley for that particular chemical.

Another important chemical that we measured is called chloroprene—the chemical that's used to make neoprene rubber, that spongy material that's in a lot of products, like wetsuits and seals. Chloroprene is very carcinogenic.

The only facility in the U.S. that makes neoprene is located in Cancer Alley—and it was the only place in our entire study that we detected chloroprene in the air. Nearby that facility is an elementary school.

What data was available on these pollutants before your team took measurements?

KN: For a lot of the chemicals we measured, there are either no government measurements or very sparse government measurements. And a lot of the data that are used to judge the safety of controls to limit the releases of those chemicals are based on the industrial facilities' self-reports to the state government.

Notably, when we compared our real-world measurements to the estimates from government models that rely on self-reporting, we found striking differences in air pollution levels for some of these very potent carcinogens.

This means that if we rely on the government's decision-making and risk estimates around these chemicals, we are underestimating what people are truly experiencing and undervaluing their risk of getting cancer or other diseases from breathing these exposures over their lifetimes.

How does your project evaluate the potential compounding effects of exposure to multiple different chemicals and carcinogens?

KN: The way chemicals have always been regulated is by figuring out which part of the body is most sensitive to that chemical and determining how to keep exposures below a level that would trigger any health effects. And if we were only breathing one chemical at a time, that would make sense.

However, when you're breathing tens or hundreds of chemicals at the same time—many of them targeting the same parts of the body—the combined burden of all of those exposures may threaten our health, even if no single chemical in the mix is at a level that would trigger an effect on its own.

Pete's team was able to measure many, many chemicals in the air. My team developed a new approach that considers each chemical and all the different parts of the body it may target, and recognizes how these chemicals can work together to cause harm.

Using the data generated by driving the mobile laboratory around Cancer Alley, we've tried to quantify the combined effect of those chemicals on the different parts of the body.

What did your research find?

KN: With traditional methods that assume each chemical acts individually, we may not see a risk for diseases and impact to organ systems. But when we consider the combined effects of 40–50 chemicals, we start to see significant risks for certain health outcomes. And these outcomes tend to reflect the community's experience.

PD: The risk numbers we're finding suggest it's very likely that these chemicals are responsible for some, if not all, of the elevated cancer risk in the area.

In some of these parishes, the estimated risk from the government models is about ten times lower than what we're finding based on our measurements and risk calculations. That said, even those government estimates indicate this area as having one of the highest cancer risks in the U.S. So if they're underestimating that by a factor of ten, it's just egregious to try to build more facilities there.

How is this data being used to effect change for communities in Cancer Alley?

PD: In addition to the science and technical work we're doing here at Hopkins, we are working with community advocacy groups in Louisiana and giving them the information and tools they need. They've been advocating for decades, but now they have empirical data about the risks of these exposures—measured by research institutions using the best instrumentation available—that back up their lived experiences.

Where we come in is providing that science-backed information for these community groups to bring to discussions with the state government.

KN: What we've done in Cancer Alley is certainly important for the residents of the communities surrounding the facilities, but it also has implications in other industrial areas and even beyond. We are not doing regulatory risk assessments in a way that adequately protects people from multiple chemicals.

Our recent publication (https://www.pnas.org/doi/10.1073/pnas.2504770122) is one of many that pave the way for a new approach to thinking about cumulative burdens from chemicals, and even stressors beyond chemicals.

If we were to implement those approaches, we'd make better decisions about permitting and about interventions to protect public health in a way that we aren't now.

This interview was edited for length and clarity by Aliza Rosen, a senior digital content strategist, and Morgan Coulson, an editorial associate, both in the Office of External Affairs at the Johns Hopkins Bloomberg School of Public Health.

Related:

- Community vs. Coal: Reclaiming Health in Curtis Bay (https://magazine.publichealth.jhu.edu/2024/community-vs-coal-reclaiming-health-curtis-bay)
- The Omnipresence of PFAS—and What We Can Do About Them (https://publichealth.jhu.edu/2024/what-to-know-about-pfas)