Pollution the Silent Killer: Destroying People, Places and the Planet!

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ABSTRACT

Air pollution kills. While this is not a controversial conclusion in the scientific community it is often contested by many business and political leaders. Using Louisville, Kentucky, one of the nation's most polluted cities, as a case study, our reporting finds that proximity to polluting industries reduces life expectancy, increases exposure to a variety of respiratory ailments making those residents more susceptible to COVID-19, undercuts academic achievement, and produces a range of social costs for the immediate residents and the metropolitan region. Industry and political leaders deny the costs of pollution, pointing to poor lifestyle choices of the victims despite the scientific evidence undercutting such arguments. There is another path forward. Pollution is not the only cause of these challenges, but it is a critical factor often ignored by key decision makers. Concerted efforts to substantially reduce pollution, or in some cases to simply remove toxic industries from residential areas, is an essential step in producing healthier and more prosperous communities.

INTRODUCTION

A nine-year-old girl in London who died following an asthma attack is the first person in the world to have air pollution listed as the cause of death, according to London officials [1,2]. As we consider the COVID-19 pandemic, there are important lessons for myriads of cities throughout the world. Using Louisville, Kentucky, one of the nation's most polluted cities, as a case study, our reporting finds that proximity to polluting industries reduces life expectancy, increases exposure to a variety of respiratory ailments making those residents more susceptible to COVID-19, undercuts academic achievement, and produces a range of social costs for the immediate residents and the metropolitan region generally. Industry and political leaders often deny the costs of pollution, pointing to poor lifestyle choices of the victims despite scientific evidence undercutting such arguments. There is another path forward.

CASE REPORT: LOUISVILLE, KENTUCKY

For this discussion, we considered the case of Louisville, Kentucky a city with a population of about 770,000. Though it seems Louisville's mayor Greg Fischer has condoned industrial pollution and blamed the poor for pollution-related health issues, the scientific data tell a different story—Louisville is among the unhealthiest, and most polluted cities in the U.S. [3]. What is the basic problem? It is the proximity of Louisville residents to industrial polluters: chemical industries, fossil fuel-fired energy plants, distilleries, and other industries.

Health Risks Due to Toxic Air Quality

According to the Centers for Disease Control and Prevention, heart disease, chronic obstructive pulmonary disease (COPD), asthma, and liver disease are two-to-four times higher for residents living near the city's chemical factories compared to residents living in the Louisville metropolitan area [4]. Further, Louisville's air quality ranks worse than several well-known places for environmental degradation: including the city of Detroit, Michigan, and regions such as Louisiana's cancer alley [5]. The Louisville Department of Health and the Office of the Mayor estimate that 62,142 people die prematurely in toxic West Louisville—10 to 12.6 years earlier than those living on the east side of Louisville, which is further from the industrial polluters [6-10]. In fact, lifespans are is shorter than folks living in war-torn Iraq and Jamacia.

Why is asthma two times greater and COPD four times greater in West Louisville compared to the rest of the city? Our research team recently found that Louisville ranks as the second worst in the U.S. for deadly toxic air pollution when compared to 146 other mid-sized U.S. cities [5]. Strikingly, West Louisville residents are exposed to 84,699 tons of toxic air compared to just 7,320 tons yearly in Bowling Green, Kentucky—one of the nation's top ten cleanest cities—located just 113 miles (182 km) south of Louisville.

How does Louisville reconcile with the fact that most of the residents impacted by toxic air pollution are black? The inequity is clear: pollution is contributing to health disparities and killing our black neighbors.

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Air Quality Impacts Educational Attainment

Despite reliable and valid data from the United States Environmental Protection Agency (EPA), the Louisville Air Pollution Control District continues to claim that Louisville's level of pollution is safe for its residents [11,12]. Reliable and verifiable data from the EPA, Center for Disease Control (CDC), and Jefferson County Public Schools (JCPS) compared the quality of life of residents in heavily polluted West Louisville to those residing in East Louisville, along with cities with cleaner air [4,5,7,13].

The toxic release inventory (TRI) map program was created by the EPA through the Emergency Planning and Community Right-to-Know Act. The TRI program tracks the management of certain toxic substances that put human health and the environment at risk. TRI chemicals are known to cause chronic human health effects, such as cancer or respiratory illness, and have other adverse environmental impacts [14]. Figures 1 and 2 depict how the physical

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proximity to industrial polluters is correlated with poorer reading and math proficiencies in elementary school students in Jefferson County Kentucky. Data for the Kentucky Performance Rating for Educational Progress (K-PREP) assessment was provided by Jefferson County Public Schools (JCPS) Open Datasets Data Portal [13].

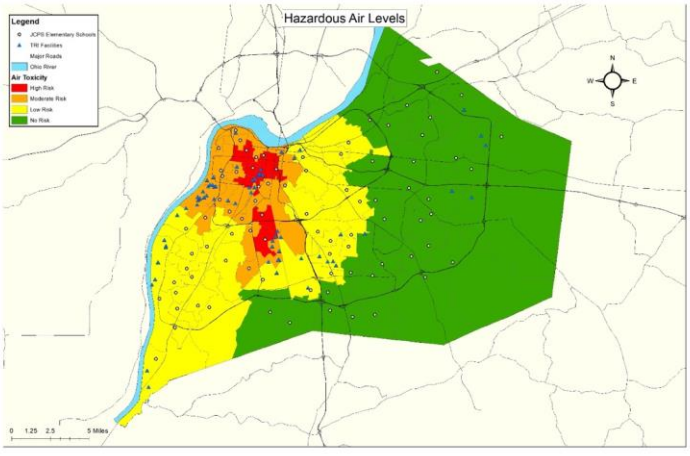

Figure 1. Toxic release inventory map of Jefferson County Kentucky [11].

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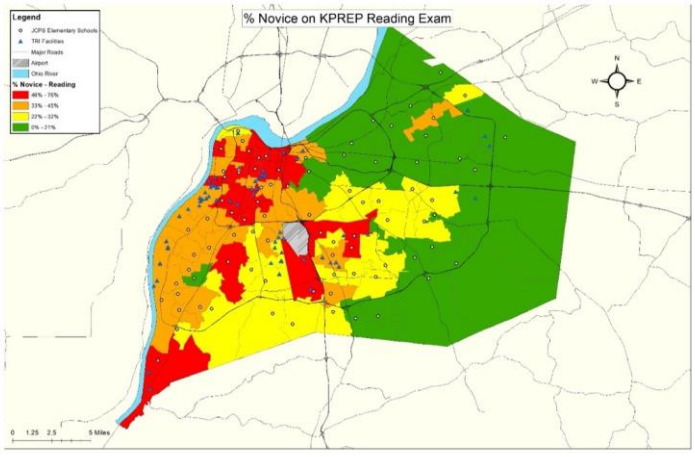

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Jefferson County Public Schools provided us with reading scores for schools near Rubbertown (a zoned industrial district located in West Louisville) and elsewhere. The reading scores of students are lower in areas near the 45 chemical plants; 53% of the students are not proficient in math or reading. Figures 1 and 2 indicate that large amounts of air pollution are strongly correlated with reading scores. A nearly identical map shows how math scores show similar relationships. Other maps show that student absentee rates and suspensions follow a similar pattern. This might be the consequences of toxic pollutants being 12 times higher in elementary schools located near the polluting industrial plants.

Impacts of Pollution on Longetivity

Moreover, pollution shortens lives [3]. Research shows premature deaths in West Louisville residents are primarily due to toxic pollution in the air, soil and water [3,5]. Another study found that the overall lifespan of Louisville residents is five years shorter for people in the lower income quartile than for similar groups in the California cities of Santa Barbara and Santa Rosa [15]. The life spans of the wealthier (those in the upper income quartile) are unaffected because they live farther away from the polluting industries in eastern parts of Louisville.

Furthermore, a recent study of 146 mid-sized cities demonstrates that cities with high levels of pollution have much higher COVID-19 case rates and deaths [3]. We argue that a contributing factor is that persons living in highly polluted cities, especially in neighborhoods near industrial polluters, have higher rates of asthma and COPD, ultimately making them more vulnerable to severe COVID-19 infections.

Let's next consider New Zealand. As of February 21, 2021, New Zealand reported just 26 deaths from COVID-19, among 4,942,000 residents [16]. In addition to Prime Minister Jacinda Ardern's stellar leadership throughout the pandemic, instituting critical public health measures, another key factor is that New Zealand is ranked in the bottom 10% in the world for levels of air pollution among 189 countries [17]. Compare these deaths to one of China's most polluted cities and the birthplace of COVD-19: Wuhan, China where over 50,000 people died from COVID-19.

Pollution's Impact on Green House Gasses

While we have focused on how devastating impacts of industrial pollution on learning, places, and people locally, there is a more insidious impact; Louisville produces more greenhouse gasses (GHGs) than any other American city. GHGs are largely responsible for causing the worldwide climate chaos of droughts, flooding, fires, reduction in lifespans, COVID-19 and unlivable temperatures for humans and living things.

Louisville is a leading city in releasing toxic GHGs. Just one chemical company, Chemours Louisville Works, emits more climate-damaging compounds than all of the 750,000 registered automobiles circulating around the Louisville region [21]. The most harmful climate super-pollutant produced at the plant is the byproduct, hydrofluorocarbon-23 (HFC-23), a potent GHG that produces 12,400 times more warming than carbon dioxide (CO_2), the main chemical compound responsible for climate change. This manufacturing plant also emits hundreds of tons of hydrochlorofluorocarbon-22 (HCFC-22), a chemical ingredient in everything from Teflon to lubricants used on the International Space Station. In addition to being a climate super-pollutant that is 1,760 times more effective at warms the atmosphere more than CO_2, HCFC-22 also destroys the atmospheric ozone layer that helps protect the Earth from harmful ultraviolet rays. Its production was banned in the U.S. and other developed countries under an international agreement known as the Montreal Protocol. However, Chemours is exempt from that prohibition because the HCFC-22 produced in Louisville is used as a feedstock to make other products that do not damage the Earth's protective ozone layer [21].

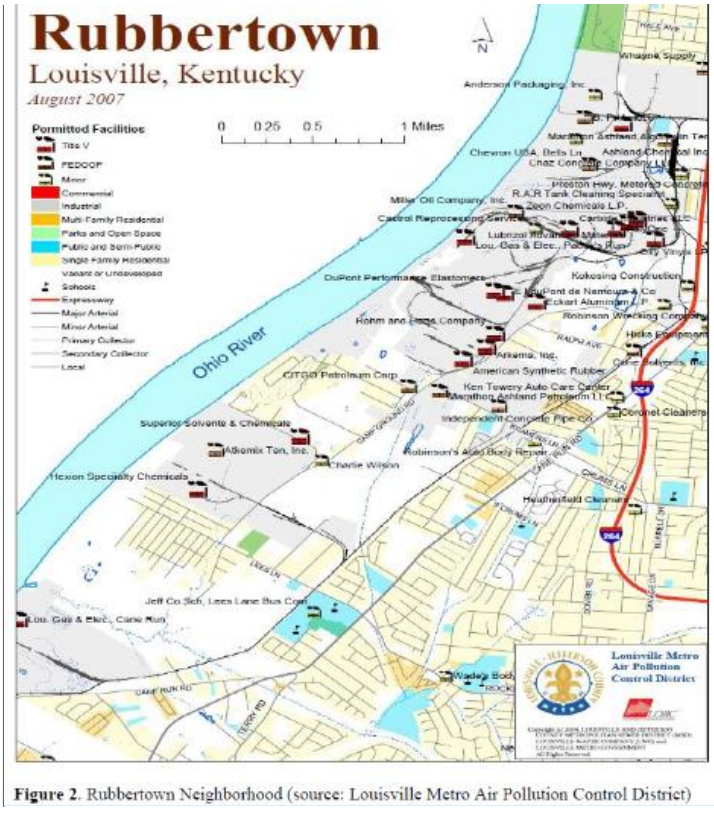

Figure 2. Rubbertown Neighborhood (source: Louisville Metro Air Pollution Control District)

Figure 3. Louisville's Rubbertown neighborhood (source: Louisville Metro Air Pollution Control District).

If just one chemical company can do this much damage to the climate, what is the combined impact of Louisville's 44 other chemical factories, liquor distilleries, and coal-fired plants? Do the math. It's absolutely horrific. So instead of Louisville's Mayor declaring the city to be a global climate leader because some corporate backed foundation like Kaiser or CDP, they should be denouncing the real sources of climate change in Louisville.

MOVING FORWARD WITH VIABLE SOLUTIONS

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Louisville's science-based environmental justice programs were replaced with an industry-funded center at the University of Louisville, the Christina Lee Brown Environmental Institute [18]. This new center posts press releases on its website that ignore the negative effects of pollution and makes false claims that pollution levels in Louisville's air are improving [5,9,19].

In Louisville, lobbying and million-dollar donations from owners of chemical companies, coal-fired power plants, and distilleries have resulted in the sudden closure of environmental justice programs and the erasure of websites that contained federally funded research reports at the University of Louisville. A former top aid to Louisville's Mayor operates a pollution Center for healthy air, water, and soil that claims that the air is either getting better (false) or that the impacts from industrial polluters on humans is minimal. It operates like a propaganda center with over 126 press releases falsely trumpeting Louisville's clean air accomplishments, none of them critical of industrial polluters, coal fired plants, or liquor distilleries.

Reducing pollution will also reduce health disparities, ultimately resulting in improved housing, fewer chronic health conditions, fewer cases of COVID-19, longer (and better quality) lives, and slowing down climate change. One solution is to regulate more types of polluting compounds. To reduce impacts, it might require moving toxic industries out of residential areas. Of course, pollution is not the only factor creating such enormous health disparities, but it is one that many city leaders have often downplayed or ignored. Leaders in other U.S. cities can learn from the abdication of leadership in Louisville. Unfortunately, there are many lessons of what not to do.

When a 9-year-old girl in London is declared dead from pollution, it makes us wonder how many more children are also being harmed. Pollution kills, and now there is at least one official coroner's report that air pollution exposure is the medical cause of death [20]. The first step to resolving any problem is to identify it. As Mayor Sadiq Khan of London stated, "Toxic air pollution is a public health crisis, especially for our children, ministers and the previous mayor have acted too slowly in the past, but they must now learn the lessons from the coroner's ruling and do much more to tackle the deadly scourge of air pollution in London and across the country" [21].

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