

Trailblazing Toward Healthier Air

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A new conversation is taking place around air quality in the Pittsburgh region, inspired partly through recent innovative public engagement and enormous growth in awareness and activism generated by the Breathe Project. The Heinz Endowments launched the initiative in 2011 after environmental program staff evaluated several years of effort to address the region's pernicious air quality. One of the program's highest priorities has been to help southwestern Pennsylvania recover from a legacy of industrial pollution issues. Clean air, clean water and well-protected ecosystems are essential to future quality-of-life improvements. Our evaluation found that while much had been accomplished, the region continued to have some of the dirtiest air in the country. Moreover, there was widespread civic disbelief and denial that air pollution was a public health problem. A typical attitude was, "Well, you should have seen what it was like 30 years ago!" While Pittsburgh's air has been steadily improving, the Breathe Project has argued that better is not good enough.

Many people associate Pittsburgh with national accolades such as Most Livable City, thanks to numerous magazine rankings. This represents a significant accomplishment, and the region can celebrate many successes. Unfortunately, when viewed through an environmental health lens, Pittsburgh is one of the most unlivable cities in the country.

Central to our concerns is the well-being of families and individuals, especially the most vulnerable. More than 30 peer-reviewed studies in the region have found associations with air quality and adverse birth outcomes, exacerbation of heart and lung disease, and premature death (R.H. White Consultants, LLC 2013). Last year, researchers in Pittsburgh found that children with autism spectrum disorder in the region were more likely to have been exposed to higher levels of certain air toxics during their mothers' pregnancies and the first two years of life compared to children without the condition (University of Pittsburgh 2014).

Pittsburgh's current levels of fine particulate matter air pollution (PM_{2.5}) rank in the dirtiest 13 percent of cities across the nation. In 2013, Pittsburgh experienced what the U.S. Environmental Protection Agency (EPA) considers "not good" air quality upwards of 240 days of the year. Allegheny County is not yet in compliance with federal ambient air quality PM_{2.5} standards while half the counties in the U.S. cleared this hurdle over a decade ago. The county is among

the final 5 percent of counties still trying to comply. Also, the county's air toxics rank in the top two-tenths of 1 percent for cancer risk from industrial sources compared to counties elsewhere in the United States. The city is still heavily industrial in spite of its shedding many steel mills and coking facilities over the past few decades. These metrics underscore the unacceptable reality that air quality in most American cities is far cleaner and healthier than in Pittsburgh.

Air pollution is not unique to contemporary Pittsburgh. In the United States, PM_{2.5} is responsible for 12 percent of ischemic heart disease, 10 percent of stroke, 6 percent of lung cancer and 5 percent of COPD deaths as estimated from the Global Burden of Disease Study (Institute for Health Metrics and Evaluation 2014). Thirty percent of medical costs in the country are estimated to be related to air pollution, according to *The Lancet* (The Lancet 2011). The EPA has recently estimated that more than 100,000 premature mortalities, nearly 200,000 nonfatal acute myocardial infarctions, tens of thousands of hospitalizations and emergency department visits, and hundreds of thousands of cases of acute bronchitis resulted from PM_{2.5} and ozone air quality levels during 2005 in the United States (Fann et al. 2011).

According to the World Health Organization (WHO), air pollution is the world's single largest environmental health risk (World Health Organization 2014). Globally, one in eight deaths results from air pollution exposure, or around 7 million people a year. Outdoor or ambient air pollution kills 3.7 million persons a year. The majority of deaths are from heart disease and strokes.

Why is so much death and disease attributable to one type of contaminant? The answer is because it is nearly ubiquitous in our outdoor and indoor environments. The risks on an individual level are small. But at the population level the magnitude of risk is sizeable because of the high prevalence of population exposure as quantified by comparative risk assessment (Nawrot et al. 2011). In other words, everyone breathes. And where the air is unhealthy, the risks across the entire population magnify. No one can escape it.

Fortunately, solutions to the problem are well-understood and achievable. Studies have demonstrated that EPA's clean air programs, for example, lead to large and measurable public health benefits that exceed implementation costs

by a factor of more than 30-to-1 (United States Environmental Protection Agency 2014). For every dollar spent to reduce air pollution, many more dollars are saved by avoiding thousands of heart attacks, millions of cases of respiratory problems, and millions of lost workdays and lost school days.

Moreover, the scale and burden from this public health threat have not gone unnoticed. Across the country, many public health leaders, as well as civic officials, consider air pollution to be a high-priority challenge. Even those cities where $PM_{2.5}$ is well within the minimum federal standards do not consider their work to be done.

A good example is New York City, whose regulatory officials consider air pollution to be a leading environmental threat to the health of its citizens (New York City Department of Health and Mental Hygiene 2013). Each year, $PM_{2.5}$ pollution causes more than 2,000 deaths and over 6,000 hospitalizations and emergency department visits for respiratory and cardiovascular causes. These estimates reflect a decline of approximately 25 percent in $PM_{2.5}$ -attributable deaths relative to five years earlier due to action taken at the federal, state and local level to reduce harmful emissions.

Through the Breathe Project, The Heinz Endowments challenged our business, civic and community leaders with the question: “What do we need to do to ensure that our air is safe to breathe?” New allies have joined the effort as the fuller dimensions of the city’s air quality challenges are revealed. More people now understand how Pittsburgh’s air affects their own lives and bottom line. Advocates for schools and children, parks and trails, outdoor enthusiasts, green and healthy buildings and homes, workplace sustainability, and neighborhood revitalization and development are taking an active role. So, too, has the health care and medical community become more engaged in understanding and addressing the impacts of air pollution on children and the elderly.

While some forces of status quo remain, the civic conversation has changed. More people are taking steps to reduce their contributions to poor air quality and at the same time are demanding a faster response from regulators to hold large pollution sources accountable. It has become clear to many that if Pittsburgh truly wants to compete with other cities socially, culturally, and economically, then it must move from the ranks of the worst in the nation to the ranks of the best. Until then, Pittsburgh cannot claim the mantle of a truly livable city.

The environment program’s grantmaking has supported a variety of endeavors including scientific research to map hotspots and pollution gradients across much of the county;

epidemiological analysis and exposure assessment; development of low-cost monitoring technologies and data visualization platforms to foster large-scale citizen science campaigns, schools engagement, and community-based participatory research; advocacy to support more adequate regulations and their enforcement; projects to reduce emissions from a variety of sources; and educational and awareness campaigns using the arts, social media, and other forms of communication and storytelling.

Our grantmaking has also supported the fostering and engagement of an Air Quality Collaborative comprising more than 20 groups and entities. This network meets regularly to develop capacity-building skills and techniques; integrate strategic priorities around specific campaigns; and harmonize communications and outreach efforts.

Two recent examples illustrate the variety of work supported by the Breathe Project and ways that this initiative has engaged with the public. In December, the Endowments launched the Breathe Cam. Developed by robotics engineers at Carnegie Mellon University, four camera arrays now provide high-resolution panoramas of Pittsburgh’s skyline and other views in the region. The online tool provides zoomable, live-camera feeds and historical time-lapses to enable views of the horizon from sky-high vantage points. Monitoring data and weather information are embedded into the screens. A first-ever tool was created to detect, count, and graph changes at any point within the panorama over time, such as plume activity from a point source or movement on rail line. Advocacy groups and the local regulators are now deploying additional camera systems that will be used to conduct surveillance of local industrial sources.

In November, digital-media pioneer Andrea Polli installed Particle Falls at a busy downtown location through New Year’s Eve. The project used video projection to illuminate a large façade with a cascading “falls” of blue light overlaid with spots of color that represented $PM_{2.5}$ in the air detected in real-time by a monitor across the street. Pittsburgh was the fourth city to host the public artwork. By projecting the city’s air pollution problem in bright lights on the wall of a major Downtown landmark, the installation helped to make a seemingly invisible problem highly visible. It challenged the city to confront its air quality issues and to engage in conversation about how to work together toward solutions.

In these and other ways, The Heinz Endowments is working with many partners to help blaze new trails into the minds and attitudes of Pittsburghers. During this journey, we hope to improve the well-being of communities and make way for sustainable environmental development in the Pittsburgh region.

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