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AIR POLLUTION IS A PUBLIC HEALTH CRISIS THAT CONTRIBUTES TO HEALTH DISPARITIES

BY LISA HAYWARD WATTS

Air pollution is a major threat to public health worldwide, linked to almost seven million deaths per year, according to the World Health Organization. In Washington State, community members in vulnerable populations considered to be “overburdened” by air pollution live an average of 2.4 years less than people across the rest of Washington, according to a recent report by the Washington Department of Ecology.

Most of the overburdened communities identified by the Department of Ecology are found along major transportation corridors, near industry, and in agricultural areas—locations where economic activities occur that benefit many, but also unduly burden the relatively few who live in their proximity. Moreover, in many cases, these few are more likely to live in poverty, be foreign-born, have no health insurance, and be sicker.

Below are summaries of some recent papers by our members that highlight the health effects of air pollution, associated disparities, and interventions that may promote environmental justice.

BOTH URBAN AND RURAL POPULATIONS SUFFER FROM AIR POLLUTION

Some consider air pollution to be a problem mostly in cities. While exhaust from motorized vehicles and industry tends to be more concentrated in urban areas, rural communities experience air pollution from other sources, including tilling, harvesting, and field burning. Recent work done by our member Catherine Karr and colleagues in Washington’s Yakima Valley found levels of small airborne particles known as PM2.5 equivalent to those found in downtown Seattle. Additionally, the Yakima Valley had more days with high levels of PM2.5. Children in the Yakima Valley show patterns of association between air pollution and asthma similar to those seen in cities, suggesting that the health impacts of air pollution may be similar, even if the sources of pollution vary¹.

EVEN SHORT-TERM EXPOSURE TO AIR POLLUTION HAS HEALTH IMPACTS

Many studies have shown short-term and long-term harm from air pollution including lung and heart disease, cancer, and asthma. Recent work by our Director Joel Kaufman has also shown that exposure to air pollution from a two-hour ride in Seattle’s rush hour can increase blood pressure for at least 24 hours¹. This supports other evidence suggesting that traffic-related air pollution may contribute to hypertension, and has important implications for the long-term health of people living,

ADDRESS

Roosevelt One Building
4225 Roosevelt Way NE, Suite 100
Seattle, WA 98105-7234

CONTACT

(206) 685-5333
edgectr@uw.edu
deohs.washington.edu

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working, or attending school near major roadways—people who are disproportionately black, brown, Hispanic, and/or lower income ².

Kaufman and his colleagues found that using an air filter and a HEPA air cleaner in the car at the time of the drive reduced levels of air particles by 86%-- enough to counteract the effects of the traffic exposure on blood pressure.

USING AIR PURIFIERS IN SCHOOLS CAN PARTIALLY COMBAT DISPARITIES

One highly effective way to reduce health disparities associated with air pollution is to regulate polluters through policy and enforcement. Air quality improved dramatically after the ban on leaded gas. Another approach that also addresses pollution from wildfires and other processes that are hard to regulate is to use interventions such as air cleaners in indoor spaces. Our members Elena Austin and Edmund Seto have shown that using portable air cleaners with high efficiency particulate air (HEPA) filters reduced the concentration of ultrafine particles to between one half and one tenth of outdoor concentrations ⁴. Ultrafine particles are produced through combustion from road and air traffic and, as a result, occur in high concentrations near major traffic routes such as are found in South Seattle.

Previous research suggests that improving indoor air quality can significantly improve asthma outcomes and even academic performance in children. More work needs to be done to establish whether the HEPA air cleaner intervention would have such an effect, but if it does, it may be an important way to help reduce health disparities for communities that are overburdened by air pollution.

- [1] [Loftus C, Yost M, Sampson P, Arias G, Torres E, Vasquez VB, et al. Regional PM2.5 and asthma morbidity in an agricultural community: a panel study. *Environ Res.* 2015;136:505-512. doi:10.1016/j.envres.2014.10.030](#)
- [2] [Young MT, Jansen K, Cosselman KE, Gould TR, Stewart JA, Larson T, et al. Blood Pressure Effect of Traffic-Related Air Pollution : A Crossover Trial of In-Vehicle Filtration. *Ann Intern Med.* 2023;176\(12\):1586-1594. doi:10.7326/M23-1309](#)
- [3] [Antonczak B, Thompson TM, DePaola MW, Rowangould G. 2020 Near-roadway population census, traffic exposure and equity in the United States. *Transp Res Part D: Trans Environ.* 2023;125:103965. doi:10.1016/j.trd.2023.103965](#)
- [4] [Carmona N, Seto E, Gould TR, Rasyid E, Shirai JH, Cummings BJ, et al. Indoor Air Quality Intervention in Schools: Effectiveness of a Portable HEPA Filter Deployment in Five Schools Impacted by Roadway and Aircraft Pollution Sources. *Atmosphere* . 2022;13\(10\):1623. doi:10.3390/atmos13101623](#)

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