

Stanford study finds poor air quality responsible for one in five infant deaths in sub-Saharan Africa



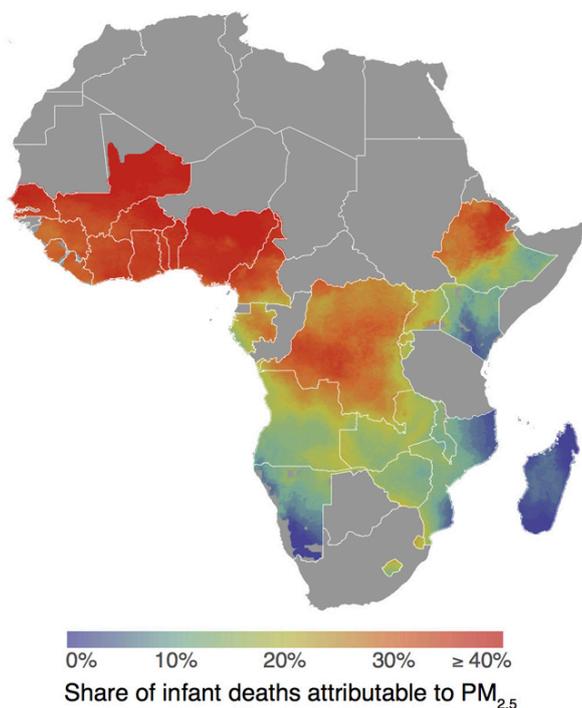
Satellite measurements of air quality across sub-Saharan Africa revealed small improvements in air quality could be one of the most effective interventions to curb infant mortality rates.

By Michelle Horton | Stanford News

In 2015, exposure to particulate matter in sub-Saharan Africa led to 400,000 otherwise preventable infant deaths, according to a new Stanford study. The research, published this week in [Nature](#), finds that even modest improvements in air quality could lead to substantial reductions in infant mortality in developing countries.

“Many wealthy countries have recently used legislation to clean up their air,” said [Marshall Burke](#), study co-author and assistant professor of Earth system science in the [School of Earth, Energy & Environmental Sciences](#) at Stanford.

“We find that if countries in Africa could achieve reductions in particulate matter exposure similar to wealthy countries, the benefits to infant health could be larger than nearly all currently used health interventions, such as vaccinations or food and water supplements.”



Stanford scientists calculate the amount of infant deaths due to high particulate matter concentrations in 31 sub-Saharan African countries.

(Image credit: Marshall Burke)

Led by Sam Heft-Neal, a research scholar at Stanford’s [Center on Food Security and the Environment](#), the research team combined 15 years of survey data on nearly 1 million births across sub-Saharan Africa with satellite-based measurements of particulate matter, an important contributor to poor air quality. The mixture of microscopic particles in the air can cause serious health effects when inhaled.

“We know that breathing dirty air is bad for your health,” said Heft-Neal. “But in developing countries in particular, we don’t yet know how big a threat poor air quality is relative to other common health risks like poor nutrition and infectious disease.”

Understanding the impact of poor air quality in developing countries has traditionally been difficult, as most do not have on-the-ground pollution monitors or vital registration data recording birth outcomes. To overcome these constraints, the research team compiled data from 65 household surveys across 30 sub-Saharan African countries spanning from 2001 to 2015. Using new satellite-based measures of ambient particulate matter, they then compared the particulate matter each infant was exposed to while in utero and after birth. From this, they could relate exposure to particulate matter with health outcomes.

“The results were sobering,” said Burke. “We find that mortality rates are substantially higher for infants exposed to higher levels of particulate matter.”

The researchers found that high particulate matter concentrations were responsible for 22 percent of infant deaths from 2001 to 2015. They also found that this number has not decreased over the past 15 years and remains unchanged even in wealthier households.

The group’s estimate of the effect of particulate matter exposure on mortality is about three times larger than existing estimates, suggesting poor air quality is an even bigger problem than currently believed. The main explanation for these larger estimates, according to the study’s authors, is that exposure to particulate matter can lead to a range of negative health effects, including lower birth weight and impaired growth in the first year of life, beyond those typically considered in health analyses.

One of the study’s most important implications is that relatively small decreases in particulate matter concentrations could result in major reductions in mortality.

The researchers conclude that finding cost-effective ways to reduce particulate matter exposure should be a research and policy priority. “We now have a better sense of the immense benefits of air quality improvements for infant health,” said Heft-Neal. “Next we need to establish how these improvements can be achieved.”

Additional co-authors include [Jennifer Burney](#), a fellow at the Center on Food Security and the Environment and an associate professor at the University of California, San Diego, [School of Global Policy and Strategy](#), and [Eran Bendavid](#), an associate professor of medicine at Stanford, member of the [Child Health Research Institute](#) and an affiliate of the [Stanford Woods Institute for the Environment](#). Burke is also a fellow at the Center on Food Security and the Environment, the Stanford Woods Institute and the [Freeman Spogli Institute for International Studies](#), and the [Stanford Institute for Economic Policy Research](#). The research was supported by the Stanford Environmental Venture Projects program and the [National Science Foundation](#).

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Media

Video by Stanford Center on Food Security and the Environment

A new Stanford study shows that improving air quality in sub-Saharan Africa could provide benefits to infant health larger than nearly all currently used health interventions, such as vaccinations or food and water supplements.

“Pollution responsible for one-fifth of infant deaths in sub-Saharan Africa” featured in [Nature International Journal of Science \(podcast\)](#)