

# More than 15 million children in high-mortality hotspots in sub-Saharan Africa

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Stanford University researchers have determined that more than 15 million children are living in high-mortality hotspots across 28 sub-Saharan African countries, where death rates remain stubbornly high despite progress elsewhere within those countries.

The study, which will be published online Oct. 25 in *The Lancet Global Health*, is the first to record and analyze local-level [mortality](#) variations across a large swath of sub-Saharan Africa.

These hotspots may remain hidden even as many countries are on track to achieve one of the U.N. Sustainable Development Goals: reducing the mortality rate of children under the age of 5 to 25 per 1,000 by 2030. National averages are typically used for tracking [child mortality](#) trends, allowing left-behind regions within countries to remain out of sight—until now.

The senior author of the study is Eran Bendavid, MD, MS, an assistant professor of medicine and a core faculty member at Stanford Health Policy. The lead author is Marshall Burke, PhD, an assistant professor of Earth system science and a fellow at the Freeman Spogli Institute's Center on Food Security and the Environment.

## Decline in under-5 mortality rate

The authors note that the ongoing decline in under-5 mortality worldwide ranks among the most significant public and population health successes of the past 30 years. Deaths of children in that age group have fallen from nearly 13 million a year in 1990 to fewer than 6 million a year in 2015, even as the world's under-5 population grew by nearly 100 million children, according to the Institute for Health Metrics and Evaluation.

"However, the amount of variability underlying this broad global progress is substantial," the authors wrote.

"Mortality numbers are typically tracked at the national level, with the assumption that national differences between countries, such as government spending on health, are what determine progress against mortality," Bendavid said. "The goal of our work was to understand whether national-level mortality statistics were hiding important variation at the more local level, and then to use this information to shed light on broader mortality trends."

The authors used data from 82 U.S. Agency for International Development surveys in 28 sub-Saharan African countries, including information on the location and timing of 3.24 million births and 393,685 deaths of children under age 5, to develop high-resolution spatial maps of under-5 mortality from the 1980s through the 2000s.

Using this database, the authors found that local-level factors, such as climate and malaria exposure, were predictive of overall patterns, while national-level factors were relatively poor predictors of child mortality.

## Temperature, malaria exposure, civil conflict

"We didn't see jumps in mortality at country borders, which is what you'd expect if national differences really determined mortality," said co-author Sam Heft-Neal, PhD, a postdoctoral scholar in Earth system science. "But we saw a strong relationship between local-level factors and mortality."

For example, he said, one standard deviation increase in temperature above the local average was related to a 16 percent higher child mortality rate. Local malaria exposure and recent civil conflict were also predictive of mortality.

The authors found that 23 percent of the children in their study countries live in mortality hotspots—places where mortality rates are not

declining fast enough to meet the targets of the U.N. Sustainable Development Goals. The majority of these live in just two countries: Nigeria and the Democratic Republic of Congo. In only three countries do fewer than 5 percent of children live in hotspots: Benin, Namibia and Tanzania.

As part of the research, the authors have established a high-resolution mortality database with local-level mortality data spanning the last three decades to provide "new opportunities for a deeper understanding of the role that environmental, economic or political conditions play in shaping mortality outcomes." The database, available at <http://fsedata.stanford.edu>, is an open-source tool for health and environmental researchers, child-health experts and policymakers.

"Our hope is that the creation of a high-resolution mortality database will provide other researchers new opportunities for deeper understanding of the role that environmental, economic or political conditions play in shaping mortality outcomes," said Bendavid. "These data could also improve the targeting of aid to areas where it is most needed."

Provided by Stanford University Medical Center

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