Tackling inequality could save millions of children

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An unprecedented study mapping child deaths over almost two decades finds that nearly half of the 5.4 million under-five deaths in 2017 can be attributed to differences in child death rates within and across countries.

The study is the first of its kind, mapping child deaths in 99 low- and

middle-income countries at the level of individual districts. Published today in the journal *Nature*, the findings include precision maps illuminating health disparities within countries and regions often obscured by national-level analyses. An interactive visualization accompanying the research compares child death rates from year to year.

The research, conducted by the Institute for Health Metrics and Evaluation (IHME) at the University of Washington's School of Medicine, looks at countries where more than 90 percent of child deaths occurred in 2017. Mortality rates varied as much as 10-fold between districts within a country. Across all countries studied, the likelihood of a child dying before age 5 varied more than 40-fold at the district level.

"It is as reprehensible as it is tragic that, on average, nearly 15,000 children under age 5 die every day," said Dr. Simon I. Hay, the senior author on the study and Director of the Local Burden of Disease (LBD) group at IHME. "Why are some areas doing so well, while others struggle? In order to make progress, we need to enable precise targeting of interventions, such as vaccines. Our findings provide a platform for nations' health ministers, clinicians, and others to make focused improvements in health systems."

Globally, approximately 5.4 million children died before their fifth birthdays in 2017, as compared to 9.7 million in 2000. Researchers estimated that if every district in the low- and middle-income countries studied had met the Sustainable Development Goal (SDG) target of at least as low as 25 child deaths per 1,000 live births, 2.6 million fewer children would have died. If every district within a country rose to the level of the best-performing district in that country, the estimated number of deaths averted rises to 2.7 million.

The vast majority of the 17,554 districts among the 99 nations studied saw improvement in lowering child deaths, but levels of inequality

between districts were more variable over the study period. Despite major gains in reducing child deaths over the past 20 years, the highest rates of death in 2017 were still largely concentrated where rates were highest in 2000.

The study, funded by the Bill & Melinda Gates Foundation, reveals areas of success where strategies could be replicated across and within countries, according to Dr. Hay.

For example, in Rwanda, the highest district-level rate of child deaths in 2017 was less than half that of the lowest district-level death rate in 2000—gains partially attributed to investments in children's health in the poorest communities, expansion of health insurance, and increasing numbers of community health workers. Nepal significantly decreased inequalities among its districts over the study period. And Peru made major strides in reducing child mortality and inequality after implementing sustained, cross-cutting antipoverty and health programs.

The study estimates both rates and absolute numbers of deaths by district, presenting a complete picture of global child mortality that illuminates important trends and patterns.

A growing proportion of child deaths are occurring in areas with low overall death rates. Neonatal mortality (death occurring in a child's first 28 days) and infant mortality (death in the first year of life) are both increasing as a percentage of total child deaths. These trends highlight the need for tailored approaches. Premature birth was the biggest cause of deaths before age one year in 2017, while older children were more likely to die from lower respiratory infections, diarrhea, and other communicable diseases.

Hay and his research team are working toward more detailed mapping of factors that influence child survival, including education, malnutrition,

and disease prevention, in order to better understand the specific obstacles faced in different regions.

Among the key findings:

- In 2017, nearly a third of the 17,554 districts in the 99 countries studied had already met the SDG target of at least as low as 25 child deaths per 1,000 live births.
- In 43 countries studied, the district with the worst child mortality rate in 2017 was still better than the district with the best child mortality rate in 2000.
- The highest estimated child death rate in 2000 at the local level was just over 300 deaths per 1,000 births. In 2017, the highest rate was 195 deaths per 1,000 births. Both were in Nigeria.
- At the national level, Colombia, Guatemala, Libya, Panama, Peru, and Vietnam all had achieved the SDG target of at least as low as 25 child deaths per 1,000 live births in 2017, but had districts, municipalities or provinces that did not achieve the goal.
- The proportion of deaths in a child's first 28 days of life increased in 91 percent of countries studied and 83 percent of districts in those countries over the study period.
- A growing proportion of child deaths are occurring in "low"-mortality areas. In 2000, only 1.2 percent of deaths occurred in study areas achieving the SDG target. By 2017, this percentage had grown over six-fold, to 7.3 percent.
- In 2000, approximately 25 percent of child deaths occurred in study areas where mortality rates were less than 80 child deaths per 1,000 live births. In 2017, almost 70 percent of child deaths occurred in areas below the 80 per 1,000 mark.

More information: Mapping 123 million neonatal, infant and child deaths between 2000 and 2017, *Nature* (2019). DOI:

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