Open defecation is associated with child height.

Height is an important measure of early life health and human capital. Although each person has his or her own genetic potential height, the health and net nutrition that a child experiences in utero and during her first two years of life shape whether she can grow to her genetic potential. Height is important because it is not the only aspect of a child developing in early life: children who get the good health and net nutrition required to grow to their height potentials are also more likely to grow to their potentials in other dimensions, including cognitive achievement.

Differences in open defecation can statistically account for more than half of the variation in average child height across developing countries.

Data source: computations from Demographic and Health Surveys. Each circle plots the averages of an entire DHS survey round. Circle area is proportional to country population size.
Open defecation interacts with population density: sanitation-health gradients are steeper where people live closer to, and are more exposed to, others’ fecal germs.

This graph uses the same data as the graph on the previous page, but the horizontal axis is now the *density* of open defecation. The three large circles on the bottom right are the three Demographic and Health Surveys in India. So, it is no surprise that children in India are so short: they are exposed to a double threat of high population density and high open defecation.

Sanitation is also more steeply associated with infant mortality where population density is greater. The graph below combines all available DHS surveys worldwide with census population density data to show that sanitation matters especially much where population density is high:
Exposure to open defecation in early life is associated with lower cognitive achievement in childhood.

This is consistent with evidence that the first few years of life are a critical period for cognitive development, and that disease in early life diverts nutritional resources from cognitive development. Using data from the India Human Development Survey, the graph below shows that children at all levels of rich or poor are more likely to be able to read in childhood if they were exposed to better local area sanitation in infancy:

Children exposed to more latrines constructed by India’s Total Sanitation Campaign in their first year of life were more likely to be able to recognize letters and numbers when they are six years old:
Men in India exposed to a better disease environment in their first year of life earn higher hourly wages as adults.

The graphs below match wages in the India Human Development Survey to infant mortality rates and sanitation coverage in their first year of life. Unsurprisingly – given that an improved early-life disease environment improves physical and cognitive achievement – adults exposed to a healthier early-life district environment earn more money.

(a) effect of IMR, no controls    (b) effect of sanitation, no controls

(c) effect of IMR, with controls  (d) effect of sanitation, with controls

For further reading

Each of the graphs in this handout is taken from a larger research paper which supports the result with detailed econometric analysis. For more information, or to read more about these findings, please see research papers online at www.riceinstitute.org.