



Potential for Life Course Health Benefits From Improved Household Environments

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Lack of access to safe water, sanitation, and handwashing facilities has important consequences for human health and sustainable development (Sustainable Development Goal 6, as set by the United Nations).¹ Children are particularly affected by poor water, sanitation, and hygiene (WaSH), which are responsible for a large proportion of diarrheal-associated deaths among children and have a major effect on disability-adjusted life-years.¹ Inadequate WaSH has negative consequences for children's linear growth because of recurrent diarrheal episodes and undernutrition. The resulting stunting in children can have lifelong effects, including increased risk of morbidity and mortality and impaired educational and economic performance in later life. In this context, the study by Chakrabarti et al² brings new evidence from India regarding the detrimental association of poor sanitation with linear growth, with the novelty of not only evaluating children younger than 5 years, for whom there is the most evidence, but also considering children aged up to 18 years. Although limited by the cross-sectional design and the potential for residual confounding by poverty and closely related environmental exposures (eg, household air pollution, measured by an error-prone indicator of cooking fuel type), the authors showed the potential of using population-based survey data (ie, India's District Level Household and Facilities Survey) to shed new light on the topic. Open defecation at the village level and lack of household access to boiled or filtered drinking water were inversely associated with height-for-age z scores among both sexes in most age groups, including those older than 5 years of age. The magnitude of the association for open defecation was larger in urban than in rural areas, for boys during early and middle childhood than during later childhood, and for girls during middle to late childhood than during early childhood.

Future studies based on longitudinal data starting in early life are needed to disentangle whether the associations of poor sanitation with growth in later childhood are owing to early-life exposure (ie, consistent with the developmental origins of health and disease concept) or more recent exposure to poor sanitation. Analogies with other environmental exposures, such as household and ambient air pollution (which are emerging as risk factors for child stunting), highlight the potential relevance of exposure at multiple points during the life course.³ The most relevant window of exposure has obvious implications for targeting interventions to maximize health and human capital for populations in low- and middle-income countries. The evaluation of ongoing large-scale programs, such as India's national sanitation program, Swachh Bharat Mission,² will hopefully provide additional evidence from natural experiments regarding the critical exposure windows for improved sanitation on child growth from real-world settings.

Despite recent progress, poor sanitation remains a persistent challenge worldwide and in India. In 2017, it was estimated that 786 million people worldwide had no access to safe drinking water; 2 billion had no access to basic sanitation services; 3 billion still lacked basic handwashing facilities at home; and 673 million still practiced open defecation.⁴ Although India has achieved a large reduction in open defecation (a decrease of 47% from 2000 to 2017),⁴ poor sanitation remains a major challenge, with 1 in 4 people practicing open defecation.² Similarly, important barriers to access to boiled or filtered drinking water remain in India, as indicated by the data presented by Chakrabarti et al.² Approximately 70% of the households surveyed had no access to boiled or filtered drinking water.

As discussed by Chakrabarti et al,² evidence from India and other low- and middle-income countries challenges the hypothesis that economic development alone will deliver reductions in child

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growth disorders. What additional levers for progress are available? Complex, integrated interventions have sought to answer this. Three large, well-designed randomized clinical trials in rural areas of 3 low-income countries recently evaluated complex interventions tackling inadequate WaSH, with components in water, sanitation, and hygiene, combined or not with nutritional components. However, the effects were null on childhood linear growth and mixed for diarrhea, as reported in a recent expert consensus report analyzing the results of the 3 trials.⁵ While the benefits of each WaSH intervention component were not challenged by the trial results,⁵ questions remain regarding the best way to deliver interventions to the community and how to maximize synergistic benefits. While broad-scale economic development may not be sufficient to eliminate stunting, more targeted economic support programs, such as conditional cash transfers, may hold promise.⁶

As highlighted by the fact that Chakrabarti and colleagues² found stronger associations between open defecation and growth in urban vs rural areas, poor sanitation is essentially an ecological, community-level exposure, although interventions are often implemented at the household level. The need for more ambitious and integrated community-based interventions that consider multiple environmental exposures (eg, household air pollution, WaSH) alongside nutrition and improved access to health care has been previously articulated.⁷ Interventions should also aim to tackle within-community inequity and vulnerability and to increase community empowerment and individual autonomy.

ARTICLE INFORMATION

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