

Is targeting access to sanitation enough?



Exposure to faecal pathogens including rotavirus, pathogenic strains of *Escherichia coli*, *Vibrio cholerae*, *Shigella* spp, *Salmonella enterica* serotype Typhi, hepatitis E virus, and soil-transmitted helminths can precipitate serious human illness. However, systematic reviews of efforts to reduce exposure to human faeces through improvement of sanitation have shown that the evidence of a health benefit is based on weak study designs that restrict scientific inference and do not provide conclusive evidence that approaches being implemented to improve sanitation in low-income communities actually improve health.^{1,2}

Many advocates assert that improved sanitation is a basic human right. The main justification for this assertion is that sanitation is essential for achievement of health and promotion of human dignity.^{3,4} If the justification for investment in sanitation is a right based on privacy and human dignity, then the weakness of the scientific evidence for health benefits of sanitation programmes is less important. However, a justification based solely on dignity provides little guidance about how to optimise interventions to improve health. With the present state of scientific knowledge, it is unclear whether or not changing a longstanding, culturally acceptable community practice of open defecation in an area some distance from human settlement towards concentrated defecation in a makeshift pit latrine located much closer to the households' food preparation area actually improves the health of household members. Similarly, whether or not marginal investment to improve latrine quality through the addition of a cement slab improves health is also unclear.

This absence of sound data for the health effect of sanitation results in a paucity of evidence to guide decisions about whether to invest scarce funds in the improvement of sanitation. Might communities be healthier if the funds were instead invested in water infrastructure, handwashing promotion, rotavirus vaccine, nutritional supplementation, or improvement of clinical management of diarrhoea with oral rehydration and zinc treatment?

We do not have strong evidence about the relation between sanitation and health because such data are difficult and expensive to generate. Environments highly exposed to faecal pathogens are remarkably diverse.

Different latrine technologies are appropriate with different water-table depths and different population densities. Communities vary in their preference for and acceptance of different latrine designs. The relative importance of sanitation in the interruption of pathogen transmission almost certainly varies by community. In some communities, water contaminated from a distant source; food contaminated in agricultural fields, in markets, or during commercial preparation; or hands contaminated through cleaning up of children who defecated, handling of animal manure, or contact with contaminated food are likely prominent pathways of enteric pathogen transmission that would not be immediately interrupted by improvements in household sanitary infrastructure. Even within a specific setting, latrines are not standardised, factory-manufactured products, but instead are small construction projects built by local artisans who use various approaches, designs, and materials.

Few rigorous assessments of sanitation interventions have been funded. Programme implementers might fear that rigorous assessments will suggest to their donors that they've accomplished less than they had hoped. In *The Lancet Global Health*, Thomas Clasen and colleagues⁵ describe a carefully conducted cluster-randomised controlled trial, providing precisely the type of rigorous evidence that has been so scarce. The investigators randomly assigned 50 villages in Odisha, India, to undergo a latrine promotion and construction intervention, and 50 to receive no intervention. The intervention increased mean village-level latrine coverage from 9% to 63% (compared with an increase in control villages from 8% to 12%), but did not reduce the prevalence of diarrhoea soil-transmitted helminth infection, or stunting in children younger than 5 years.

Why the intervention did not lead to improvements in these health outcomes is unclear, although implementers seemingly directed more attention to latrine construction than to changing defecation habits.⁶ This rigorous assessment is important, because it provides the best evidence so far for the uncomfortable conclusion that well-funded, professionally delivered sanitation programmes, even when they reach coverage levels that are quite commendable for large scale interventions, do not necessarily improve health.

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The only other randomised controlled trial⁷ of sanitation reported so far also showed no effect on health, although uptake was lower than in Clasen and colleagues' study.⁵ With low uptake, whether the absence of a health benefit results from a technically ineffective intervention or from a technically effective intervention with poor uptake is unclear. If better health outcomes are identified among people who take up an intervention,⁸ this effect might be because people who were already healthier are more likely to take up improved sanitation. Development and assessment of interventions that not only improve coverage, but also substantially change defecation behaviour and reduce environmental contamination should be an immediate research priority. Such investigations will allow us to clarify whether the most effective pathway to improved community health is through further technical improvement or through interventions to improve adoption of existing technology.

If the implementers of sanitation programmes use public money with an aim of improving health, stewards of public funds have a responsibility to assess the effectiveness of these interventions. Interventions to improve sanitation are complex to implement and difficult to assess. Nevertheless, following Clasen and colleagues' lead,⁵ careful investigation of these important interventions by independent researchers with publication of these results in the peer-reviewed

scientific literature can contribute to the development of sanitation interventions that not only provide privacy and dignity, but also improve the health of communities.

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I have no competing interests.

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