

Copenhagen Consensus: The best ideas for improving access to sanitation.

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Developing the Smartphone of Toilets

More than 2.5 billion lack basic sanitation. We can fix that.



A slum in Delhi, India, with open sewers. More than 2.5 billion people lack basic sanitation.

Giagnori
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Images.

In this series, Bjorn Lomborg explores the smartest investments to respond to global challenges—and readers get to have their say. See the earlier articles here. And find out which investments are currently at the top of Slate readers' priority list here. Have your

say by voting in the poll at the end of each article.

The story of water and sanitation is one of success and failure. The world has met the Millennium Development Goal on the provision of clean drinking water five years early, but is set to miss its goal on basic sanitation by almost 1 billion people. An astonishing one-third of the world population, 2.5 billion people, lacks access to basic sanitation. More than 1 billion people must defecate out in the open rather than using the toilets that we take for granted in the developed world.

Inadequate sanitation is much more than an inconvenience. It costs lives. It caused a cholera outbreak in Haiti in late 2010 that has now made 500,000 people sick and killed 7,000. Smaller cholera outbreaks are still commonplace during the rainy season in Bangladesh and the low-lying parts of many African cities. Diarrheal diseases are still a leading cause of death for children under 5, second only to respiratory infections. The World Bank concludes that the economic impact of poor sanitation can be as high as 7 percent of GDP for some Asian countries and close to 1 to 2 percent of GDP for African countries.

Copenhagen Consensus 2012 asked Frank Rijsberman and Alix Peterson Zwane from the Gates Foundation to establish the best ways to reduce the size of this challenge. Their research paper is out today.

They found that development agencies overemphasize safe-water projects and underinvest in sanitation. Rijsberman and Zwane look at what it would cost to improve sanitation services for both the unserved population in developing countries (those 1 billion or so who must defecate in the open), and what it would cost to improve the quality of service for those people in urban areas who are nominally “served” but are confronted with the challenges of emptying and safely disposing of latrine or septic tank contents.

An estimated 200 million latrines and septic tanks are emptied manually, by a worker descending into the pit with a bucket and spade, and subsequently dumped or buried in the immediate environment, often reintroducing pathogens previously contained in the pit or tank.

They propose three solutions as potentially worthy of large-scale investment.

The first of these is Community Led Total Sanitation, the name given to various forms of an approach that emphasizes behavior change, particularly making it the community's responsibility to share in the creation of communities that are free from open defecation, particularly in rural areas. Rijsberman and Zwane base their calculations on a large-scale behavior-change program, reaching 23 million with a one-off delivery cost of \$3 to \$5 per person affected.

Given the rapid adoption of community-led total-sanitation programs aiding tens of millions of people over the last 10 years and the relatively high rate of success in achieving "open-defecation free" communities, they consider this to be a comparatively low-risk intervention.

Their analysis implies that about 50 percent of people in rural areas—about 600 million people—who lack access to basic sanitation could be reached with a total investment of \$3 billion, providing welfare benefits that are four to seven times higher.

The second intervention they explore is Sanitation as a Business. For the existing 2 billion latrines and septic tanks in developing countries, a critical bottleneck—one that affects the urban poor particularly—is that there are no affordable and sustainable services to effectively and efficiently empty them and process the fecal sludge safely and economically.

Typically, the sludge is just deposited on the ground, negating almost all of the health benefits of sanitation. The solution is to generate innovation in sanitation services, reducing the cost of this service from between \$35 and \$91 per household to just \$10 per household per year. That cost pays for emptying the latrine or septic tank, transporting the fecal sludge to a treatment plant, and treating it to acceptable levels before reuse or dispersal into the environment. While speculative, the authors provide illustrative calculations that suggest that an investment in innovation to develop these technologies, including an initial subsidized rollout, would provide benefits to about 40 million people at a cost of \$320 million and overall benefits worth between 27 and 46 times higher than the costs.

Third, Rijsberman and Zwane propose The Reinvented Toilet—one of the signature ideas of the Bill & Melinda Gates Foundation: efforts to stimulate technical innovation, particularly harnessing advances in physics, chemistry, and engineering, to create a radically reinvented toilet that recycles human waste into reusable products at the household scale.

Early in 2011, the Bill & Melinda Gates Foundation challenged more than 20 top universities to use modern science and engineering to come up with a significantly different form of processing and recycling human waste that does not depend on the sewer networks and large volumes of water for transportation. The challenge was to develop a system that is off the grid, affordable for the poorest members in society (meaning that it costs less than a nickel a day), and an aspirational product—something that everyone will want to use and that over time replaces the flush toilet as the new gold standard.

The foundation has awarded eight Reinvent the Toilet Challenge grants and funded another 57 small grants in 2011 that aim to innovate all or part of the non-sewered value chain. All complete reinvented toilets are currently at the laboratory/proof-of-concept to prototype stage and therefore investments in the development of this solution are high risk. The foundation expects to review the first series of prototypes and proof-of-concept results for parts and processes in August 2012.

Assuming that this investment would lead to 100 percent coverage for all latrines currently emptied manually, this \$125 million investment would pay back \$40 for each invested dollar, serving 1 billion people. In addition, if successful, the Reinvented Toilet would serve many more of the other 3.5 billion people who currently don't have access to a flush toilet. Presuming a reinvented toilet can be successfully developed, and can become an aspirational product—the smartphone of sanitation—the issues of high cost, slow adoption, and limited benefits that variously plague the current generation of sanitation technologies will be overcome.

Rijsberman and Zwane's proposals are novel. But if we are to make the same gains in sanitation delivery as we have

in water (and in other areas of developmental spending), then we need to get creative as well as make this area a higher priority.

What priority do you think these initiatives should be given by policymakers and philanthropists? How could limited money best be spent to combat global challenges? Have your say by voting below.

Tomorrow, we turn to a topic that Slate readers have discussed a lot in the comments so far: population, and specifically the concept of overpopulation.

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