

The Global Water and Sanitation Scandal: A Challenge for Lasallian Universities

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It is my great privilege to be in front of a group of Lasallian educators to talk about the challenge of global of water and sanitation. Some of you are already working on this challenge, conducting research and working closely with students understand the issues and build the skills necessary to contribute to this important area. Others of you may not be familiar with area. I hope you will find that the lack of safe drinking water and sanitation among low-income populations represents a continuing scandal that is incompatible with our basic Lasallian values, and that you are perhaps in a unique position to address this problem.

Let me tell you a little bit about how I got here. Saint Mary's University of Minnesota – SMC when I graduated in 1978 – was a major influence on me. I studied classics and philosophy and came under the influence of passionate and committed teachers. There I also met Mary Pat, my wife of 35 years; we were actually married on campus at Saint. Thomas More Chapel. After spending my junior year in Athens, I followed the "Hippie Trail" through Turkey, went down through the Middle East, over to Iran, Afghanistan, and Pakistan, and finally ended up in India. The poverty that I saw was unforgettable. But so was the injustice. I came back, finished my degree at Saint Mary's, and went on to law school at Georgetown University. I then took a position with a large law firm and did international business transactions, mainly in Latin America.

Along the way, I invested in a company that made portable water treatment products – filters for backpackers and international travelers. While we sold a lot of these products through companies like REI, I thought this technology might have some application in low-income settings. I decided to leave my law practice, sold that company, and went off to the London School of Hygiene and Tropical Medicine where I did a master's degree in Control of Infectious Diseases and then a Ph.D. in Epidemiology. I have been teaching there since 2004.

Epidemiologists tend to focus on diseases. I focus on diarrhea – not a disease so much as a complex of symptoms characterized by poor adsorption of the intestinal wall normally due to infection. Diarrhea is not something that gets a lot of attention, partly because it is so common. However, it is a major killer, especially among young children, causing more than 1.4 million deaths annually; it is the second leading killer of children under five years of age.²

Safe water and sanitation are the primary ways to prevent diarrheal diseases. In much of Africa and South Asia, however, these very basic interventions are often lacking. At least 1.7 billion people rely on unimproved water supplies or so-called improved sources that are nevertheless unsafe for drinking. The rural poor bear much of this burden.

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One challenge is that the water these populations have access to is often unsafe even at the point of collection – usually remote sources where the water is collected and carried home, usually by women and children. The other problem is that it becomes further contaminated after collection, when almost all householders store their water in home systems that are contaminated due to poor design and poor hygiene. I first learned this working as a master's student with Oxfam in Sierra Leone, precisely where the Ebola outbreak is now centered. Oxfam's new wells were delivering safe drinking water, but by the time it was actually used in the home the water was highly contaminated with fecal pathogens.³

My experience with portable filtration products led to my early research in this area. It focused on testing interventions that could address both problems of unsafe sources and recontamination at the household level by providing low-income populations with simple water filters for treating and safely storing their water at home. In one study in Bolivia, we used a ceramic filter coated with colloidal silver. In a six-month randomized, controlled trial to assess the impact of the intervention on health, the filter achieved a 54% reduction in the longitudinal prevalence of diarrhea among all householders, and a 72% reduction among children under age five.⁴

While this looked promising, we were eager to try household-based water treatment in other settings, and ran additional studies in Colombia, Guatemala, the Dominican Republic, Zambia, Ethiopia, India, Bangladesh, and Vietnam. In one trial in Congo DRC, we used a more sophisticated filter that was also capable in eliminating viruses – a major challenge for gravity filters that must operate without water pressure or electricity. However, there was little impact, probably because the filter did not incorporate safe storage and because people were continuing to drink untreated water.⁵ In another trial in Zambia, we tested the filter and a safe storage vessel among a population of HIV+ mothers who were seeking ways of treating water for making supplemental foods for their children under two years of age. This is an especially vulnerable population since the virus can pass in breast milk, but foods made with unsafe water can also be a major threat. The filter could provide safe water for making these supplemental foods. In this year-long study, the intervention was associated with a 53% reduction in diarrhea among children under age two, and 54% among householders overall.⁶

Household water treatment is a simple intervention that can be very effective in preventing waterborne disease. In a systematic review of all 42 trials of water quality interventions, the pooled estimated effect from all these studies is a 40% reduction in the risk of diarrhea.⁷ The World Health Organization (WHO) was persuaded by the evidence in 2008 and endorsed the intervention, encouraging household water treatment for those that did not have access to reliable, piped-in water supplies.⁸ UNICEF also endorsed the intervention, and household water treatment became part of their seven point plan to address diarrheal disease.⁹ Household water treatment was also promoted in the context of home-based care for people living with HIV.¹⁰

This is an area in which we can feel confident that research has made an important contribution. It is also a demonstration of how research moved policy. There is still a massive amount of work to do in order to get appropriate, affordable, acceptable technologies into the hands of these very vulnerable populations at scale, and then by the social scientists who must implement behavior change strategies that will help people use the technologies correctly and consistently.

In most ways, sanitation is even a bigger challenge than safe water. In fact, safe water is largely a problem only because we are not successful in safely containing human excreta. An estimated 2.5 billion people lack access to improved sanitation facilities, including 1.1 billion people that still practice open defecation. India is a particular challenge, representing a quarter of the global population that lacks sanitation and nearly two-thirds of those who practice open defecation.¹¹

One problem with current sanitation solutions is that the focus is simply on building latrines that meet minimal standards. This basically means covering a pit with a slab. There are no standards for walls, roofs and doors – all of which are necessary to optimize use. There are also no standards for preventing latrines from becoming breeding grounds for synanthropic flies that serve as mechanical vectors, transferring feces to food, fluids and cooking/eating areas where it becomes a source of exposure. Finally, in many areas, these “on-site” sanitation solutions (usually pit latrines) do not address the management of sludge later on, so that when the pits fill up, they simply overflow, causing further exposure.

It is not surprising, then, that building latrines alone is not preventing disease. In a paper that we just published in *Lancet Global Health*, we reported on a three-year cluster randomized trial to assess the impact of latrine construction in Odisha, India, under the government of India’s “Total Sanitation Campaign” – the largest sanitation initiative in the world.¹² While intervention villages did experience a large increase in latrine coverage – from 9% of households at baseline to 63% upon completion of the intervention – more than a third of households were still practicing open defecation. In addition, more than a quarter of the households were not using them at all and another quarter was only using them sometimes. This combination of sub-optimal coverage and poor use probably was the reason why we found the intervention to have no impact on diarrheal disease, soil-transmitted helminth (worm) infection, or nutritional status.

Not only are current sanitation interventions ineffective in some cases, but we are also not doing much of it. None of the Millennium Development Goals (MDGs) are further behind than sanitation. Overseas direct foreign aid in sanitation has been flat for the last two decades. National governments are making important efforts, supported by the Bill & Melinda Gates Foundation and others. However, the impact on reducing open defecation has been remarkably slow.¹⁰ Rural populations in Sub-Saharan Africa and South Asia, and the poorest of the poor worldwide, have made little progress.

The lack of safe water and sanitation and the heavy burden of disease it causes is an obvious problem. But what makes it a *scandal* is that we know precisely how to address it and fail to do so. These same problems existed in North America and Europe a century ago. We responded by filtering and disinfecting our water supplies and providing distribution systems that brought the water directly to our homes. The result was a massive reduction in child mortality and in related increases in overall life expectancy.¹³ Infectious diarrhea and enteric fevers from waterborne diseases are now quite rare in high-income countries. We have effective solutions that can be implemented in low-income settings. History will almost certainly judge our failure to provide these solutions to these settings as a scandal.

Where does that leave the Lasallian community? Global water and sanitation in low-income countries is a challenge, but it is one that we should embrace. Why does it deserve a prominent

role in our research and teaching? First, as you have seen, there is a massive disease burden associated with deficiencies in water and sanitation. Second, that disease burden is borne chiefly by children, women and girls, and the poor. Third, many of the countries most affected are those in which Lasallians are already working. Finally, the solutions have much to do with education of the young and vulnerable – the people that are the focus of the Lasallian educational mission.

Lack of water and sanitation deserve to be a focus of the Lasallian research agenda for reasons directly relating to our mission of education. Evidence suggests that poor water and sanitation adversely impacts not only nutrition and growth but also cognitive development. It also leads to poor school attendance and performance. Girls drop out because schools fail to provide facilities for menstrual hygiene management.

Lack of water and sanitation also deserve to be on our research agenda because of the impact it has on poverty. The diseases associated with poor water and sanitation reduce economic productivity. They cause poor households to seek out and pay for drugs and other medical attention for sick children. Even for children not showing signs of diarrhea, repeated exposure to fecal pathogens leads to conditions such as anemia, stunting and environmental enteropathy – all with long-term effects on economic productivity and development.

Lasallian universities are in a unique position to address the challenge of water and sanitation. First, many of the most challenging settings are precisely where we have universities and schools. Second, this is a field that benefits from collaborators in low-income countries, including many in which we already have a presence. Third, work in this area can involve many disciplines: biologists, entomologists and microbiologists; civil and environmental engineers and experts in geographical information systems; economists and other social scientists; business and consumer scientists; and of course medicine and public health. All of these are currently working in the fields of water and sanitation and have important contributions to make.

Finally, work in this area can fundamentally transform students. It is extraordinary to see them change their perceptions of what is actually important when they get involved in this kind of work. They can easily wrap their heads around it, and they often want to do something about it. And like it was for me, this experience can stick with them for a long time – even as they work in other professions.

For these reasons, I urge the Lasallian universities to take up the challenge of global water and sanitation and to give it priority in your research and teaching. It is an area that will benefit greatly by developing leaders who are committed to these goals, particularly in low-income settings. But most importantly, it provides an extraordinary opportunity to practice our values of education, poverty alleviation, and environmental stewardship.

Let me close by acknowledging my collaborators: my colleagues at Emory University and the London School of Hygiene and Tropical Medicine, and researchers at other institutions including Berkeley, Stanford and Michigan. I also want to acknowledge my principal funders: the Bill and Melinda Gates Foundation, the UK Department of International Development, USAID, the World Health Organization, UNICEF, and the International Initiative for Impact Evaluation. Finally, my sincere thanks to Brother Robert Smith, Vice President for the Schools of Graduate

and Professional Programs, for his kind invitation to address you here today, and to the Institute for Lasallian Studies, for sponsoring this symposium.

Notes

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