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An Elemental Solution: Using Zinc to Stave Off Childhood Diarrhea in Developing Countries

A prolific killer of young children worldwide, diarrhea may have met its match with cheap and available zinc tablets. A new study examines how one country has gotten the word out to parents and doctors

By Katherine Harmon

Childhood [diarrhea](#) can be a tricky public health issue. Not only is it an unpleasant subject to discuss, but eradicating it, especially in poorer nations, can often mean expensive infrastructure projects and bigger battles than many strapped governments can take on.

It still kills some 1.5 million children under the age of five every year, according to a World Health Organization report issued last month. And it likely is responsible for more indirect deaths in that age group. "It doesn't often immediately kill a child," explains [Peter Winch](#), a professor at Johns Hopkins Bloomberg School of Public Health. "It often weakens a child and they die of something else—a lot of [these] deaths occur out[side] of hospitals—so out of sight, out of mind."

A 10-day course of zinc tablets, however, promises to not only treat children who have diarrhea, but also to help protect them from future bouts with the condition (the most common side effect of the zinc being nausea). The challenge lies in getting parents and caretakers to give the treatment to their children—and health care providers to embrace it.

[A new multiyear study](#), published online Monday in *PLoS Medicine*, followed a nationwide public health campaign to increase zinc use for childhood [diarrhea](#) in Bangladesh. Through extensive surveying of households that had current cases of a child with diarrhea in urban, rural and township settings, the researchers were able to uncover how effective public health messages had been in creating awareness about—and use of—the treatment.

The authors found that in the first two years of a public health campaign that used television, radio, outdoor ads, and other communication, awareness of the treatment peaked after about 10 months. Those in the urban areas outside of slums had the highest awareness (90 percent). Levels were lower in townships (74 percent), urban slums (66 percent) and rural areas (50 percent).

"We didn't expect to see awareness go up as quickly as it did," says [Charles Larson](#), of the Center for International Child Health at the BC Children's Hospital in Vancouver and lead author of the study.

By about 23 months into the campaign, however, some 25 percent of urban, non-slum caretakers who had children with a current case of diarrhea were using zinc (along with 20 percent of those in towns and urban slums and 10 percent in rural areas). As Larson points out, any marketing company might be happy if 20 percent of the target population used a product, but given the ease and benefit of using zinc tablets, he says he was "somewhat discouraged" by the latter adoption figures.

Zinc, a metallic element that is naturally present in many foods such as red meat and fish—more widely consumed in wealthier nations—is a co-factor in many different bodily enzymes. "We don't completely understand it," Winch says, but researchers do know that it is important for maintaining many enzymes that contribute to immune system support as well as maintaining skin and intestinal walls. Unlike iron, however, there are not many good, reliable tests for zinc levels, and people who are zinc deficient often don't look any different from those who are not, also unlike people who suffer from



anemia, who can be pale and fatigued.

Zinc tablets can also satiate the perceived need for a drug-based treatment. Although widely used oral-rehydration therapies help children regain lost fluids, "people don't perceive it as a treatment," Winch says. "It's not a pill, [so] they're still on the lookout for a drug to take." Many caretakers will get antibiotics, which do not treat most types of typical diarrhea, and [could contribute to antibiotic resistance](#), he says.

One challenge for the zinc scale-up programs is that the treatment course usually lasts longer than the illness itself. Many parents or caretakers discontinue the tablets after symptoms disappear, even though most countries recommend treatment for at least eight days. So, in order to best protect children from a relapse or future sickness, the programs must also convince those getting the medicine to see the full treatment through.

An important lesson from the program has been that, at least in some areas, selecting the right distribution partner can be crucial. In Bangladesh Larson and his team eventually switched from a pharmaceutical firm to a bottled water distributor—a group that didn't have a vested interest in higher profit prescription drugs and had experience with over-the-counter distribution. The project has garnered success using private companies for distribution and marketing, finding that most people purchased the 25-cent pill regimen from stores rather than obtain it from free clinics.

Of course, not all childhood diarrhea cases will benefit from zinc. Those children with more [difficult illnesses](#), such as dysentery, need other medical treatment.

Other public health issues, such as malaria, are better-known causes, Winch notes, even though they might not be responsible for as many child deaths. "Malaria has a clearer image in people's minds," he adds. There are mosquitoes, nets and it is "something that appears you could make progress on." Diarrhea, aside from a less comfortable conversation topic, often stems from unclean water and poor [sanitation services](#), infrastructural issues that appear more difficult—and more expensive—to tackle, he explains. "Policymakers don't see diarrhea as a big problem," Winch says. "There's a lot more funding out there for AIDS, malaria and tuberculosis, and funding gets people's attention."

Zinc may give agencies and public health groups a new, tenable solution to the widespread problem. "What drives the international effort for scaling up zinc is its preventive role," Larson says. Widespread adoption could avert some 400,000 deaths of children under five each year, according to a 2003 study in *The Lancet*.

Figuring out just how to spread the word about zinc will require more work and better understanding of the communities that would benefit. Studying how—and why—people change their behavior has helped other public health campaigns, including malaria, with [the wider use of bed nets](#). Larson notes that, after advertising, it is important to promote the image of individuals making the decision for themselves. It also comes down to involving the stakeholders, such as mid-level government officials and physician groups, who ultimately play a large role in a program's success.

For all of the lessons learned in Bangladesh, Larson stresses, "one size doesn't fit all. There's no template here." For zinc—or any other public health program like this—to succeed, it is crucial to do the legwork. His group laid the foundation for the project by first talking to the target populations: citizens—rich and poor—who had kids that suffered from diarrhea. Before assembling the project's components, Larson's team asked simple questions, such as how much people paid for other treatments and why they might use them. The answers helped the researchers to set appropriate prices, decide how to position zinc as a treatment and, in the end, aided in disseminating a new weapon against a condition that causes some 19 percent of all under-five childhood deaths worldwide.

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