Delivering Clean Water to Households in India

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Sector(s): Health

Fieldwork: Spring Health India Pvt Ltd

Location: Odisha, India

Sample: 160 villages (60,000 households)

Research Papers: The value of clean water: Experimental evidence from rural India

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More than two billion people around the world lack access to clean drinking water, and current approaches to increasing access have fallen short. Researchers conducted a randomized evaluation to test the impact of delivering clean water directly to households on the valuation of clean water, and other water-related benefits in India. Compared to chlorine-based treatments, another approach designed to expand access to clean water, the intervention led to high take-up and lower healthcare spending. In addition, households exhibited a high willingness to pay for clean, home-delivered water and an even higher willingness to forego compensation in exchange for water, highlighting how much they value having access to it.

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Globally, more than two billion people do not have access to clean drinking water. Drinking contaminated water is a cause of major health challenges, including approximately 500,000 child deaths annually. Moreover, the urgency of this issue is increasing. The World Health Organization reports that between 2000 and 2022, the number of people in low-income countries without access to clean water increased by 197 million. Climate change is exacerbating water scarcity, putting billions at greater risk of waterborne diseases. At the same time, existing strategies to improve water access are proving insufficient. Piped water systems, while effective in high-income countries, are prohibitively expensive to implement and maintain in rural areas of low-income countries. Evaluations of point-of-use chlorine treatments have demonstrated their affordability and effectiveness at reducing health risks, but few people adopt them for regular use even when a chlorine solution is offered for free.

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The evaluation took place in rural Odisha, India, one of the country's lowest-income states, where 26 percent of rural households do not have access to clean water. Most households depend on groundwater or surface water, which is often contaminated and needs to be boiled or treated with chlorine to make it safe for drinking. Prior to the evaluation, researchers collected seventeen water samples and detected E. Coli and fecal bacteria in all of them. Households also spend substantial time retrieving water. On average, households in the area of study spent about 32 minutes a day collecting drinking water at baseline.

On average, households in a representative group spent INR 12,494 (US$156.18) at the time of study in monthly expenses and spent INR 9,000 (US$112.50) each month. The average household comprised five members, including three children. Households had little savings, with a median bank balance of INR 2,000 (US$25). Many could only afford purchases up to INR 500 (US$6.25) without borrowing, indicating limited financial flexibility.



A group of women gather around a roadside tap, filling their containers with water in India. Photo Credit: rima das mukherjee / Shutterstock.com

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Researchers conducted a randomized evaluation to test the impact of delivering clean, treated water directly to households, in partnership with Spring Health, a private company that removes harmful bacteria from water and sells it in rural Odisha. Water was treated at local, village-based facilities to remove biological contaminants. Home delivery ensured households received clean water without the time costs and contamination risks associated with collection and transport.

Rural households were randomly assigned to one of four groups:

1. *Priced water group (40 villages)*: Households in these villages could purchase water for a price. Within each village, researchers further randomized thirteen households to receive a ten percent discount on the price of purchased water, thirteen households to receive a fifty percent discount, and thirteen households to receive a ninety percent discount. The remaining households in the villages of this group purchased the water for full market price.

2. *Free water group (40 villages)*: In each village of this group, 39 households were randomly selected to receive a free ration of 400 liters of water per month. Selected households had to place an order with Spring Health to receive the water and could thus opt

out of receiving rations by not placing orders. Selected households who used up their ration and households not selected to receive free water rations could both order water at the full market price.

3. *Exchangeable entitlements group (40 villages)*: In each village of this group, 38 households were randomly selected to receive an entitlement for 400 liters of free water per month, similar to selected households in the free water group. However, selected households in this group could exchange any unclaimed water within their entitlement for cash. The amount of cash was set equal to one of the prices that households in the priced water group paid, also randomly assigned. Refunds for each household in this group were calculated and disbursed at the end of each month, based on any unclaimed water.

4. *Comparison group (40 villages)*: In this group, villages experienced no changes to their pre-existing water access conditions and did not participate in the intervention. Households in these villages could still purchase water through Spring Health at full market price but received no special offers.

In addition to the groups described above, researchers randomly selected five households from each non-comparison group village to receive a one-time free water ration of 100 liters to test whether experience with clean water impacted subsequent demand.

The study took place between May 2022 and August 2023 and included 60,000 households across 160 villages. Researchers used scratch cards to implement household-level randomization. Each household received a card revealing their assigned program (e.g., discount level or entitlement amount). To measure outcomes, researchers used administrative data on water orders from Spring Health and collected data through surveys of households.

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Take-up of low-cost, clean water—as measured by how much water households ordered—was high. Households also valued home-delivered clean water highly.

Take-up: Households in the free water group increased their water consumption by an average of 270 liters per month. Similarly, households in the exchangeable entitlements group increased their consumption by 291 liters per month, utilizing a portion of the 400 liters of water they were entitled to under the study. In the priced water group, households purchased low amounts at high prices, but take-up rose as prices dropped. The likelihood of a household ordering water under the free ration program was 90 percent.

Household valuation of home-delivered clean water: From the variation across different price points in the priced water group, households' willingness to pay for clean water at home was INR 132 per month (US$1.65). From the exchangeable entitlements group, households were willing to forego INR 420 per month (US$5.25) to ensure they have enough drinking water for the month. Both of these figures indicate that households are willing to exchange large amounts of their money for access to clean water at home, or in other words, place a high value on clean water.

Water collection and purification: Households in the three intervention groups spent 15-39 percent less time collecting water, relative to the 32 minutes that households in the comparison group spent retrieving water on average. Additionally, clean water delivery reduced the need for boiling water, which takes both time to collect the fuel and money to pay for it.

Health outcomes: Households which were offered the priced water intervention had 22 percent fewer instances of sickness relative to the comparison group. This effect took place primarily among households with small children. When considering only households that report actually drinking clean water in surveys, households in the priced water and exchangeable entitlements groups missed 62 percent and 36 percent fewer days of work, respectively. For the free water group, it is not certain whether any health impacts were due to chance or not.

Overall, delivering treated water directly to households had high take-up, especially compared to point-of-use chlorine treatments which often resulted in poorer tasting water. Households value access to clean water at home highly, and researchers note that this value may be high enough to sustain the profitability of privately providing water.

Burling, Fiona, Amir Jina, and Anant Sudarshan. “The Value of Clean Water: Experimental Evidence from Rural India.” Working Paper, September 2024.