

Evidence Matters

Systematic reviews: What works, what doesn't work, and why. A briefing for decision-makers.

Safe drinking water

Who is willing to pay the price?

Over 700 million people lack access to safe drinking water. Piping water to all households is too expensive and not sustainable in rural areas where families live far apart and maintenance would be difficult.

Where piped water is not available, a variety of point-of-use technologies have been developed, including locally-produced ceramic filters, chlorination, solar disinfection, or simply boiling the water. Used in combination with safe storage containers that allow users to access water without actually touching it with dirty fingers, thus preventing re-contamination, these methods are inexpensive and can substantially improve the quality of the water.

Evidence shows the health benefits of drinking clean water. Treating water can reduce the prevalence of diarrhoea by up to 70 percent. So why does a child die every 15 seconds from waterborne diseases when inexpensive technologies are available?

A recent systematic review asks: are people willing to pay for clean water and is pricing the only factor influencing how people view its benefits? The review summarises research from Bangladesh, Ghana, Kenya and Zambia.

Policy messages

- Many people are not willing to pay for safe drinking water. Even paying a small fee puts people off using water treatment technologies.
- Understanding why people are not keen to pay and how much they might pay if they had the right information could help overcome these barriers.
- Subsidising the costs of water treatment technologies can improve their uptake, but large subsidies are required.
- Cheaper and innovative technologies and distribution models may encourage people to change their behaviour and start using water treatment technologies which would improve their health.

At a glance

This issue of *Evidence Matters* is based on a recent systematic review of people's willingness to pay for cleaner water.

Evidence Matters provides important policy-relevant messages from systematic reviews. It aims to help decision-makers and practitioners design more effective interventions and policies. It doesn't include recommendations, evidence not included in the systematic review, or detailed descriptions of interventions or their implementation.

The **Viewpoint** on page 4 goes beyond the evidence in the systematic review to draw out policy recommendations and provide useful direction and advice for programme design and implementation.

Systematic reviews provide an unbiased assessment of what works and why by identifying relevant studies and synthesising quantitative and qualitative evidence. Using rigorous and transparent methods, they include published and unpublished research relevant to the research questions and synthesise the findings in a way that is easily accessible to decision-makers and practitioners.

This briefing is based on

Null, C., Kremer, M., Miguel, E., Garcia Hombrados J., Meeks R., and Zwane Alix, P. (2012) *Willingness to Pay for Cleaner Water in Less Developed Countries: Systematic Review of Experimental Evidence*, 3ie Systematic Review, London

Higher prices = lower demand

Donors and governments are keen to expand access to cleaner water by promoting water quality improvements, particularly household water treatment technologies, such as filtration and chlorination. However, adoption of these technologies has been slow, even though costs are low.

The cost to the consumer of water treatment technologies vary from less than 10 US cents to just over a dollar per thousand litres of water, depending on the method used. One bottle of chlorine costs about a quarter the average agricultural daily wage in many countries and can provide an average household with a month's supply of purified drinking water.

Even a small difference in pricing can influence people's behaviour. In Kenya, access to free chlorine increased uptake to over 60 percent, whereas coupons for even a 50 percent discount had a minimal effect. In Zambia, for each 100 Kwacha (2 US cents) discount, the likelihood of purchase increased by 7 percent. Evidence suggests that people will not pay more for water treatment technologies, contrary to arguments put forward by many non-government organisations (NGOs) which operate on the principle that it is not sustainable to give people something for free. More research is needed to design innovative technologies and service delivery models to make water treatment methods more attractive and convenient for people to use.

Figure 1 illustrates that only two water treatment methods using chlorine – Clorin in Zambia and Aquatab in Bangladesh – would be sustainable, as people are willing to pay slightly more than the cost of the technology. The main reason for this significant difference is that chlorine is a lot simpler and faster to use than flocculant disinfectant, a powder added to water to remove heavy metals, organic matter, and

microorganisms which takes longer to act. Another factor which could explain the difference between the two chlorine interventions in Bangladesh is that chlorine tablets (Aquatab) don't smell as strongly as liquid chlorine (WaterGuard). On the other hand, accessing water through a protected spring water, which prevents contamination by sealing the eye of the spring, does not require anything from the user apart from the time involved in walking to the source. The systematic review estimates the opportunity cost spent in walking to the protected spring water to about 18.5 working days in a year or approximately 2.96 USD in lost wages.

Why are people not keen to pay?

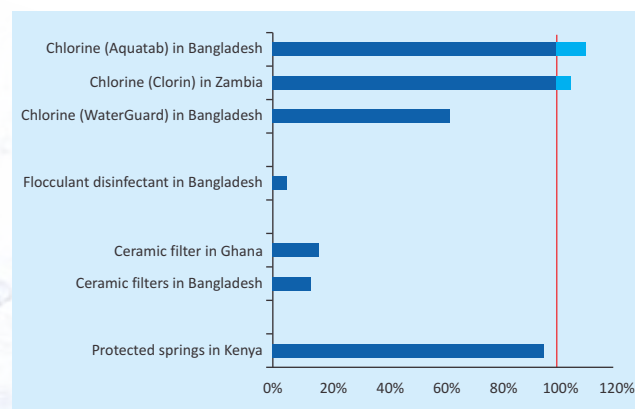
There is little evidence explaining why people are not willing to pay for clean water. The systematic review suggests that a family's level of income bears no direct correlation with people's willingness to pay for water treatment. So what influences people's decisions?

Small changes in taste, appearance, or temperature of treated water can affect whether and how much people will use these technologies, particularly over time. In addition to cost, taste or appearance, time spent on the process can influence people's decisions to pay for clean water, or not. For instance, a family will have to consider the time spent in accessing clean water or treating it, basing their decision on the opportunity cost in terms of the number of working days or earnings lost in a year.

People may also underestimate the benefits. Thus, it is harder to persuade people to invest in preventive measures, as individuals are less sensitive to improvements which they do not see. Moreover, in cases where the underlying diarrhea incidence is not high, people may genuinely think that a reduction in that incidence is simply not worth the cost. Finally, people are unlikely to link improvements to their health with the fact that their decisions may have a positive



Figure 1: Percentage of costs households are willing to pay for cleaner water per 1000 litres



effect on their neighbours and local community. While interactions through social networks can help increase information-sharing and awareness, it will not necessarily change people's attitude towards these technologies. In Kenya, when some households were randomly chosen to be given a supply of chlorine for water treatment, they subsequently had more conversations about water and health with their friends and relatives, but this had a limited effect on the people they came into contact with through their social networks.

Other important factors that can play a role in adoption are accessibility to the water treatment technology in the local market and peer effects where individuals are influenced to change their behaviour to match that of friends, family and colleagues. Chlorine dispensers developed in Kenya are an example of a novel distribution system that is promising in its ability to harness peer effects and act as a reminder to treat water by placing water treatment infrastructure and supplies at the point of collection. This latter approach also capitalises on economies of scale that make water treatment cheaper.

Subsidising water treatment – a short term solution

Households with young children who are more vulnerable than adults to waterborne diseases are not more inclined to pay for water treatment. Though women and children are usually responsible for collecting water, they are often not in a position to take decisions on whether the family should pay for safe drinking water.

Evidence also shows that women sometimes value health products more than men. In rural India, for example, village councils led by women are more likely to invest in public goods such as drinking water infrastructure. Clearly, subsidising water treatment technologies can be a solution to overcome the low willingness to pay and improve the uptake of water treatment technologies. Clair Null's viewpoint on the next page expands on this point.

Innovation and smart distribution can change people's behaviour

Social marketing campaigns use marketing strategies to achieve specific behaviour change (in this case to increase the adoption of water treatment), using positive images of good motherhood or social status to promote the technologies and increase uptake, for example. However, this approach is not enough to change people's beliefs and attitudes.



Curt Carmemark/World Bank

More importantly, water treatment technologies and behaviour change programmes need to factor in the reasons why people continue to use unsafe water. More innovative technologies and distribution models to increase the uptake of water treatment are needed.

Methodology

This systematic review focuses on studies in which the price a person pays for water treatment is determined by a lottery, similar to the way in which subjects in a drug trial are randomly assigned to either the drug or a placebo.

Willingness to pay for water treatment is directly measured by real purchase decisions. The authors focus on willingness to pay for water treatment as the best measure of willingness to pay for cleaner water, even though in practice other factors beyond water quality are affected by water treatment. The review included evidence from five trials using price randomisation to explore willingness to pay for clean water in Bangladesh, Ghana, Kenya and Zambia, and compared these to evidence from studies using other methods to measure willingness to pay.

Methods used to measure willingness to pay include contingent valuation and experimental methods. In the first case, households are asked how much they would be willing to pay – a difficult question to answer if you are not making that decision there and then; people tend to overstate their willingness to pay, as the evidence presented in this review confirms. In the second, experimental methods use price randomisation and compare people paying different prices and making decisions in real market situations. The second method provides more reliable estimates.

Viewpoint by Clair Null

Clair Null is Assistant Professor at the Hubert Department of Global Health, Emory University, USA

While there is a substantial body of evidence concerning the beneficial health effects of water treatment methods, we know very little about whether people value water treatment enough to make such products viable through private markets.

What we've learned from our review is that the cost of water treatment is often higher than the prices people are willing to pay. Even small increases in price are likely to discourage people from buying water treatment supplies. More efforts are needed to reduce the costs of water treatment, by finding cheaper and more convenient ways to produce and distribute water treatment supplies.

Some argue that giving water treatment technologies to people for free could create a culture of dependency, with recipients inferring that the product isn't worth anything, or that it might be wasted on those who wouldn't bother to use it. While these concerns are valid, the review found that the people who need water treatment the most are no more likely to pay for it. Even if we had good methods to clean up water, it is unlikely that many people would make use of these methods if they had to pay for them.

There are three main reasons, therefore, why it might be a good idea to subsidise water treatment:

- If people do not consider the possibility that, by purchasing water treatment, they might be protecting not just their own family from germs but also their neighbours (if your family is healthy, you pass on

fewer germs into the environment for your neighbours to pick up), then households could end up losing out of the potential benefits of water treatment. Subsidies can help equate the private benefits of using water treatment with the social benefits in order to encourage more people to do what's good not just for themselves, but also for society.

- Similarly, if the first person to use water treatment methods learns something important that they could share with their neighbours, or if water treatment becomes a social norm (with enough people doing it) then subsidising water treatment, at least initially, could lead to more people using it in the long term.
- Finally, the fact that those who benefit most from water treatment (especially children) tend not to be the ones who decide whether a family should spend money on it is another argument to reduce the costs of water treatment so that more families will use it. Governments might also conclude that it is worth subsidising water treatment rather than pay for healthcare for those who would otherwise become ill without it.

However, we first need more context specific information about how much people are willing to pay for water treatment, so that decision-makers, policymakers and practitioners can decide if spending public resources on water treatment is a better option than relying on people to purchase water treatment for themselves.

Additional resources: Waddington and Snilstveit *et al.* (2009), *Water Sanitation and Hygiene Interventions to Combat Childhood Diarrhoea in Developing Countries*, 3ie Systematic Review, London

Cover photo credit: Eric Miller/World Bank

Editorial team: Christelle Chapoy, Louise Daniel, Fatema Rajabali

Credits: International Initiative for Impact Evaluation (3ie)

www.3ieimpact.org | 3ienews@3ieimpact.org

New Delhi: +91 11 2613 9494/6885; London: +44 207 958 8351/8350; Washington: +1 202 629 3939



Have your say: We welcome your views and feedback. Please contact: 3ienews@3ieimpact.org

Evidence Matters is produced by 3ie with support from IDS Knowledge Services. Content may be copied or reproduced provided it is distributed free of charge and the author(s) and publisher are acknowledged. Views expressed in *Evidence Matters* do not necessarily reflect those of the editors, 3ie, or IDS.