

## Chlorine Dispenser System for Drinking Water in Western Kenya

**Abstract:** *The intervention that was evaluated is a low-cost Chlorine Dispenser System, placed next to a spring or well where families get their drinking water, that, with the turn of a lever, adds the correct amount of chlorine to a bucket of water to kill illness-causing bacteria. Evaluated in a well-conducted randomized trial in Western Kenya, the System increased the percent of households whose water tested positive for chlorine from 14% (in the control group) to 56% (in the treatment group) over a 2-3 year follow-up period. The policy significance of this result is underscored by the findings of a recent Cochrane Collaboration evidence review: (i) diarrhea kills about 1.8 million people per year around the globe, and in developing countries, accounts for 17% of deaths of children under 5; and (ii) interventions that improve water quality produce sizable reductions in prevalence of diarrhea.*

*As a next step, we believe that replication of these highly-promising findings in a second trial that is conducted in another setting and directly measures health outcomes would be desirable to confirm the System's effectiveness and establish that it generalizes to other sites.*

**Description of the Intervention:** The intervention that was tested is a Chlorine Dispenser System, placed at the water source (i.e., a spring or well) where families get their drinking water to bring back to their house. It is located next to the water source and, with the turn of a lever, adds the correct amount of chlorine to a bucket of water to kill illness-causing bacteria. It is also publicly visible, which may help induce chlorine use through positive social pressure. As part of the intervention, the program providers hired a “promoter” to encourage use of the Chlorine Dispenser System in the community during the first six months after its introduction. The intervention's cost is 25 to 50 cents per person per year (not including cost of the promoter, though that was likely minimal on a person per year basis).

### Evidence of Effectiveness:

- **Evaluation method:** The Chlorine Dispenser System was evaluated in a multi-armed randomized controlled trial that also tested a number of other interventions aimed at promoting chlorination of household water (e.g., giving households coupons for free bottled chlorine to add to their water). None of the other interventions was found to be nearly as effective as the Chlorine Dispenser System; hence, this summary focuses on the Chlorine Dispenser arms of the trial. In the Chlorine Dispenser arms, 35 water sources (each serving a different community) were randomly assigned to a treatment group, which received the Chlorine Dispenser System, or a control group, which did not receive the System. The study then randomly selected a total of 693 households served by these 35 water sources to participate in the study sample.
- **Key findings:** At the longest-term study follow-up (28-36 months after random assignment), 56% of households in treatment communities tested positive for chlorine in the water, versus 14% of households in control communities. This effect was statistically significant at the 0.01 level. Given the established causal connection between water quality and incidence of diarrhea, we believe this finding is of high public health importance with the potential to save many lives.
- **Summary of study quality:** Prior to the intervention, the treatment and control households were highly similar in their sociodemographic characteristics and use of chlorine in their drinking water (rates in both groups were about 7%). The study's analysis appropriately accounted for the fact that communities, rather than individual households, were randomly assigned. Sample retention was

high (89% of households at the 28-36 month follow-up, based on the study report and subsequent discussion with the study authors). Use of chlorine was measured with an objective, biochemical test of the water in each household, as opposed to just self-reports.

**Thoughts on What More Is Needed To Strengthen the Evidence:** Based on our impartial review, this was a well-conducted randomized controlled trial that produced a finding of high policy importance. However, its sample was geographically concentrated in Western Kenya, and the study did not directly measure health outcomes. Thus, we believe that replication of these findings in a second trial that is conducted in another setting, and measures health (not just chlorine use), would be desirable to confirm the System's effectiveness and establish that it generalizes to other sites.

#### References:

- Michael Kremer, Edward Miguel, Sendhil Mullainathan, Clair Null, and Alix Peterson Zwane, "Social Engineering: Evidence from a Suite of Take-up Experiments in Kenya," April 2011. [Linked here](#).
- Thomas Clasen, Wolf-Peter Schmidt, Tamer Rabie, Ian Roberts, and Sandy Cairncross, "Interventions To Improve Water Quality for Preventing Diarrhoea: Systematic Review and Meta-analysis," A Cochrane Collaboration Review, *British Medical Journal*, vol. 334, no. 7597, April 14, 2007, p. 782. [Linked here](#).

*This is Coalition staff summary of a promising finding that has not yet been considered by the [Top Tier Evidence](#) initiative. While we strive to ensure that our staff summaries are accurate and balanced, readers should note that they have received less scrutiny than those reviewed by the Top Tier expert panel.*