

The health consequences of inadequate water and sanitation services include an estimated 4 billion cases of diarrhea and 1.9 million deaths each year, mostly among young children in developing countries. Diarrheal diseases lead to decreased food intake and nutrient absorption, malnutrition, reduced resistance to infection, and impaired physical growth and cognitive development. Since 1996, a large body of work has been published that has examined the health impact of interventions to improve water quality at the point-of-use through household water treatment and safe storage (HWTS). Four interventions – chlorination, solar disinfection, ceramic filtration, and PuR – have been proven to reduce diarrhea in users in developing countries and are discussed below. For more information, contact [safewater@cdc.gov](mailto:safewater@cdc.gov).



A Ceramic Filter System

### Household Chlorination

Household chlorination includes water treatment with chlorine solution at the point-of-use, storage of water in a safe container, and behavior change communication. Users add one cap of solution to their storage container. Diarrhea reduction is 22-84%. Product cost is 0.01-0.05 US cents per liter treated. Benefits are residual protection against contamination, acceptability to users, ease-of-use, scalability, and low cost. Drawbacks include potential user taste and odor objections, and lower protection against some organisms and in turbid water. [www.cdc.gov/safewater](http://www.cdc.gov/safewater)

### Ceramic Filtration

Ceramic filters depend on mechanical processes to remove contaminants. To use, users simply pour water through the filters. Diarrhea reduction is 60-70% in commercially manufactured filters in conjunction with safe storage. Product cost is 0.034-0.14 US cents per liter treated. Benefits include user acceptability because of ease-of-use, long life if the filter remains unbroken, and potential for local production. Drawbacks include unknown effectiveness against viruses, lack of residual protection that can lead to recontamination, the need for user education to keep the filter and receptacle clean, and slow flow rates. [www.pottersforepeace.org](http://www.pottersforepeace.org)



The PSI Chlorination Product in Nigeria



Children using SODIS PUR™

### Solar Disinfection – SODIS

SODIS uses increased temperature, UV light, and oxidative chemistry to inactive disease-causing organisms. Users are trained to place bottles in the sun for 1-2 days, depending on climate. Diarrhea reduction is 9-86%. Aside from initial bottles, SODIS is a no-cost option. Benefits include acceptability to users because of the minimal cost, ease of use, and minimal change in water taste. Also, recontamination is unlikely because water is consumed directly from the bottles in which it is treated. Drawbacks include the need for pretreatment of turbid water, limited volume of water that can be treated at once, length of time required to treat water, and the supply of plastic bottles required. [www.sodis.ch](http://www.sodis.ch)

### Flocculant / Disinfectant Powder - PUR Purifier of Water™

Procter & Gamble developed the combined flocculant/disinfectant PUR® for sale at no-profit to users and NGOs. To use, one sachet is added to 10 liters of water, and users stir, let the solids settle, strain the water through a cloth, and wait 20 minutes. Diarrhea reduction is 16->90%. Product cost is 1 cent per liter treated. Benefits include high quality water due to dual process treatment even in turbid waters, residual protection against contamination, and visual improvement in the water. Drawbacks are multiple steps for correct use, the need for users to have two buckets, a cloth, and a stirrer, and the higher relative cost per liter of water treated. <http://www.pghsi.com/pghsi/safewater/>

