

# Household Water Treatment

## Solar Disinfection

### Household Water Treatment and Safe Storage in Developing Countries

Studies have shown that household water treatment and safe storage interventions improve water quality and reduce diarrheal disease incidence in developing countries. Five of these proven options – chlorination, solar disinfection, ceramic filtration, slow sand filtration, and flocculation/disinfection – are widely implemented in developing countries. The decision of selecting which options are most appropriate for a community is often difficult, depending on existing water and sanitation conditions, cultural acceptability, implementation feasibility, availability of technology, and other local conditions. This series of technical bulletins is designed to assist organizations in comparing and selecting the most appropriate options.



A woman using SODIS  
Swiss Federal Institute

### Solar Disinfection

Solar disinfection (SODIS) was developed in the 1980's to inexpensively disinfect water used for oral rehydration solutions. In 1991, the Swiss Federal Institute for Environmental Science and Technology began to investigate and implement SODIS as an household water treatment option to prevent diarrhea in developing countries. Users of SODIS fill 0.3-2.0 liter plastic soda bottles with low-turbidity water, shake them to oxygenate, and place the bottles on a roof or rack for 6 hours (if sunny) or 2 days (if cloudy). The combined effects of UV-induced DNA alteration, thermal inactivation, and photo-oxidative destruction inactivate disease-causing organisms.

### Lab Effectiveness, Field Effectiveness, and Health Impact

In the laboratory, SODIS has been proven to inactivate the viruses, bacteria, and protozoa that cause diarrheal diseases. Field data have also shown reductions of bacteria in water from developing countries treated with SODIS. In four randomized, controlled trials, SODIS has resulted in reductions in diarrheal disease incidence ranging from 9-86%.

### Benefits, Drawbacks, and Appropriateness

#### The benefits of solar disinfection are:

- Proven reduction of viruses, bacteria, and protozoa in water
- Proven reduction of diarrheal disease incidence
- Simplicity of use and acceptability
- No cost if using recycled plastic bottles
- Minimal change in taste of the water
- Recontamination is served and stored in the small narrow necked bottles

#### The drawbacks of solar disinfection are:

- Need for pretreated water of higher turbidity (flocculation and filtration)
- Limited volume of water can be treated at once
- Length of time required to treat water
- Large supply of intact, clean, suitable plastic bottles required



Using SODIS on a rooftop  
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SODIS is most appropriate in areas where there is availability of bottles and community motivation and training for users on how to correctly and consistently use SODIS for treating household drinking water.

## Implementation Examples

***Over 2 million people in 28 developing countries use SODIS for daily drinking water treatment.***

Experience has shown that SODIS is best promoted and disseminated by partner institutions based in the project area. Important partners are community-based organizations (CBOs) such as women's clubs, youth associations or self-help groups, well-established NGOs working on community development projects, institutional organizations such as health posts, hospitals, and teacher training centers, and government programs. Individuals, such as community and religious leaders as well as politicians and decision-makers, play a key role and should be involved from the beginning of a project. SODIS promotion in a new area begins with a pilot project of one year that reaches 2000-4000 families. In the second year, the project expands into the field of advocacy to scale-up the project.

The CBO Kenya Water for Health Organization promotes SODIS in the Kibera slums of Nairobi, Kenya. Over 250,000 people are reached by trained promoters using social marketing to disseminate knowledge about SODIS. Research-based information is given out by promoters to potential users, especially when users are skeptical about SODIS.

In Latin America the promotion is channeled through a regional reference center, Fundação Sodis. Their strategy is to build and strengthen a network of partner institutions; they do not implement projects, but focuses on training trainers, technical assistance, and lobbying activities. More than 100,000 people are using SODIS in Latin America.

In Assam, India, Assam University provided technical and training support for a SODIS promotion project with a local NGO. The dissemination phase targeted 20,000 households based on lessons learned during the pilot phase. An approach involving active participation of institutions such as village councils, schools, and health centers was adopted to ensure the project is community-owned and sustainable.



*Using SODIS on a rooftop  
Swiss Federal Institute*

## Economics and Scalability

SODIS as a virtually zero-cost technology faces marketing constraints. Since 2001, local NGOs in 28 countries have disseminated SODIS through training of trainers, educating at the grassroots level, providing technical assistance to partner organizations, lobbying key players, and establishing information networks. The experiences gained have shown that SODIS is best promoted and disseminated by local institutions with experience in community health education. A long-term training approach and repeated contact with the community is needed to create awareness on the importance of treating drinking water and to establish corresponding changes in behavior. Both the Swiss Federal Institute and the SODIS Foundation provide technical assistance to NGOs implementing SODIS.

For more information about household water treatment systems visit:

<http://www.cdc.gov/safewater>

or

[http://www.who.int/household\\_water/](http://www.who.int/household_water/)

For more information about solar disinfection for developing countries visit:

<http://www.sodis.ch>

<http://site.fundacionsodis.org>



*Children with SODIS  
Swiss Federal Institute*