

CALL TO ACTION
CLEAN WATER 2010

**Save Lives and Heal the World
with SODIS Water**

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Introduction

More than one billion people ^[1] worldwide lack access to clean drinking water, exposing them to waterborne diseases such as diarrhea, cholera, typhoid fever, hepatitis A, amoebic and bacillary dysentery and other diarrheal diseases. Each year, four billion cases of diarrhea cause 2.2 million deaths ^[2], mostly children under the age of five. This translates into one person dying every 15 seconds. These deaths constitute around 15 percent of all deaths under the age of five in developing countries.

The situation regarding access to clean drinking water is worse in developing countries where one-third of the population is without safe water. Around 50 percent of people ^[3] in developing countries suffer from one or more water-related diseases, and 80 percent of diseases in these countries are caused by contaminated water.

Initiatives to better the quality of drinking water at household level have been effective in reducing the occurrence of waterborne diseases. One such method is SODIS (solar water disinfection).

This technique is being currently used by an estimated three million people ^[4] in over 30 countries around the globe. Numerous studies have proved health benefits of SODIS when it is correctly and consistently used. One such study showed the occurrence of cholera during an epidemic in Kenya was 88% ^[4] lower among those who used SODIS water, than non-users.

Studies have also proved that SODIS inactivates the viruses, bacteria, and protozoa, which cause diarrheal diseases. Field data ^[5], collected in developing countries, have also shown reduction of bacteria in water treated with SODIS. Randomized, controlled trials have reported 9-86 percent reductions ^[5] in incidence of diarrheal diseases in communities using SODIS.

What is Solar Water Disinfection (SODIS)?

SODIS is a method to improve the quality of drinking water by using sunlight. During the exposure, the sun destroys the pathogens causing diarrhea. It's an environmentally sustainable and low cost solution for drinking water treatment.

Simple Application

The SODIS method is very simple: A transparent and clean PET bottle is filled with water and placed in sunlight for at least six hours.

- If it's sunny or less than half of the sky is clouded, place the bottle for six hours in the sun.
- When more than half the sky is clouded, the bottle must be placed in the sun for two consecutive days to disinfect the water.

Heavily scratched bottles should not be used. SODIS becomes less effective if the water is very turbid (cloudy/murky) . Effectiveness of SODIS can be improved if the bottles are exposed on sunlight reflecting surfaces such as aluminum or corrugated iron sheets. The treated water should be kept in the bottle and consumed directly from it, or poured into a cup or glass immediately before consumption in order to prevent it from contamination. If the bottle is kept unopened after treatment and stored in a cool, dark place, it can be stored for as long as you wish. The dead bacteria cannot multiply again. Algae may grow, but does not represent a health hazard.

The effectiveness of SODIS was first discovered by Professor Aftim Acra at the American University of Beirut in the early 1980s ^[6]. Extensive follow-up research was conducted by research groups of Martin Wegelin at the Swiss Federal Institute of Aquatic Science and Technology (EAWAG) and Dr Kevin McGuigan at the Royal College of Surgeons in Ireland. Clinical control trials were pioneered by Professor Ronan Conroy of the RCSI team in collaboration with Dr. T Michael Elmore-Meegan.

Advantages of SODIS

- Reduces the risks of infectious diarrhea and dysentery from bacterial and parasitic infections and cholera.
- The diarrhea-causing bacteria inactivated by the SODIS process rarely appears to re-grow or recover infectivity.
- SODIS improves the quality of the water without changing its taste. On the other hand, if water is boiled for purification, the oxygen dissolved in the water escapes. This gives the boiled water an unpleasant taste. Use of chlorine also makes the water taste unpleasant.
- SODIS can serve as an entry point for health and hygiene education.
- The cost of SODIS is low.
- SODIS is easy to understand and apply.
- SODIS does not require a large and costly infrastructure.

Caution

SODIS destroys 99.9 percent of bacteria ^[7] and viruses and also removes parasites to a certain degree from contaminated water. However, water is not completely sterilized through SODIS and since babies very quickly get dehydrated, they faced a greater death risk due to diarrhea. Therefore, only boiled water, which is sterile, should be used for preparing powder milk or food for babies. SODIS water may be introduced to children when they actively move around and start drinking on their own at the age of about 18 months ^[2].

Use of PET bottle in SODIS has come under criticism in recent years that drinking water from such bottles causes different diseases. However, tests conducted by the Federal Laboratories for Materials Testing and Research (Empa) confirm that there is no threat to health if SODIS method is used correctly ^[7]. Studies carried out by other research institutes have verified these results.

Case Studies

In the aftermath of a tsunami ^[8] that caused widespread death and destruction in Sri Lanka, Indonesia, India, Thailand, Malaysia, Maldives, Myanmar, Somalia and Bangladesh, it was feared that waterborne diseases would plague the region particularly due to contaminated water and lack of hygiene. However, the catastrophe was averted by using cheap and practical ways to treat available water, one of these methods being SODIS.

Also, during a 1996 pilot project in Thailand ^[8], water samples collected in Ban Phu Lek and Ban Nong Rue Kae reported not only improved taste, but also 86.6 percent decrease in the ratio of sickness. A growing number of households in these areas are now using the SODIS technique as it becomes available.

In another pilot project ^[8] launched in five districts in Sri Lanka, 81 percent people continued using the SODIS method well after the project was over, thanks to the concerted efforts of community development workers.

In parts of Kenya beset by diarrhea and typhoid, rural women seemed aware of the goodness of sunlight, and after training they started adopting the SODIS technique to treat water. To dispel skepticism about the SODIS method, bacteriological tests of faecal coliform (FC) were undertaken. The near-zero FC content ^[8] in SODIS water indicated that the treatment was successful.

Use of the SODIS technique has also been initiated in India ^[8] by the League for Education and Development (LEAD), a Tiruchirapalli-based women's organization. In Tamil Nadu, where a large section of the population does not have access to clean drinking water and even the available water sources are highly contaminated, LEAD has been engaged in promoting SODIS for over three years. It has trained schoolteachers and students to help disseminate the message.

SODIS technique is also being used in Indian city of Chennai ^[9] where LEAD has introduced the method in slums in Saidapet, Besant Nagar and Korukkupet areas.

In Assam ^[8], India, the 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.

Many Middle Eastern countries ^[10] have serious water problems. Some of them, including Iraq, Jordan and the Palestinian Authority (especially Gaza),

have dire shortages of safe drinking water. The use of SODIS by people living in these locations has considerably lessened the dangers of waterborne diseases.

EAWAG, through the Department of Water and Sanitation in Developing Countries (SANDEC), coordinates SODIS promotion projects in 33 countries ^[6], including Bhutan, Bolivia, Burkina Faso, Cambodia, Cameroon, DR Congo, Ecuador, El Salvador, Ethiopia, Ghana, Guatemala, Guinea, Honduras, India, Indonesia, Kenya, Laos, Malawi, Mozambique, Nepal, Nicaragua, Pakistan, Perú, Philippines, Senegal, Sierra Leone, Sri Lanka, Togo, Uganda, Uzbekistan, Vietnam, Zambia, and Zimbabwe.

SODIS is also being used by several communities in Brazil ^[6]. More than 100,000 people are using SODIS in Latin America, where an estimated 60 million people ^[11] do not have access to a quality water supply (WHO/UNICEF 2004).

Impact On Health

Different studies have been conducted to measure the effectiveness of SODIS on health improvement of children of various ages.

In Kenya, a study on health benefit from SODIS among 206 adolescents aged 5-16 years was conducted. During the four-month study period the number of new cases of diarrhea in families using SODIS was 10% less ^[2] than in families not using the method. Another study among Kenyan children under five years showed a reduction of 16% of diarrheal illnesses among SODIS users over a one year observation period. In 1997/98 when a cholera outbreak occurred in Kenya, researchers proved ^[2] the effectiveness of solar water disinfection for cholera prevention in children below the age of 6. Among SODIS users, children below six were eight times less likely to contract the disease.

In Bangladesh, among 16 villages ^[2] where SODIS was introduced, child diarrhea was significantly less frequent in areas with better adoption of the technique. The study also found a 24% reduction of severe diarrhea among children of families that used SODIS.

These studies and pilot projects have proved that SODIS is an effective method of purifying water. The cost is low and application is easy. The health benefits are numerous. Therefore, one can say for sure that SODIS water can save lives and heal the world.

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