

## The Sunny Side of It All: The Investigation of SODIS Water Purification

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Safe drinking water in developing countries has been a global concern for many years. Pathogens such as viruses, bacteria, and parasites contaminate the water supply that lacks proper purification systems. Some people who drink the water become ill or may even die. Currently, there are many options for purification of water. Solar disinfection should be the best, or at least the most inexpensive and convenient, purification method for drinking water in developing countries. Imagine not having safe drinking water for daily living. Could it be possible to survive without water that is identified as unsafe? According to the United Nations, at least 20 liters of water per person is needed daily to meet their basic needs (cooking, cleaning, and drinking). The sad reality is that over 890 million people worldwide don't have this amount of fresh water available to them. We must strive for a world where water is safe to drink for all people (World Health Organization, 2007).

Dr. Mark D. Sobsey, Professor of Environmental Microbiology at the University of North Carolina, explains that solar disinfection was created by the Swiss Federal Agency for Environmental Science and Technology. Solar disinfection (SODIS) has been proven to purify water. The heat and UV rays from the sunlight are used to destroy the microbes that are present in the water: "Users of SODIS fill 0.3-2.0 liter plastic bottles with low-turbidity water, shake them to oxygenate the water, and place the bottles on a roof or rack for six hours (if sunny) or two days if (cloudy)" (Lantagne, Quick, & Mintz, n.d.). This method is a great way to use natural resources.

Although the sunlight kills microorganisms, time factors remain relevant. The disinfection duration may take hours or even days to prove effective. Education and training of community leaders are important in testing water quality. Sobsey states, "In addition to the essential technical components, the SODIS system for drinking water disinfection also includes important educational, socio-cultural, behavioral and motivational components, such as education and training, behavior modification and motivational training"(p.18). The type of pathogen must also be taken into consideration. There are heat-resistant waterborne pathogens, and it "Often requires several hours to disinfect and even longer (2 days) if cloudy weather; more heat resistant

pathogens inactivated only slowly (rotavirus) or not at all (e.g. hepatitis A virus and bacteria spores)” (Sobsey, 2002, p.17).

Solar disinfection is an inexpensive method to treat contaminated water. “It has been introduced and disseminated by both governments and NGOS (Non-Governmental Organizations) and subjected to economic analysis based on actual costs (estimated at 3 US\$ per year for a household of five people)” (Sobsey, 2002). This estimate is equal to twenty-five cents per month.

The Solar Disinfection method requires small containers in order to be effective. This may be a problem for household that uses large volumes of water. There must be enough water for uses such as cooking and water consumption: “Limited to volumes of 1-several liters per bottle; using 1.5-L bottles (optimum size), several bottles are needed per household per day” (Sobsey, 2002 p. 17).

The sediment in the water should be minimal. If sediment is high, then alternative methods such as filtration should be utilized as a pretreatment. The sediment in the water is also known as NTU (Nephelometric Turbidity Units). “The drawbacks include: Need to pretreat water that appears slightly dirty...” (Latagne, et al., n.d., p. 27). “High turbidity reduction by sedimentation, filtration or other methods” (Sobsey, 2002, p18). The quality of water is important program and should be implemented in local communities.

SODIS water's taste is usually unchanged. This factor may appeal to the local groups, which are accustomed to the taste of dirty water. Cross-contamination increases when water is transferred to other bottles. “Additional advantages include water taste being largely unchanged following treatment and minimal risk of recontamination if water is consumed directly from the bottle in which it was treated” (World Health Organization, 2007, p.29). Sobsey adds, “Provides no chemical disinfectant residual; water must be consumed within a day or so, or else microbial regrowth can occur” (2002, p.18).

Local community education of the SODIS program is a top priority in many countries. People who are unfamiliar with the program are less likely to implement continuation of solar disinfection plan. “Creating awareness of the importance of treating drinking water and establishing corresponding changes in

behavior requires a long-term training approach and repeated contact with the community” (Lantagne et. Al, n.d., p. 26). The World Health Organization echoes this importance: “Experience suggests that educational and promotional messages should target positive ideas, such as clarity, taste, good health, affordability, and ease of use” (2007). Non-Governmental Organizations (NGOS) should be able to serve and educate communities through local leaders and residents In the matter of potable water.

. In conclusion, solar disinfection is simple method of purification of water. It has been shown to destroy different pathogens by heat and UV rays of the sunlight. It becomes vital that water is maintained in the sunlight for a certain time to be effective in microbial destruction, but SODIS can be certainly be used as an inexpensive method for poor third world countries, which lack the government financial support to obtain centralized water purification service. Simply, small containers are required for the program to be successful, but pretreatment with other purification or filtration would be required if water is murky or dirty in appearance. The taste of the water remains unchanged, which can be a positive point for local residents. Education is an important aspect in the duration of the promotion of the SODIS program. This is a good program for poor countries, though, because it is extremely inexpensive. With the continuation of research, this program will serve as an important contribution in the reduction of life-threatening waterborne illness in developing countries.

## References

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