



Supportive Environments for Healthy Communities

Issue 71 September 14, 2012 | Focus on Household Water Treatment & Safe Storage

This issue contains some of the key HWTS literature published so far in 2012 and updates two previous WASHplus weeklies on HWTS. The studies listed below discuss health, behavioral, and economic aspects of HWTS and recent studies on SODIS, BioSand filters, boiling, and other household water treatment methods. Also included is a link to the International Network on Household Water Treatment and Safe Storage communications website.

Please let WASHplus know at any time if you have resources to share for future issues of WASHplus Weekly or if you have suggestions for future topics. An [archive](#) of past Weekly issues is available on the WASHplus website.

GLOBAL/REGIONAL REPORTS

- **Accounting for Water Quality in Monitoring Access to Safe Drinking-Water as Part of the Millennium Development Goals: Lessons from Five Countries.**

WHO Bulletin, Mar 2012. R Bain. ([Full-text](#))

The objective of this study was to determine how data on water source quality affect assessments of progress toward the 2015 Millennium Development Goal (MDG) target on access to safe drinking water. When data on water source quality were taken into account, the percentage of the population that had access to safe drinking water in 2008 was substantially lower in four of the five study countries. The criterion used by the MDG indicator to determine whether a water source is safe can lead to overestimates of the population with access to safe drinking water, and, consequently, also overestimates on the progress made toward the 2015 MDG target.

- **Status of National Household Water Treatment and Safe Storage Policies in Selected Countries, 2012.** WHO. ([Full text, pdf](#))

This report details the responses from a survey and categorizes countries into three tiers of readiness to scale-up HWTS. Based on identified challenges, greater support is needed to develop and implement national HWTS policies, encourage integration with

other health interventions and diarrheal disease prevention efforts, and strengthen monitoring, evaluation, and regulation.

HEALTH IMPACTS

- **High Adherence Is Necessary to Realize Health Gains from Water Quality Interventions.** *PLoS ONE*, May 2012. J Brown, London School of Hygiene and Tropical Medicine. ([Full-text](#))

This study constructed a quantitative microbial risk model to predict gains in health attributable to water quality interventions based on a range of assumptions about pre-treatment water quality; treatment effectiveness in reducing bacteria, viruses, and protozoan parasites; adherence to treatment interventions; volume of water consumed per person per day; and other variables. Results suggest that high adherence is essential in order to realize potential health gains from HWT.

- **Pumps, Germs and Storage: The Impact of Improved Water Containers on Water Quality and Health.** *Health Econ.* June 2012. I Günther. ([Abstract](#))

This study investigated the impact of improved water transport and storage containers on the water quality and health of poor rural households. The results indicate that improved household water infrastructure improves water quality and health outcomes in an environment where point-of-source (POU) water quality is good but where recontamination is widespread, leading to unsafe POU drinking water.

- **A Randomized Controlled Trial of the Plastic-Housing BioSand Filter and Its Impact on Diarrheal Disease in Copan, Honduras.** *Am Jnl Trop Med Hyg*, June 2012. A Fabiszewski de Aceituno. ([Abstract](#))

POU drinking water treatment with the BioSand filter (BSF) allows people to treat their water in the home. The purpose of this research was to determine whether recipients of a BSF would experience a reduction in household diarrheal disease in a randomized controlled trial. A logistic regression adjusting for clustering showed that the incidence of diarrheal disease in children under 5 years was reduced by approximately 45 percent in households that had a BSF compared to those without, but this finding fluctuated depending on the season and was not statistically significant. Households with a BSF had significantly better drinking water quality regardless of water source or season.

- **Traditional Copper Water Storage Vessels and Sub-lethal Injury of *Salmonella enterica* serovar Typhi and *Vibrio cholera*.** *Journal of Water and Health*, No 2 2012. R Sharan, Centre for Plant and Water Science. ([Abstract](#))

Recent studies on *Escherichia coli* have demonstrated sub-lethal injury—sensitivity to oxygen and selective agents prior to irreversible inactivation when kept in water in a brass vessel. The present study was carried out to investigate whether equivalent responses occur in copper vessels using the pathogens *Salmonella enterica* serovar Typhi and *Vibrio cholerae*. These findings have practical implications for the short-term storage of water samples in copper storage vessel as the possibility of bacterial injury is

high.

BEHAVIORAL ASPECTS

- **Boiling as Household Water Treatment in Cambodia: A Longitudinal Study of Boiling Practice and Microbiological Effectiveness.** *Am J Trop Med Hyg*, July 2012. J Brown. ([Abstract](#))

This paper focuses on the consistency of use and microbiological effectiveness of boiling as it is practiced in rural Cambodia. Despite more than 90 percent of households reporting that they used boiling as a means of drinking water treatment, an average of only 31 percent of households had boiled water on hand at follow-up visits, suggesting that actual use may be lower than self-reported use. Storing boiled water in a covered container was associated with safer water than storage in an uncovered container.

- **Determining Behavioral Factors for Interventions to Increase Safe Water Consumption: A Cross-Sectional Field Study in Rural Ethiopia.** *Int J Environ Health Res*. July 2012. A Huber, Eawag: Swiss Federal Institute of Aquatic Science and Technology. ([Abstract](#))

The article presents an approach to designing community interventions based on evidence from quantitative data. After installing a community filter, a baseline study was conducted in 211 households to survey the acceptance and usage of the filter. To identify important psychological factors that lead to health behavior change, the risk, attitude, norm, ability, self-regulation model was taken into account. For every behavioral factor, an intervention potential was calculated. It was found that perceived distance, factual knowledge, commitment, and taste strongly influenced participants' consumption behavior and therefore should be tackled for interventions.

- **The Effect of Water Quality Testing on Household Behavior: Evidence from an Experiment in Rural India.** *Am Jnl Trop Med Hyg*, July 2012. A Hamoudi, Duke University. ([Abstract](#))

How does specific information about contamination in a household's drinking water affect water handling behavior? The treatment group observed a contamination test of the drinking water in their own household storage vessel. While they waited for their results, they were provided with a list of actions to remedy contamination if they tested positive. They reacted by purchasing more of their water from commercial sources rather than make more time-intensive adjustments.

- **Promoting Household Water Treatment through Women's Self Help Groups in Rural India: Assessing Impact on Drinking Water Quality and Equity.** *PLOS ONE*, Sept 2012. M Freeman, Emory University. ([Full text](#))

This study used a case-control study design to evaluate the extent to which the commercial promotion of household water filters through microfinance institutions to women's self-help group members improved access to safe drinking water. This pilot program achieved a 9.8% adoption rate among women targeted for adoption. While

adopters were more likely than non-adopters to have children under 5 years, they were also more educated, less poor, more likely to have access to improved water supplies, and more likely to have previously used a water filter.

- **Systematic Review of Behavior Change Research on Point-of-Use Water Treatment Interventions in Countries Categorized as Low- to Medium-Development on the Human Development Index.** *Social Science & Medicine*, Mar 2012. A Parker Fiebelkorn, Centers for Disease Control and Prevention. ([Abstract](#))
The authors conducted a systematic literature review of published behavioral research on factors influencing adoption of POU water treatment. Despite documented health benefits of POU water treatment interventions in reducing diarrheal diseases, the study found limited peer-reviewed behavioral research on the topic. The scarcity of papers on behavior change with respect to POU water treatment technologies suggests that this field is underdeveloped.

COMMERCIALIZATION/ECONOMIC ASPECTS

- **Carbon Credits and HWTS: A Viable “Green” Funding Mechanism?** 2012. International Network on Household Water Treatment and Safe Storage. ([Link to webinar](#))
Carbon credits and carbon markets are a component of international attempts to mitigate the growth in concentrations of greenhouse gases. Household water treatment and clean cookstove implementers have recently tapped into carbon markets to finance the delivery of their programs. Implementers will share their experiences and webinar participants will have the opportunity to pose questions and learn more about this potentially lucrative, and at times controversial, funding mechanism.
- **Commercialization Toolkit**, 2012. PATH. ([Link to Toolkit](#))
Through illustrative examples and case studies, this toolkit illustrates how PATH has helped partners through the commercialization process in several developing countries. It is organized into eight modules, each covering a different commercial discipline or approach. It is a living toolkit, in the sense that PATH and partners will continue to add and refine the tools and approaches contained within, and it is not meant to be exhaustive.
- **Safe Drinking Water: Who is Willing to Pay the Price?** *Evidence Matters*, Aug 2012. C Null. ([Full-text, pdf](#))
This systematic review asks: Are people willing to pay for clean water and is pricing the only factor influencing how people view its benefits? The review summarizes research from Bangladesh, Ghana, Kenya, and Zambia. Many people are not willing to pay for safe drinking water. Even paying a small fee puts people off using water treatment technologies. Cheaper and innovative technologies and distribution models may encourage people to change their behavior and start using water treatment

technologies that would improve their health.

- **Cambodia – Distribution of Ceramic Water Purifiers through Direct Sales and Retail Sales Pilots in Cambodia**, 2012. PATH. ([Full-text, pdf](#))

In Cambodia, the Safe Water Project piloted two models for the distribution of a branded ceramic water purifier called Tunsai and an improved-design version introduced through the pilot under the brand Super Tunsai. The pilot included a retail sales model using existing retailers at the community/village level, and a direct sales model. This report presents the results from an evaluation of the pilot conducted by Abt Associates in 2010-2011.

- **Distribution of Chujio Ceramic Water Purifier through a Basket of Goods Model in Rural Kenya**, 2012. PATH. ([Full-text, pdf](#))

The basket-of-goods model is one of a number of pilot projects that PATH and partners undertook in Kenya and other countries to find ways of overcoming distribution and marketing barriers that make it difficult for manufacturers of household water treatment and safe storage products to penetrate lower income markets.

- **Learning to Dislike Safe Water Products: Results from a Randomized Controlled Trial of the Effects of Direct and Peer Experience on Willingness to Pay**. *Environ. Sci. Technol*, May 2012. J Luoto. ([Abstract](#))

Low-cost POU safe water products have the potential to reduce waterborne illness, but adoption by the global poor remains low. The authors performed an eight-month randomized trial of four low-cost household water treatment products in Dhaka, Bangladesh. Intervention households received repeated educational messages about the importance of drinking safe water along with consecutive two-month free trials with each of four POU products in random order. Households' willingness to pay for these products was quite low on average (as measured by bids in an incentive-compatible real-money auction), although a modest share was willing to pay the actual or expected retail price for low-cost chlorine-based products.

TREATMENT METHODS

- **Handbook: Sustainable Decentralized Water Treatment for Rural and Developing Communities Using Gasifier Biochar**, 2012. Aqueous Solutions. ([Link to handbook/videos](#))

Contamination of drinking water sources by synthetic organic compounds (SOCs – e.g. pesticides, pharmaceuticals, fuel compounds, etc.) is a growing worldwide problem. SOC's are rarely or not addressed at all in the majority of safe drinking water programs. This site contains resources on water treatment and targeted approaches for removing both biological and chemical threats to drinking water quality.

- **Microbiological Effectiveness of Mineral Pot Filters**, 2012. WaterSHED. ([Presentation, pdf](#))

On July 3, 2012, WaterSHED's Lab Supervisor Chai Ratana presented findings from an evaluation of microbiological effectiveness of Mineral Pot Filters (MPFs) during a monthly water & sanitation sector meeting at the Cambodian Ministry of Rural Development. MPFs are widely used in Cambodia, yet until recently their performance and effectiveness had never been systematically and scientifically tested.

- **Optimizing the Solar Water Disinfection (SODIS) Method by Decreasing Turbidity with NaCl.** *Journal of Water, Sanitation and Hygiene for Development, No 2 2012.* B Dawney. ([Pre-print, full-text](#))

This study investigates the use of common table salt (NaCl) to reduce the turbidity of water containing suspended colloidal clay particles for use in the SODIS method. The results show that NaCl, in combination with high-activity clay particles in solution, may effectively reduce turbidity to levels suitable for SODIS treatment, thereby expanding the number of people who can use the technology effectively.

- **Purifying Drinking Water with Sun, Salt, and Limes.** *Environ Health Perspect, 2012.* A Burton. ([Full text](#))

Sun, salt, and lime juice may sound like ingredients for a vacation margarita, but recent research suggests they can also be used to help purify drinking water easily and cheaply—the type of solutions needed by millions of people in developing countries.

- **Using Limes and Synthetic Psoralens to Enhance Solar Disinfection of Water (SODIS): A Laboratory Evaluation with Norovirus, Escherichia coli, and MS2.** *American Journal of Tropical Medicine and Hygiene, April 2012.* S Alexander. ([Abstract](#))

This study investigated the use of psoralens and limes to enhance SODIS using a UV lamp and natural sunlight experiments. SODIS conditions were replicated using sunlight, 2 liter polyethylene terephthalate (PET) bottles, and tap water with Escherichia coli, MS2 bacteriophage, and murine norovirus.

- **Water Purification Using Moringa oleifera and Other Locally Available Seeds in Fiji for Heavy Metal Removal.** *International Journal of Applied Science and Technology, May 2012.* V Nand. ([Full text](#))

In this paper, the use of local seeds to improve the quality of drinking water in Fiji was investigated. The results showed that Moringa seeds were capable of absorbing the heavy metals tested compared to other seeds in some water samples. The percentage removal by Moringa seeds was 90 percent for copper, 80 percent for lead, 60 percent for cadmium, and 50 percent for zinc and chromium.

WEBSITES

- **International Network on Household Water Treatment and Safe Storage** ([Link](#))

The International Network on Household Water Treatment and Safe Storage (HWTS Network) is a World Health Organization initiative bringing together over 100 key

stakeholders worldwide to promote and scale up the adoption of practices and technologies that improve the quality of household drinking water for vulnerable populations. This site includes the network newsletter, events and conference presentations.

- **WASHplus Household Drinking Water Quality Updates** ([Link](#))

This resource has peer-reviewed literature, research reports, selected news items, etc. on HWTS.

PREVIOUS ISSUES OF WASHplus WEEKLY ON HWTS

- [February 3, 2012](#)
- [July 1, 2011](#)

Each WASHplus Weekly highlights topics such as Urban WASH, Indoor Air Pollution, Innovation, Household Water Treatment and Storage, Hand Washing, Integration, and more. If you would like to feature your organization's materials in upcoming issues, please send them to Dan Campbell, WASHplus knowledge resources specialist, at dacampbell@fhi360.org.



About WASHplus - WASHplus, a five-year project funded through USAID's Bureau for Global Health, creates supportive environments for healthy households and communities by delivering high-impact interventions in water, sanitation, hygiene (WASH) and indoor air pollution (IAP). WASHplus uses proven, at-scale interventions to reduce diarrheal diseases and acute respiratory infections, the two top killers of children under five years of age globally. For information, visit www.washplus.org or email: contact@washplus.org.

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