



Supportive Environments for Healthy Communities

Issue 11 June 3, 2011 | Focus on the Health Impacts of WASH Interventions

This *WASHplus Update* contains 14 articles and reports published in 2010 and 2011 on the health impacts of water, sanitation and hygiene (WASH) interventions. Most of the studies discuss WASH and diarrheal diseases but one study concludes that arsenic in drinking water also increases the risk of lower respiratory tract infections. A March 2011 World Bank review concludes that full household coverage with water and sanitation infrastructure could lead to a total reduction of 2.2 million child deaths per year. A 2010 Cochrane review states that rigorous studies in multiple settings are still needed to clarify the potential effectiveness of excreta disposal in preventing diarrheal diseases. Also included in this issue are links to fact sheets on water and sanitation related diseases and other resources from the World Health Organization.

JOURNAL ARTICLES

- **Arsenic Exposure in Pregnancy Increases the Risk of Lower Respiratory Tract Infection and Diarrhea during Infancy in Bangladesh**, IN: *Environ Health Perspect.* May 119(5) 2011. Rahman, International Centre for Diarrhoeal Disease Research. ([Link to full-text](#))

Arsenic exposure during pregnancy was associated with increased morbidity in infectious diseases during infancy. Taken together with the previous evidence of adverse effects on health, the findings strongly emphasize the need to reduce arsenic exposure via drinking water.

- **Effects of sewerage on diarrhoea and enteric infections: a systematic review and meta-analysis**, IN: *Lancet Infectious Diseases*, (10)4 August 2010. G. Norman. ([Link to full-text](#)) (Full-text is free but registration required)

Twenty-five studies investigated the association between sewerage and diarrhoea or related outcomes, including presence of intestinal nematodes. Pooled estimates show that sewerage systems typically reduce diarrhea incidence by about 30% or perhaps as much as 60% when starting sanitation conditions are very poor. Sewerage interventions seem to reduce the incidence of diarrhea and related outcomes.

However, cautious interpretation of these findings is recommended, because, in many contexts, sewerage might be less cost effective and sustainable than onsite alternatives.

- **Effects of Water and Sanitation Crisis on Infants and Under-five Children in Africa**, IN: *Journal of Environmental Science and Technology* (4)2 2011. O. Eneh. ([Link to full-text](#))

This review critically examines secondary information and data on sources of water contamination and the effects of water and sanitation crisis on infants and under-five children in Africa. Methaemoglobinemia (Blue Baby Syndrome), dehydration, malnutrition and loss of parents associated with high maternal mortality ratio and water and sanitation related low life expectancy afflict children, leading to high mortality rate and morbidity of infants and under-five children. Recommendations include emphasis on preventive healthcare and pro-poor health policies to ensure the quality and availability of safe water.

- **Interventions to Improve Disposal of Human Excreta for Preventing Diarrhea**, IN: *Cochrane Database Syst Rev June* (16)6 2010. Clasen TF, LSHTM. ([Link to full-text](#))

This review provides some evidence that interventions to improve excreta disposal are effective in preventing diarrheal disease. However, this conclusion is based primarily on the consistency of the evidence of beneficial effects. The quality of the evidence is generally poor and does not allow for quantification of any such effect. The wide range of estimates of the effects of the intervention may be due to clinical and methodological heterogeneity among the studies, as well as to other important differences, including exposure levels, types of interventions, and different degrees of observer and respondent bias. Rigorous studies in multiple settings are needed to clarify the potential effectiveness of excreta disposal on diarrhea.

- **Purification of Household Water Using a Novel Mixture Reduces Diarrhoeal Disease in Matlab, Bangladesh**, IN: *Trans R Soc Trop Med Hyg. Jun*;105(6) 2011. Islam MS, International Centre for Diarrhoeal Disease Research. ([Link to abstract](#))

In Bangladesh, one of the main causes of waterborne diseases is related to the use of contaminated surface water. This pilot study was conducted to determine the acceptability and effectiveness of a recently developed surface water purifying mixture to prevent diarrhoeal diseases in a rural community in Bangladesh. The mixture, using a combination of alum potash, bleaching powder and lime, is added to 15 liters of surface water and mixed; the water becomes suitable for drinking after 30 minutes. A total of 420 households from 15 villages were provided with the mixture and were taught how to use it. A total of 83 diarrhoeal patients were treated at Matlab Hospital from 1613 control families, but only one patient was treated for diarrhea from among the intervention families. Among the intervention families, 73 families decided to shift from using tube well water to surface water using the mixture. The mixture could be

used as a cheaper, easier and simpler point-of-use water treatment strategy in Bangladesh.

- **Relationship of the Presence of a Household Improved Latrine with Diarrhea and Under-Five Child Mortality in Indonesia**, IN: *Amer Jnl Trop Med Hyg*, (84)3 2011. R. Semba, Johns Hopkins University. ([Link to abstract](#))

Among rural and urban families, respectively, lack of an improved latrine was associated with a child history of diarrhea in the last 7 days and under-five child mortality. The lack of a household improved latrine is associated with diarrhea and under-five child mortality in Indonesia.

- **Sanitation and Health**, IN: *PLoS Med* 7(11) 2010. D, Mara, University of Leeds. ([Link to full-text](#))

The diseases associated with poor sanitation are particularly correlated with poverty and infancy and alone account for about 10% of the global burden of disease. At any given time close to half of the urban populations of Africa, Asia, and Latin America have a disease associated with poor sanitation, hygiene, or water.

- **Scaling Up Diarrhea Prevention and Treatment Interventions: A Lives Saved Tool Analysis**, IN: *PLoS Med*. Mar.(8)3 2011. CL Fischer. Johns Hopkins University. ([Link to full-text](#))

Diarrhea remains a leading cause of mortality among young children in low- and middle-income countries. Although the evidence for individual diarrhea prevention and treatment interventions is solid, the effect a comprehensive scale-up effort would have on diarrhea mortality has not been estimated. This study used the Lives Saved Tool (LiST) to estimate the potential lives saved if two scale-up scenarios for key diarrhea interventions (oral rehydration salts [ORS], zinc, antibiotics for dysentery, rotavirus vaccine, vitamin A supplementation, basic water, sanitation, hygiene, and breastfeeding) were implemented in the 68 high child mortality countries.

- **A Systematic Review and Meta-analysis of the Association between Self-reported Diarrheal Disease and Distance from Home to Water Source**, IN: *Am J Trop Med Hyg*. Sep 83(3) 2010. Wang X. University of East Anglia, Norwich, UK. ([Link to abstract](#))

The aim of this study was to identify whether there was a relationship between the distance that people have to carry water home and ill health. A systematic review was conducted for papers that reported on the association between diarrheal risk and distance. The combined odds ratio showed a significant increase in illness risk in people living farther away from their water source. There is a need for better designed studies to further elucidate the health impacts on having to carry water home.

- **Water, Sanitation and Hygiene for the Prevention of Diarrhoea**, IN: *Int J Epidemiol*. April 2010. Cairncross S. London School of Hygiene & Tropical Medicine. ([Link to full-text](#))

This study finds diarrhoea risk reductions of 48, 17 and 36%, associated respectively, with handwashing with soap, improved water quality and excreta disposal as the estimates of effect for the LiST model. Most of the evidence is of poor quality. More trials are needed, but the evidence is nonetheless strong enough to support the provision of water supply, sanitation and hygiene for all.

REPORTS

- **The Economic Impacts of Inadequate Sanitation in India**, 2010. Water and Sanitation Program. ([Link to full-text](#))

Under the health-related impact of Rs.1.75 trillion (US\$38.5 billion), diarrhea is the largest contributor, amounting to two-thirds of the total impact. This is followed by Acute Lower Respiratory Infection (ALRI), accounting for 12 percent of the health-related impacts.

- **Water and Sanitation to Reduce Child Mortality: The Impact and Cost of Water and Sanitation Infrastructure**, 2011. World Bank. ([Link to full-text](#))

Using household survey data, this paper estimates the mortality impact of improved water and sanitation access in order to evaluate the potential contribution of water and sanitation investment toward achieving child mortality targets. According to the estimates, full household coverage with water and sanitation infrastructure could lead to a total reduction of 2.2 million child deaths per year in the developing world. The results suggest that investment in water and sanitation is a highly cost-effective policy option, even when only the mortality benefits are taken into consideration. Taking into account the additional expected benefits, such as reduced morbidity, time spending, and environmental hazards, would further increase the benefit-cost ratio.

- **Water, Sanitation and Children's Health: Evidence from 172 DHS Surveys**, 2010. World Bank. ([Link to full-text](#))

This paper combines 172 Demography and Health Survey data sets from 70 countries to estimate the effect of water and sanitation on child mortality and morbidity. The results show a robust association between access to water and sanitation technologies and both child morbidity and child mortality. The point estimates imply, depending on the technology level and the sub-region chosen, that water and sanitation infrastructure lowers the odds of children to suffering from diarrhea by 7-17 percent, and reduces the mortality risk for children under the age of five by about 5-20 percent.

- **Water, Sanitation and Hygiene Interventions to Combat Childhood Diarrhoea in Developing Countries**, 2009. H. Waddington, International Initiative for Impact Evaluation. ([Link to full-text](#))

This report is a review of impact evaluations examining effectiveness of water, sanitation and hygiene interventions in reducing childhood diarrhoea. A comprehensive search was conducted of published and unpublished materials. Studies were identified for inclusion which employed rigorous impact evaluation techniques, using

experimental (randomised assignment) and quasi-experimental methods, and which evaluated the impact of water, sanitation and/or hygiene interventions on diarrhoea morbidity among children in low- and middle-income countries. Sixty-five rigorous impact evaluations were identified for quantitative synthesis, covering 71 distinct interventions assessed across 130,000 children in 35 developing countries during the past three decades.

WEBSITES

- Kaiser Family Foundation - **Global Health Interventions: Waterborne Diarrhea** - ([Link to website](#)) - This web-based tool summarizes findings for a range of prevention and treatment interventions designed to reduce the risk of death and disease in the developing world.
- WHO - **Facts and Figures: Water, Sanitation and Hygiene Links to Health** - ([Link to website](#)) - This site provides statistics on water and sanitation related diseases.
- WHO - **Water and Sanitation Related Diseases Fact Sheets** - ([Link to website](#)) - This page contains links to fact sheets on cholera, diarrhea, typhoid and other diseases.
- WHO - **WASH Burden of Disease and Cost-effectiveness Estimates** - ([Link to website](#)) - WHO has undertaken a cost-effectiveness analysis and a cost-benefit analysis at the global level. The costs, the health benefits and the additional benefits of a range of selected interventions to improve water and sanitation services were assessed for each of the 14 WHO sub-regions.

WASHplus Updates will highlight topics such as Urban WASH, Indoor Air Quality, Innovation, Household Water Treatment and Storage, Handwashing, 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@aed.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 quality (IAQ). 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 contact: washplus@aed.org.

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