



Supportive Environments for Healthy Communities

Issue 40 January 27, 2012 | **Year in Review - Health Impacts of WASH and IAP Interventions from 2011**

This *WASHplus Weekly* issue contains nine 2011 studies on the health impacts of water, sanitation, and hygiene (WASH) interventions and seven 2011 studies on the health impacts of interventions to prevent or reduce indoor air pollution. One WASH study (Water and Sanitation Program) calculates the economic costs to five East Asia countries due to losses related to poor sanitation. On the IAP side, a study (Dix-Cooper) investigated whether early life chronic exposure to wood smoke is associated with children's neurodevelopmental and behavioral performance. This seems to be the first study of its kind. Please let WASHplus know if you have additional resources on this topic or if you have suggestions for future *Weekly* topics.

WATER, SANITATION, AND HYGIENE (WASH)

- **Economic Aspects of Sanitation in Developing Countries**, *Environ Health Insights*, Oct 2011. H Van Minh, Hanoi Medical University, Hanoi, Vietnam. ([Full-text](#))
This paper, by gathering relevant research findings, aims to report and discuss currently available evidence on the economic aspects of sanitation, including the economic impacts of unimproved sanitation and the costs and economic benefits of some common improved sanitation options in developing countries. Given the current state of knowledge, sanitation is undeniably a profitable investment. It is clear that achieving the MDG sanitation target not only saves lives but also provides a foundation for economic growth.
- **The Effect of Water and Sanitation on Child Health: Evidence from the Demographic and Health Surveys 1986-2007**, *Int J Epidemiol*, Oct 2011. G Fink, Harvard School of Public Health. ([Journal article abstract](#)) | ([Full-text report](#))
Access to improved sanitation was associated with lower mortality, a lower risk of childhood diarrhea, and a lower risk of mild or severe stunting. Access to improved water was associated with a lower risk of diarrhea and a lower risk of mild or severe stunting, but did not show any association with noninfant child mortality. Although the study's estimates indicate somewhat smaller protective effects than some of the

estimates reported in the existing literature, the results presented in this article strongly underline the large health consequences of lacking access to water and sanitation for children aged <5 years in low- and middle-income countries.

- **Geographical Analysis of the Role of Water Supply and Sanitation in the Risk of Helminth Infections of Children in West Africa**, *Proc Natl Acad Sci USA*, Dec 2011. R Soares Magalhaes, University of Queensland. ([Abstract](#))

This study aimed to quantify the role of WASH in the risk of contracting *Schistosoma hematobium*, *Schistosoma mansoni*, and hookworm infection in school-aged children; to estimate the population attributable fraction of helminth infection due to WASH; and to spatially predict the risk of infection. It generated predictive maps of areas in West Africa without piped water, toilet facilities, and improved household floor types, using spatial risk models. Five percent of hookworm cases could have been prevented if improved toilet facilities had been available. Mapping the distribution of infection risk adjusted for WASH allowed the identification of communities in West Africa where preventive chemotherapy integrated with interventions to improve WASH will yield the greatest health benefits.

- **Health System Determinants of Infant, Child and Maternal Mortality: A Cross-sectional Study of UN Member Countries**, *Global Health*, Oct 2011. K Muldoon, British Columbia Centre for Excellence in HIV/AIDS. ([Full-text](#))

Few studies have examined the link between health system strength and important public health outcomes across nations. This study examined the association between health system indicators and mortality rates. Several key measures of a health system predict mortality in infants, children, and maternal mortality rates at the national level. Improving access to water and sanitation and reducing corruption within the health sector should become priorities.

- **Integrating Hygiene Promotion into World Bank Projects: Experiences from Colombia and Peru**, 2011. R Florez, Water and Sanitation Program. ([Full-text](#))

Research is increasingly pointing to hygiene promotion, specifically hand washing with soap, as the most effective method to reduce not only the risk of diarrhea, but also of acute respiratory infections. Clean water supply and appropriate sanitation facilities play a major role in preventing the transmission of bacteria and viruses that cause diarrhea. When all benefits are taken into consideration, investments in hygiene, sanitation, and water yield a net benefit ranging from US \$3 to \$46 per dollar invested, not counting the value-added of an increase in school attendance, as data suggest, among families with access to safe water and proper sanitation.

- **Policy Interventions to Address Health Impacts Associated with Air Pollution, Unsafe Water Supply and Sanitation, and Hazardous Chemicals**, 2011. OECD Environment Working Papers, No. 35. A Hunt, University of Bath. ([Full-text](#))

This document was developed based on an analysis of recent peer-reviewed literature

and focuses on studies that value the impacts of human exposure to outdoor air pollution, unsafe water supply, and sanitation and hazardous chemicals, and the costs of policy interventions to address such impacts. Based on this review, the report describes the degree to which conclusions can be drawn, with confidence, about the effectiveness of these policy interventions.

- **Scaling Up Diarrhea Prevention and Treatment Interventions: A Lives Saved Analysis**, *PLoS Medicine*, Mar 2011. C Fischer Walker, Johns Hopkins University. ([Full-text](#))

The researchers calculated 2010 coverage values for seven prevention interventions (breastfeeding, vitamin A supplementation, hand washing with soap, improved sanitation, improved water source, better household water treatment, and rotavirus vaccination) and for three treatment interventions (ORS, zinc supplementation, and antibiotics for dysentery) from published data. They then used *LiST* to estimate the effect on diarrhea deaths of scaling up intervention coverage according to two scenarios.

- **Water, Sanitation and Hygiene: Foundations of Development**, 2011. C Brocklehurst, UNICEF. ([Full-text](#))

Perhaps no set of interventions underpins the attainment of Millennium Development Goals more critically than water, sanitation, and hygiene. Water scarcity, degrading water quality, lack of access to both adequate sanitation and clean drinking water, and poor hygiene increase disease; contribute to malnutrition; disadvantage women; undermine economic growth; and threaten development, peace, and security.

- **What Are the Economic Costs of Poor Sanitation and Hygiene?** 2011. Water and Sanitation Program. ([Full-text](#))

The Economics of Sanitation Initiative, launched in 2007 with a WSP study from East Asia, found that the economic costs of poor sanitation and hygiene amounted to over US \$9.2 billion a year (2005 prices) in Cambodia, Indonesia, Lao PDR, the Philippines, and Vietnam, affecting a total population of more than 400 million. The groundbreaking study was the first of its kind to attribute dollar amounts to a country's losses from poor sanitation.

INDOOR AIR POLLUTION (IAP)

- **Association Between Indoor Air Pollution Measurements and Respiratory Health in Women and Children in Lao PDR**, *Indoor Air*, Feb 2011. K Mengersen, Queensland University of Technology, Brisbane. ([Full-text](#))

While there have been other studies published on indoor air quality in other developing countries, the situation in Laos is different because the majority of houses in Laos use wood stoves, and therefore, emissions from wood burning are the dominant source of indoor air pollution. This study quantified, for the first time, concentrations in two provinces in Lao PDR and shed light on the impact of human activities and urban

design on pollutant concentrations and respiratory health.

- **Does Domestic Cooking Environment Influence Risk of Respiratory Morbidities in Rural Indian Women?** *International Journal of Collaborative Research on Internal Medicine & Public Health*, Jan 2012. N Sukhsohale, Indira Gandhi Government Medical College. ([Full-text](#))

This study is an attempt to assess the risks associated with indoor air pollution in the context of adverse domestic cooking conditions for rural women of central India. It concludes that even partial reduction of biomass use may be beneficial in improving the lung function of rural, nonsmoking women in spite of having an inadequate domestic cooking environment.
- **Effect of Reduction in Household Air Pollution on Childhood Pneumonia in Guatemala (RESPIRE): a Randomised Controlled Trial**, *Lancet* Nov 2011. K Smith, University of California, Berkeley. ([Full-text](#))

Pneumonia causes more child deaths than does any other disease. Observational studies have indicated that smoke from household solid fuel is a significant risk factor that affects about half the world's children. This study investigated whether an intervention to lower indoor wood smoke emissions would reduce pneumonia in children.
- **Intervention to Lower Household Woodsmoke Exposure in Guatemala Reduces ST-segment Depression on Electrocardiograms**, *Environ Health Perspect*, Nov 2011. J McCracken, Harvard School of Public Health. ([Full-text](#))

A large body of evidence suggests that fine particulate matter air pollution is a cause of cardiovascular disease, but little is known in particular about the cardiovascular effects of indoor air pollution from household use of solid fuels in developing countries. The stove intervention in this study was associated with reduced occurrence of nonspecific ST-segment depression, suggesting that household wood smoke exposures affect ventricular repolarization and potentially cardiovascular health.
- **Neurodevelopmental Performance Among School Age Children in Rural Guatemala Is Associated with Prenatal and Postnatal Exposure to Carbon Monoxide, a Marker for Exposure to Woodsmoke**. *Neurotoxicology*, Sept 2011. L Dix-Cooper, University of California, Berkeley. ([Abstract](#))

This study investigated whether early life chronic exposure to wood smoke, as an indicator, is associated with children's neurodevelopmental and behavioral performance. This seems to be the first study on wood smoke exposure and neurodevelopment, and the first longitudinal birth cohort study on chronic early life CO exposures, determined by high quality measures of mothers' and infants' personal carbon monoxide exposures, and well-established, reliable child neuropsychological tests.

- **Prevalence of Chronic Obstructive Pulmonary Disease in Rural Women of Tamilnadu: Implications for Refining Disease Burden Assessments Attributable to Household Biomass Combustion**, *Global Health Action* Nov 2011. P Johnson, Sri Ramachandra University, India. ([Full-text](#))

Chronic obstructive pulmonary disease (COPD) is the 13th leading cause of burden of disease worldwide and is expected to become fifth by 2020. Biomass fuel combustion significantly contributes to COPD, although smoking is recognized as the most important risk factor. This study was conducted to estimate the prevalence of COPD and its associated factors among nonsmoking rural women in Tiruvallur district.

- **Respiratory Health Effects of Air Pollution: Update on Biomass Smoke and Traffic Pollution**, *Clin Rev Aller Immun*, Jan 2012. R Laumbach, Occupational Health Sciences Institute, University of Medicine and Dentistry of New Jersey. ([Full-text](#))
- Newer methods for measuring and modeling exposures are beginning to unravel complex associations with asthma and other respiratory tract diseases. These studies indicate that air pollution from these sources is a major preventable cause of increased incidence and exacerbation of respiratory disease.

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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