



Issue 132 January 31, 2014 | Focus on Handwashing

Periodic Overview of Handwashing Literature: Summary of Selected Peer-Reviewed and Grey Literature Published January–June 2013

This weekly issue features a literature review prepared for the Global Public-Private Partnership for Handwashing (PPPHW) by Jelena Vujcic (University at Buffalo), Pavani K. Ram (University at Buffalo), Dan Campbell (CARE/WASHplus), and Katie Carroll (PPPHW).

The review provides a summary of 21 studies and reports that were published from January through June 2013. The publications are organized under the categories of: risk factors and disease prevalence; handwashing and health outcomes; factors that affect handwashing behavior and handwashing measurement. A [PDF version](#) of the review can be found on the PPPHW website.

RISK FACTORS AND DISEASE PREVALENCE

The first paper of the Lancet series on childhood pneumonia and diarrhea estimates that, in 2010, there were 1.73 billion episodes of diarrhea and 120 million episodes of pneumonia in children less than 5 years old globally. In 2011, an estimated 700,000 episodes of diarrhea and 1.3 million episodes of pneumonia led to death with a high proportion of deaths occurring in the first two years of life for both diseases (72% for diarrhea and 81% for pneumonia). ([Walker et al. 2013](#))

Ashraf and colleagues found that children under 5 years old from a cohort of 873 households in Karachi, Pakistan, were at a 6% increased risk of pneumonia for every additional day of diarrhea within a two week period. This suggests that public health programs that prevent diarrhea may also reduce the risk of respiratory illness. ([Ashraf et al. 2013](#))

A case-control study in a Cairo hospital that compared children with diarrhea (cases) to children without diarrhea (controls) found that not having soap at the toilet, having no towels in a bathroom, and sharing a toilet with other families were (modifiable) risk factors for a child having diarrhea. ([Mansour et al. 2013](#))

Among school-aged children in Tajikistan, handwashing after using the toilet (OR=0.78) and after handling animals (OR=0.66) were significant protective factors against *E. vermicularis* infections (the most prevalent intestinal helminth infection among the population tested) in a

cross-sectional survey. ([Sherkhonov et al. 2013](#))

Take away for implementers:

In 2010 and 2011, diarrhea and pneumonia episodes among children less than 5 years old remained high and led to a large number of deaths, especially in the first two years of life.

Programs that prevent diarrhea may also reduce the risk of pneumonia.

Lack of soap at a toilet, no towels in the bathroom, and sharing a toilet may be more frequently observed among children with diarrhea than among well children.

Handwashing after using the toilet and after handling animals may be protective against certain helminth infections but more rigorous investigation is needed to assess this relationship.

HANDWASHING AND HEALTH OUTCOMES

A cluster randomized controlled trial evaluating an at-scale handwashing behavior change program (reaching approximately 1.5 million people and specifically targeting mothers and caregivers; evaluation occurred among subset of approximately 3,100 households) in Vietnam (WSP) showed those exposed to the campaign had slightly higher availability of handwashing materials in the household and reported washing hands at some of the times promoted by the campaign compared to those who were not exposed to the program. However, observed handwashing with soap at critical times was low and not different between those exposed and unexposed to the handwashing campaign. They found no impact of the program on health or productivity. The authors conclude that, even where knowledge and access to soap and water are not constrained, large scale behavior change campaigns must balance intensity of the intervention with effectiveness. ([Chase and Do. 2012](#))

A randomized controlled trial evaluating new approaches to promoting handwashing with soap in Peru (WSP) found that mass media alone had no significant effect on exposing target communities to handwashing promotion messages and thus no effect on knowledge or behavior. The program targeted 800 districts in 104 provinces and specifically targeted mothers of reproductive age (15 to 49 years), caregivers of children under 5 years old, and children up to 12 years old, and the evaluation was among approximately 3,500 households. However, a community-level intervention (included community and school activities) was able to reach the audience with handwashing promotion messages, improve knowledge related to handwashing, and improve self-reported and observed handwashing with soap at critical times. They did not observe any significant improvements in health of children less than five 5 years old. The authors conclude that changing behavior to improve health requires intensive and more personalized interventions. ([Galiani et al. 2012](#))

In a cluster randomized intervention trial, Bieri and colleagues assessed the effects of an interactive education package (including handwashing) on incidence of helminth infection among school children in rural China. The incidence of soil-transmitted helminth infection was 50% lower (4.1%) among schoolchildren (9-10 years old) that received the interactive learning package compared to the control group that received posters (8.4%). Schoolchildren that received the intervention had 90% higher mean score for knowledge of helminths and had twice as high prevalence of handwashing after using the toilet in the school compared to

the control group. The authors concluded that culturally appropriate, age-appropriate, relatable education approaches based in behavioral theory can improve education, change behavior, and improve health outcomes. ([Bieri et al. 2013](#))

In Sofala Province, Mozambique, Davis and colleagues examined the nutrition-related behavior of mothers and the nutrition status of children less than 2 years old before and after an intervention that used a care group model to teach newborn survival and nutrition skills. A community volunteer for every 12 households and 6.6 paid project staff per 100,000 people delivered messages to 50,000 households. Volunteers were trained to teach messages and skills, one of which included handwashing as an essential nutrition action (construction of a handwashing station, critical times). There were 30% to 50% differences in reported handwashing of mothers of children less than 2 years before preparing food, before eating, after defecating, and after attending to a child who has defecated. Undernutrition (weight-for-age Z-score less than two standard deviations below international standard median/mean) declined by 8.1 percentage points over a five-year period in children under 2, four times the rate of decline in children under 5 years nationwide in Mozambique. The project cost was \$0.55 per capita per year and \$2.78 per beneficiary per year. This evaluation did not include a comparison group and, therefore, the reader cannot be sure the observed effects are attributed to the program only. However, the difference between the effects seen in the evaluation and the national rates suggest the project may have contributed to the observed effects. ([Davis et al. 2013](#))

Evaluation of the Fit for School Program in the Philippines showed that, after one year, children in the intervention group significantly increased their body mass index, and had a lower prevalence of moderate or severe soil-transmitted helminth infection compared to the control group. The intervention group had daily supervised handwashing with soap and clean water as a group, daily supervised tooth brushing as a group, and biannual deworming at school. ([Monse et al. 2013](#))

Lin et al. found that children from “cleaner” households (includes having soap and water at a handwashing station) had a 0.5 standard deviation higher height-for-age Z-score (indicator of growth) and a 0.32 lower L:M ratio in urine (indicator of intestinal absorption) compared to children from “less clean” households. These results support the hypothesis that fecal contamination of the environment could be a cause of growth faltering in young children and is mediated through environmental enteropathy. However, more robust evidence of this mechanism is needed. ([Lin et al. 2013](#))

Systematic review of evidence of the effects of WASH interventions (individually or in combination) on nutritional status of children reports there is no evidence of effect on weight-for-age Z-score, weight-for-height Z-score, and borderline significant effect on height-for-age Z-score. Authors report the duration of the studies included in the meta-analysis were relatively short and none were of high methodological quality. However, larger trials are underway to understand this with more rigor. ([Dangour et al. 2013](#))

Take away for implementers:

Where knowledge and access to materials are not notable barriers, large scale handwashing promotion programs may need more rigor or intensity to improve handwashing behavior.

Community and school level interventions appear to work better than large mass media

campaigns at reaching community members and improving handwashing behavior in Peru.

Two different participatory school-based approaches (that include hand hygiene) demonstrated improvements in helminth infection among school children.

A community level intervention using a care group model was able to improve mothers' handwashing behavior at certain critical times and improve the nutritional status of their children over a five-year period at a cost of \$0.55 per capita per year and \$2.78 per beneficiary per year.

Households with better WASH environments (including having a handwashing station with soap and water) had better growth indicators and gut absorption compared to children with worse WASH environments in the household.

Current evidence about the effects of WASH interventions on children's nutritional status show little benefit, but the studies pointing to this conclusion lack rigor. A number of trials are ongoing to better assess this relationship.

FACTORS THAT AFFECT HANDWASHING BEHAVIOR

A follow-up of the Karachi Soap Health Study (Luby et al. *Lancet* 2005) showed that intervention households (those that received soap and weekly handwashing education for nine months in 2003) were 3.4 times more likely to have soap at the household handwashing station, knew more key times to wash hands, and reported purchasing more soap than control households five years after the study completion. The authors state these results suggest habituation of improved handwashing practices, but they cannot be certain these indicators correspond to handwashing behavior because these are proxy indicators. ([Bowen et al. 2013](#))

Based on an evaluation of BRAC's WASH program using a pre-/post-intervention design among 26,404 households in rural Bangladesh, researchers reported a gap between knowledge of handwashing at critical times and self-reported practice of handwashing at those critical times. Education, water access, and access to media were predictive of reporting handwashing with soap. ([Rabbi and Dey. 2013](#))

In a cross-sectional study, researchers found that adolescents (10-19 years old) from rural Indian households who reported washing their hands with soap after defecation and before eating food were more likely to have a reported good handwashing practice by their mother, a sanitary latrine, soap at a handwashing location, an in-house water supply, and higher per capita income compared to adolescents who reported not washing their hands with soap before eating or after defecation. Some of the predictors of good handwashing behavior found here are consistent with previous work. About 32% of the 442 adolescents interviewed reported washing hands with soap after defecation and before eating. ([Dobe et al. 2013](#))

One study qualitatively assessed a teacher-centered participatory handwashing with soap intervention among multi-ethnic primary schools in rural Vietnam. From semi-structured interviews, focus group discussions, and observations, the authors reported children, schoolteachers, and parents viewed the intervention as positive and feasible, regardless of ethnicity, the schoolchild's gender, and the schoolteachers' background. Important barriers to maintaining and transferring good handwashing behavior to the home were: lack of hygiene

lessons in the standard curriculum of schools, lack of prioritization and time dedicated to practical teaching methods, and lack of guidance and reminders to wash hands regularly at home. Continuous access to soap and water may be a challenge at schools but did not seem to be a barrier at home. ([Xuan le et al. 2013](#))

Formative research from southern Tanzania explored hygiene practices at birth and newborn care in home deliveries. Respondents reported that insertion of any family member's hands into the vagina of a delivering woman to check for labor progress was common practice—highlighting an important role for hand hygiene during birth for women in this community. Birth attendants did not discuss handwashing and wearing of gloves as being important for newborn health, and the practice of handwashing and wearing gloves varied. Respondents cited that lack of water, lack of gloves, and lack of awareness are significant barriers to good hand hygiene practice during delivery. Respondents deemed most recommended birth hygiene and newborn care behaviors acceptable and could be changed with improved awareness. ([Shamba et al. 2013](#))

In Nepal, researchers found that a community hygiene intervention reduced child diarrhea by 40% using quantitative methods, but qualitative methods showed the intervention did not reach the ultra-poor. The authors argue that a social marketing approach focuses on individual factors instead of structural limitations to good behavior and can thus exacerbate health inequity. Social marketing should be used within a range of interventions that also address structural drivers of behavior change. Qualitative methods in formative research and evaluation phases of a health intervention can address issues of program/intervention equity. ([Langford and Panter-Brick 2013](#))

Take away for implementers:

Frequent handwashing promotion and provision of soap to households may influence habit adoption but current evidence is suggestive.

Level of education, water access, and access to media remain important predictors of reported handwashing practice among adults. Access to a sanitary latrine, soap and water at a handwashing place, in-house water supply, higher per capita income, and reporting that their mother has good handwashing practice were predictors of good handwashing behavior (self-reported) by adolescents.

School-based handwashing programs that are motivating and engaging to students and teachers can still face structural barriers to good handwashing practice such as continuous access to soap and water.

Birth attendants and mothers from a community in Tanzania deemed improved awareness as the key to better hand hygiene behavior at birth and for newborn care, especially to mitigate risk for certain practices around the birth.

One study showed a social marketing approach should be deployed with interventions that also address structural determinants of behavior change. Qualitative work during the formative and evaluation phases of a program can help identify inequity issues to program implementation.

HANDWASHING MEASUREMENT

We did not find any articles published between January and June 2013 that assessed methods to measure handwashing behavior.

ADVOCACY

Paper two of the Lancet series on childhood pneumonia and diarrhea outlines interventions to address deaths equitably from these causes by looking at what works and at what cost. The authors explore environmental interventions (like WASH), nutrition, vaccinations, and treatment along with delivery platforms. Authors assessed the potential effect on lives saved if interventions were scaled up to reach 80% coverage by 2025. WASH interventions could prevent almost the same amount of child deaths as Hib, pneumococcal, and rotavirus vaccines (500,000). Handwashing alone was estimated to avert about 170,000 deaths from diarrhea and pneumonia. Cost analysis shows WASH interventions are historically less expensive than vaccines and would be marginally less expensive to scale up by 2025 in 75 “countdown countries.” ([Bhutta et al. 2013](#))

Paper three of the Lancet series on childhood pneumonia and diarrhea explores bottlenecks, barriers, and solutions from multi-country consultations focused on reducing child deaths from diarrhea and pneumonia. Advocacy for WASH interventions to increase awareness and support was one of five main proposed solutions. Social marketing was recommended to “aggressively promote desirable behaviors and discourage undesirable practices.” Advocacy should include multiple stakeholders such as national governments and policymakers to support childhood survival programs, train effective and motivated health workers, invest in long-term, large-scale public infrastructure to develop sanitation systems, and convince communities of the benefits of hand, water, and food hygiene. ([Gill et al. 2013](#))

Take away for implementers

Handwashing with soap is estimated to avert a large number of deaths from diarrhea and pneumonia with substantial scale up over the next 10 years and remains less expensive to scale up than vaccines.

Advocacy for WASH is one of five recommended solutions to reduce childhood morbidity and mortality from diarrhea and pneumonia.

ADDITIONAL RESOURCES

WaterAid's hygiene framework outlines its strategic guidance for country programs to develop or refine approaches to hygiene. This is an example of a framework for hygiene promotion and behavior change. ([Link](#))

DFID's evidence paper outlines the strength of current evidence on WASH interventions' effects on health and development and identifies knowledge gaps. ([Link](#))

CITATIONS

Ashraf S, Huque MH, Kenah E, Agboatwalla M, and Luby SP. 2013. **Effect of recent diarrhoeal episodes on risk of pneumonia in children under the age of 5 years in Karachi, Pakistan**. *International Journal of Epidemiology* 42(1):194–200.

Bhutta ZA, Das JK, Walker N, Rizvi A, Campbell H, Rudan I, Black RE, Lancet D, and Pneumonia Interventions Study G. 2013. **Interventions to address deaths from childhood pneumonia and diarrhoea equitably: what works and at what cost?** *Lancet* 381(9875):1417–1429.

Bieri FA, Gray DJ, Williams GM, Raso G, Li YS, Yuan L, He Y, Li RS, Guo FY, Li SM et al. 2013. **Health-education package to prevent worm infections in Chinese schoolchildren.** *The New England Journal of Medicine* 368(17):1603-1612.

Bowen A, Agboatwalla M, Ayers T, Tobery T, Tariq M, and Luby SP. 2013. **Sustained improvements in handwashing indicators more than 5 years after a cluster-randomised, community-based trial of handwashing promotion in Karachi, Pakistan.** *Tropical Medicine & International Health* 18(3):259-267.

Chase C and Do Q. 2012. Water and Sanitation Program (WSP) Policy Research Working Paper. **Handwashing behavior change at scale, evidence from a randomized evaluation in Vietnam.** ([Link](#))

Dangour AD, Watson L, Cumming O, Boisson S, Che Y, Velleman Y, Cavill S, Allen E, and Uauy R. 2013. **Interventions to improve water quality and supply, sanitation and hygiene practices, and their effects on the nutritional status of children.** *The Cochrane Database of Systematic Reviews* 8:CD009382.

Davis TP, Wetzel C, Hernandez Avilan E, De Mendoza Lopes C, Chase RP, Winch PJ, and Perry HB. 2013. **Reducing child global undernutrition at scale in Sofala Province, Mozambique, using care group volunteers to communicate health messages to mothers.** *Global Health: Science and Practice* 1(1):35-51.

Dobe M, Mandal RN, and Jha A. 2013. **Social determinants of good hand-washing practice (GHP) among adolescents in a rural Indian community.** *Family & Community Health* 36(2):172–177.

Galiani S, Gertler P, and Orsola-Vidal A. 2012. WSP Policy Research Working Paper. **Promoting handwashing behavior in Peru: the effect of large-scale mass-media and community level interventions.** ([Link](#))

Gill CJ, Young M, Schroder K, Carvajal-Velez L, McNabb M, Aboubaker S, Qazi S, and Bhutta ZA. 2013. **Bottlenecks, barriers, and solutions: results from multicountry consultations focused on reduction of childhood pneumonia and diarrhoea deaths.** *Lancet* 381(9876):1487-1498.

Langford R and Panter-Brick C. 2013. **A health equity critique of social marketing: where interventions have impact but insufficient reach.** *Social Science & Medicine* 83:133-141.

Lin A, Arnold BF, Afreen S, Goto R, Huda TM, Haque R, Raqib R, Unicomb L, Ahmed T, Colford JM, Jr. et al. 2013. **Household environmental conditions are associated with enteropathy and impaired growth in rural Bangladesh.** *The American Journal of Tropical Medicine and Hygiene* 89(1):130-137.

Mansour AM, Mohammady HE, Shabrawi ME, Shabaan SY, Zekri MA, Nassar M, Salem ME, Mostafa M, Riddle MS, Klena JD et al. 2013. **Modifiable diarrhoea risk factors in Egyptian children aged <5 years.** *Epidemiology and Infection* 1-13.

Monse B, Benzian H, Naliponguit E, Belizario V, Schratz A, and van Palenstein Helderma W. 2013. **The Fit for School health outcome study—a longitudinal survey to assess health impacts of an integrated school health programme in the Philippines.** *BMC Public Health* 13:256.

Rabbi SE and Dey NC. 2013. **Exploring the gap between hand washing knowledge and practices in Bangladesh: a cross-sectional comparative study.** *BMC Public Health* 13:89.

Shamba DD, Schellenberg J, Penfold SC, Mashasi I, Mrisho M, Manzi F, Marchant T, Tanner M, Mshinda H, Schellenberg D et al. 2013. **Clean home-delivery in rural southern Tanzania: barriers, influencers, and facilitators.** *Journal of Health, Population, and Nutrition* 31(1):110-117.

Sherkhonov T, Yap P, Mammadov S, Sayfuddin K, Martinez P, Amoss WP, Wientzen RL, and Steinmann P. 2013. **National intestinal helminth survey among schoolchildren in Tajikistan: prevalences, risk factors and perceptions.** *Acta Tropica* 126(2):93-98.

Walker CL, Rudan I, Liu L, Nair H, Theodoratou E, Bhutta ZA, O'Brien KL, Campbell H, and Black RE. 2013. **Global burden of childhood pneumonia and diarrhoea.** *Lancet* 381(9875):1405-1416.

Xuan le TT, Rheinlander T, Hoat LN, Dalsgaard A, and Konradsen F. 2013. **Teaching handwashing with soap for schoolchildren in a multi-ethnic population in northern rural Vietnam.** *Global Health Action* 6:1-12.

WASHplus Weeklies will highlight 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, supports healthy households and communities by creating and delivering interventions that lead to improvements in access, practice and health outcomes related to water, sanitation, hygiene (WASH) and indoor air pollution (IAP). WASHplus uses at-scale, targeted as well as integrated approaches 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.