



PERIODIC OVERVIEW OF HANDWASHING LITERATURE

Summary of selected peer-reviewed and grey literature published July - December 2013
The Global Public-Private Partnership for Handwashing (PPPHW)

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PPPHW aims to publish overviews of handwashing literature twice a year that provide practical guidance for implementers. We compiled peer-reviewed and grey literature publications (including e-publications and ahead-of-time publications) between July through December 2013. From these, we selected relevant articles which allowed for practical guidance for implementation. We excluded most publications from high income and/or medical facility based settings. *No single study is universally applicable. We strongly recommend considering the context of the study when interpreting results.*

KEY FINDINGS

Handwashing and health outcomes

- In Kenyan primary schools, improvements in WASH reduced reinfection of some soil transmitted helminths in primary school children after deworming though the magnitude of effect may be sex specific (Freeman et al.). A review of published evidence from schools worldwide showed that incorporating a WASH educational component in interventions was very effective in improving absenteeism. The benefits of handwashing appeared more pronounced in female students who had the highest absences rates and socioeconomic status (SES) was an important barrier to access of handwashing materials (Joshi and Amadi). Furthermore, providing sanitizer to Kenyan primary schools with limited access to water improved hand cleansing after using the toilet among students and reduced rhinorrhea but had no effect on diarrhea or respiratory prevalence (Pickering et al.).
- In India, a handwashing behavior change intervention targeting children less than 5 years old had notable impacts on diarrheal, ARI and eye infection prevalence, and school absences among these children (Nicholson et al.). However, a systematic review from community settings worldwide showed that the effectiveness of hand hygiene interventions to prevent ARI and influenza transmission varies between settings, context and compliance (Warren-Gash et al.).
- In Nicaraguan hospitals, simple corrective measures on usage and stock of disinfectants and improved hygiene procedures reduced the incidence of neonatal sepsis over 2 years. (Lopez et al.)

Factors that affect handwashing behavior

- In Kenya, students who attended primary schools with consistent soap provision washed their hands with soap more often than students without regular soap provision. However, other notable barriers to good handwashing behavior remained (Saboori et al.). In another trial, improved funding, maintenance and accountability improved access to handwashing materials in Kenyan primary schools but soap was not consistently available to students even if soap was in stock (Alexander et al.).
- Several qualitative studies in SE Asia and Africa, identified factors that affect handwashing behavior among mothers and caregivers of young children. In Indonesia (Greenland et al.), new mothers rarely washed hands with soap at critical times for pathogen transmission. How they washed hands varied between washing with soap, rinsing with water or doing either reactively. Each of these may have different drivers such as disgust for reactive washers or rinsers. Senior women and midwives were important influencers for child care and related behaviors and may be appropriate targets for behavior change. Similarly, in Bangladesh (Nizame et al.), handwashing with soap before contact with food was

poor. Lack of habit and a convenient place to wash hands while cooking or eating food were cited barriers to handwashing at these critical times. In rural Zimbabwe (Ngure et al.), infants and young children were observed to ingest chicken feces and soil, which had high counts of fecal bacterial. WASH interventions do not typically address these important sources, which may undermine efforts to prevent harmful exposure to young kids. In Kenya (Person et al.), researchers observed hand drying practices after hand washing and found them to be potentially unsafe.

Behavior theory related to handwashing

- IBM-WASH is a comprehensive framework that may be useful in guiding the development of an intervention, program or evaluation related to handwashing and other WASH behaviors. (Dreibelbis)

Measuring handwashing behavior and M & E approaches

- Using a multi-dimensional WASH focused indicators developed by Garriga and colleagues appears to provide a contextualized and easily interpretable measure to guide policy decisions for WASH service delivery and may be more useful than health impact indicators or the standard JMP indicators. (Garriga)

Handwashing technologies

- Appropriate handwashing technology can be an important determinant of handwashing behavior. IBM-WASH framework can be useful tool to guide evaluation and selection of handwashing technologies; for example, in Bangladesh researchers found that low cost, durability, water storage capacity, ease of use and maintenance and quality influenced which technologies respondents preferred (Hulland et al.). In some places, such as Cambodia, there is a need and a potential demand for dedicated handwashing stations. Such technology should improve convenience, be low cost and functional with variable water availability (Jenkins et al.).
- Oregano essential oil added to liquid detergent improved the soap's antibacterial properties. Researchers found it reduced aerobic bacteria on hands as well as commercial antibacterial soap and was more effect than regular soap (Rhoades).

DETAILED SUMMARY

Handwashing and health outcomes

- In a cluster randomized trial, Freeman and colleagues found children from 20 Kenyan government primary schools who received a school-based water treatment, hygiene and sanitation program had 44% lower odds of reinfection of *Ascaris Lubricoides* compared to children from 20 control schools. Girls from intervention schools had lower odds of reinfection and lower egg count compared to girls from control schools. There was no difference between boys. There was no significant effect of the intervention on the reinfection of 3 other soil-transmitted helminths. (Freeman et al. 2013)
- Joshi and colleagues reviewed recent evidence of the impact of access to safe water, handwashing facilities and hygiene education on absenteeism and health outcomes among school-aged children. Of the 5 studies that assessed WASH and absenteeism, the authors found that incorporating an educational component in interventions was very effective in reducing absenteeism. Access to handwashing instructions and facilities improved primary school attendance during flu season. The benefits of

handwashing appeared greater in female students who had the highest absence rates. These studies relied on self-report for compliance and illness. Those with a lower socioeconomic index had worse access to safe water and improved sanitation and hygiene infrastructure compared to higher indices. (Joshi and Amadi 2013)

- Pickering and colleagues examined the behavioral and health impact of providing waterless hand sanitizer to primary schools with limited resources and water access in Kibera, Kenya. They observed that students from schools that received sanitizer cleaned their hands 82% of time after they used the toilet, compared 38% of times among students from schools provided with soap and after 37% of times among control schools. Students in schools with sanitizer were 23% less likely to have rhinorrhea than control students. There was no difference in diarrhea or respiratory symptoms. (Pickering et al. 2013)
- In a randomized controlled trial among urban Indian households, authors found that children from intervention households had 25% fewer diarrheal episodes, 15% fewer ARI episodes and 27% fewer school absences due to illness, and 46% fewer eye infections compared to controls. Families of intervention children also had fewer episodes of illness compared to families of control children. Intervention households (n=847) received a handwashing social marketing program targeting 5 year old children and free soap. The intervention aimed to educate children about germs, whether hands are germ free based on appearance, and how soap works. Children received cues to help them remember to wash hands at key 5 times (after defecating, before eating each meal and while bathing) and were rewarded for handwashing with soap. Mothers helped children and were encouraged through in person visits and “good mums” clubs. The main behavioral motivators were fear of contamination, disgust, and peer pressure created through public pledging. The 833 control households continued their usual handwashing practice. All children received 50 rupee gift once a month. Families were monitored for diarrhea, ARI, eye infections and school absence due to illness for 41 weeks.(Nicholson et al. 2014)
- In a systematic review of the effects of hand hygiene on transmission of influenza and acute respiratory tract infections in community settings, Warren-Gash and colleagues found moderate to low-quality evidence of reduction in both diseases with hand hygiene interventions in schools. Authors found high quality evidence of a small reduction in respiratory infection in child care settings and a large reduction in squatter settlements. They also found moderate to high quality evidence that there is no effect of hand hygiene interventions on secondary transmission of influenza in households. The effectiveness of hand hygiene interventions varies between settings, context and compliance. (Warren-Gash et al. 2013)
- A baseline assessment in Nicaragua found 9 hospitals did not correctly use disinfectants, or practiced proper sterilization and hand hygiene. The ministry of health and USAID developed guidelines that corrected usage of disinfectants, improved hand hygiene procedures, revised a medical supply list to support appropriate antisepsis, and corrected diagnosis neonatal sepsis. Researchers found median incidence of neonatal sepsis decreased in 18 hospitals by 67% over 2 years. (Lopez et al. 2013)

Factors that affect handwashing behavior

- In a cluster randomized trial, Saboori and colleagues found that Kenyan students from primary schools that received regular soap provision washed their hands with soap 32% of the time compared to 3% among students from primary schools that did not receive soap. However, they found that hand contamination with fecal bacteria was similar between these students. Even when soap is provided, other barriers, such as availability water for handwashing, existing social norms among teachers and lack of incentive and accountability, prevent good handwashing behavior. (Saboori et al. 2013)

- In a cluster randomized controlled trial, Alexander and colleagues assessed the effect of 3 different administrative improvements (1. Additional WASH budget, 2. Additional WASH budget plus monitoring of conditions, or 3. Additional WASH budget plus structural repairs and hiring of janitor) on availability and condition of WASH structures, including handwashing materials, among 70 primary schools in western Kenya. All 3 intervention groups were about 4-6 times more likely to have soap available for students and 30-40% more likely to have water for handwashing compared to control schools. However, soap was not consistently available to students among schools with soap in stock. (Alexander et al. 2013)
- In Indonesia, a qualitative study found that first-time mothers infrequently wash hands with soap. If they did wash hands, they primarily washed after food preparation, household chores, after eating or cleaning a baby's bottom. They rarely washed with soap before preparing food or eating. Authors observed different types of 'handwashers' ('washer', 'reactive washer', 'rinsers', 'reactive rinsers', 'avoiders') who may have different motivators (ex. disgust for reactive washers). Authors hypothesize that disgust and comfort were main drivers of handwashing among this study population. Generally, mothers in this study did not seem prompted to wash hand by having a new child. While mothers cited 'being too busy' as a barrier to handwashing with soap, observers found that mothers had considerable time post-birth and were almost exclusively concerned with childcare. Midwives and senior women, such as grandmothers, were important and influential sources of information for childcare and could be important targets for handwashing promotion. Authors suggest that motherhood is a "teachable moment" to improve handwashing with soap. (Greenland et al. 2013)
- Ngure and colleagues conducted formative research among caregivers and their infants to identify major pathways of fecal-oral transmission in rural Zimbabwe. They observed some infants ingest handfuls of soil and/or chicken feces multiple times with 6 hours. Microbiological sampling of objects that were mouthed most frequently or were most visibly dirty confirmed that chicken feces and soil had higher fecal indicator than other vectors (hands, food, utensils, toys, water). Ingestion of soil and chicken feces posed the greatest risk of fecal bacteria exposure. According to the authors, current interventions typically do not address these sources of contamination and will not effectively diminish transmission of fecal bacteria to children. The authors recommend incorporating separate and protected play spaces, and accompanying education about personal and environmental hygiene and safe feces disposal that targets mothers and caregivers. (Ngure et al. 2013)
- Using a mixed methods approach, Nizame and colleagues investigated handwashing practices associated to child feeding practices in Bangladesh. Most participants felt their community knew about the importance of handwashing before preparing food and feeding a child but did not have the habit to do so. None of the observed households washed hands with soap before these two times. Most participants felt lack of soap and water near the cooking places as a barrier to hand hygiene before food preparation. Caregivers felt nurturing messages would be the best motivators to encourage good handwashing behavior around food handling. (Nizame et al. 2013)
- Qualitative evaluation of hand drying practices among Kenyans found using a clean towel to dry hands was uncommon. Typically, women dried hands on their waist cloth or clothes. Children usually wiped hands on their clothes, shook them or did not dry them. Most people wiped hands on their clothes after sneezing. The authors conclude that hand drying on clothes and rags may compromise the benefits of handwashing with soap. (Person et al. 2013)

Handwashing theory

- A systematic review of existing theoretical models and frameworks aimed at guiding behavior change interventions related to WASH, found 15 such models/frameworks. These models under-represented the role of technology on behavior change and focused mostly on individual behavioral outcomes. The

authors developed the Integrated Behavioral Model for Water, Sanitation and Hygiene (IBM-WASH) interventions as a comprehensive framework to understand behavioral determinants of WASH practices and inform intervention development. The model is structured by three overarching areas, contextual, psychosocial and technology, and has five levels of operation (societal/structural, community, interpersonal/household, individual and habitual). (Dreibelbis et al. 2013)

Handwashing measurement and M & E approaches

- Garriga and colleagues analyzed the utility of three different Monitoring and Evaluation approaches (1. Using health impact indicators, 2. Using standard indicators of WHO/UNICEF Joint Monitoring Program, and 3. Using multi-dimensional WASH focused indicators formed into an index) from a policy making perspective. More specifically, the authors assessed whether data is easily and meaningfully interpreted and captures complexity inherent in delivery of rural services. They found that health impact indicators were questionably adequate for operational and strategic decision making. JMP indicators showed quality basic estimates of coverage but provided an incomplete picture of context. The index approach provided broader picture and was useful to guide policy level decisions to improve service delivery. (Garriga and Foguet 2013)

Handwashing technologies

- Using the trials of improved practices approach (formative research), Hurland and colleagues tested 7 handwashing technologies to identify locally feasible and acceptable handwashing stations in rural and urban Bangladeshi households. They employed the Integrated Behavioural Model for Water, Sanitation and Hygiene (IBM-WASH), a theoretical behavioral model, to guide selection of handwashing stations and data analysis. They found that low cost, durability, water storage capacity, ease of use and maintenance, and quality of materials influenced selection of designs. Using this approach, authors selected a handwashing station set-up to pilot test in a large randomized controlled trial. (Hurland et al. 2013)
- Jenkins and colleagues used formative research to investigate the need and demand for dedicated handwashing materials in Cambodian households. They found most households that depended on stored water lacked a dedicated handwashing place and materials, which made handwashing cumbersome, time-consuming and required assistance to perform. Respondents were interested in and considered buying handwashing equipment suggesting a demand for such materials. Handwashing technology which improves ease, convenience, is low cost and takes variable water availability into account may enable better handwashing behavior. (Jenkins et al. 2013)
- Authors found that oregano essential oil emulsified in liquid detergent was as effective as commercial antimicrobial soap at reducing aerobic bacteria counts on hands and more effective than regular soap. (Rhoades et al. 2013)

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