

WASH Benefits and STH: Results and Program Implications

Session Date: Saturday, November 4

Session Time: 9:00am – 12:00pm

Session Location: Loch Raven II

Session Description: The goal of this session will be to present the results of two rural, cluster randomized WASH and nutritional intervention trials in Bangladesh and Kenya that measured effects on STH prevalence among children (a birth cohort and older siblings), and to discuss the implications of the results for global STH control programs. The primary objective of the WASH Benefits trials with respect to STH infection was to determine whether individual interventions reduced STH prevalence and infection intensity, and whether combining interventions reduced STH infection more than single interventions. The session will report primary results from both trials, along with effects on STH ova measured in soil and, in the Bangladesh trial, effects among nearby, non-intervention compounds (spillover effects). We will discuss the implications of the trials' findings for current global STH control programs.

Session Chairs: Ben Arnold, University of California, Berkeley
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KEY DISCUSSION POINTS

- There was similar uptake of the interventions in the single arms compared with the combined arms, but there will also be further subgroup analysis.
- The different STH species have different transmission patterns. Environmental monitoring is crucial for understanding transmission.
- The results of the trials suggest that waterborne transmission of STH probably occurs (water treatment interventions alone led to reductions of hookworm in Bangladesh and Ascaris in Kenya), but the WASH Benefits study did not measure STH in stored drinking water or source water.
- Studies that look at environmental reservoirs of STH in water or on hands or in soil are necessary and will feed into modeling studies. The trials measured STH in soil using microscopy, but molecular methods would probably be the best approach – particularly given how fragile hookworm ova are (current microscopy protocols for soil are optimized for heartier Ascaris eggs)
- It would be interesting to see the interaction between history of deworming and WASH interventions, but the study was not powered to look at sub-groups.
- The high prevalence of infection among children at age 2 years in the trials, even in settings with ongoing, school-based MDA, highlights the need to address STH in preschool-age children (PSAC).

- It's important to measure uptake of interventions, and for WASH interventions that include behavior change and require regular use it can present challenges in terms of objective indicators and integrating uptake over time.
- The behavior change campaigns were intensive in the two trials, but it's difficult to achieve sustained behavior change. When the intensive health promotion stops, you see drop off in behavior change, even in a trial setting.
- In Kenya, there were indicators of latrine use based on observable indicators and self-reported data. In Bangladesh, sensors were used to capture motion in and out of latrines. This data will be analyzed and compared with the self-reported data to see if they match.
- Geophagia is an important and perhaps underreported issue. In the Kenya trial, 40% of pre-school aged children (index children) and 10% of school aged children were reported to have intentionally eaten soil in the past week. When mothers eat soil their children copy them. 1/3 of pregnant women reported eating soil, which is highly contaminated with STH ova (recent papers cited in presentation). Geophagia was also common in the Bangladesh trial. It is an issue that has been overlooked in current behavior change campaigns.
- How do we measure quality of uptake? There was a high impact of sanitation relative to hygiene and good sanitation uptake; for sanitation it doesn't matter who does it, whereas for hygiene it is beneficial to have few people with high quality uptake compared to lots of people doing it poorly.
- MDA has a 70+% reduction on STH. We were disappointed by the magnitude of effect of WASH interventions on STH (20-30% relative reduction), but the magnitude of effect is what we would expect for the effects of WASH interventions on diarrheal disease. They are more modest effects, and it is possible that these modest effects are what we can expect with environmental interventions.
- How long would interventions be required to see dramatic impacts? Even though the trials were 2 years long, Ascaris eggs can last 5+ years in the environment, and it is possible that the effects of WASH interventions could only be fully realized over even longer time horizons.
- A modeling study based on the WASH for WORMS deworming and WASH intervention trial in Timor Leste suggests that WASH might not be expected to have much of an effect on STH transmission until prevalence is very low in a population. We may therefore need to think about WASH as a complementary strategy to MDA, or at least consider WASH conditions in conjunction with MDA campaigns as populations approach elimination.
- The cost-effectiveness evaluation is coming out in the next year, but in general WASH interventions are very expensive so the benefits side of the equation needs to span many diseases (not just STH) and potentially non-health benefits as well.
- In order to develop joint measurements for WASH and NTDs to integrate the programs, 7 core indicators have been developed. The disease-specific indicators for STH are handwashing, footwear, and knowledge of hygiene practices. Geophagia had not been considered previously, nor had water treatment and storage practices. The results of these trials suggest that these additional indicators could be important.
- The HIV sector has been innovative in assessing social bias using polling booth methods. This could help us have a clearer understanding of uptake for sanitation, as well as get more accurate data, using innovative strategies.
- Because of the heterogeneity of STH, it's difficult to make sweeping recommendations. It's clear that certain components of WASH are effective for certain outcomes; we need to think about how to tell the story of this trial and how to relay those messages. There are quality of life improvements aside from health and STH that are associated with WASH interventions.

KNOWLEDGE GAPS IDENTIFIED

- Interaction between history of deworming and WASH interventions. Are elimination efforts through MDA more likely to succeed in settings with more improved WASH?
- What should we expect from each component of WASH on each STH? When is the best time to implement WASH interventions to see impact on STH?
- Both studies bring out the theme that water might be an important transmission route for STH, and we haven't measured STH in stored drinking water or source water. Studies that look at prevalence of STH in water or on hands are necessary and will feed into modeling studies.
- Relationship between geophagia and anemia and hookworm infection and prevalence of anemia.
- What is the effect of chlorine on hookworm?

RECOMMENDED NEXT STEPS

- Next steps for WASH Benefits as presented during the session (see slides).
- How to sustain behavior change (i.e. tippy tap use for handwashing, which dropped off over time).
- Measure STH in stored drinking water and source water, and improve protocols for molecular detection of STH in environmental media.
- Given the durability of *Ascaris ova*, could rural WASH interventions have larger effects on STH transmission if sustained over longer periods of time than this 2 year trial?
- Are household- or community-level WASH conditions an effect modifier for the effectiveness of MDA in populations that approach elimination?