

WaterAid's reflections on the results of the WASH Benefits Trials – Kenya and Bangladesh

February 2018

In January and February 2018, the first of the WASH Benefits trials findings were published in the Lancet Global Health from Bangladesh and Kenya. This note has been put together to help WaterAid staff and actors working on nutrition and water, sanitation and hygiene (WASH) to understand the results and implications of these studies, and to interpret the results in light of the full body of evidence on WASH and nutrition.

Summary of the WASH Benefits studies and key findings

Aim: The WASH Benefits trials aim to add to the evidence base on the impact of WASH and nutrition interventions combined or alone on child health and development in the first 2 years of life.

Study Design: Seven-arm cluster randomised control design: control arm, water only, sanitation only, hygiene only, combined WASH, nutrition, and combined WASH+nutrition

Main Findings:

- In both Bangladesh and Kenya, there was a small improvement of the nutrition intervention and the combined nutrition and WASH intervention on linear growth (in line with previous child nutrition studies).
 - Bangladesh: Small, statistically significant effects of the nutrition intervention (0.24; 0.13 – 0.36 LAZ) and WASH+N (0.13; 0.02-0.24) with an effect size in line with previous child nutrition studies
 - Kenya: Significant but small improvement of nutrition (0.13; 0.01-0.25) and WASH+N (0.16; 0.05-0.27) on linear growth
- In Kenya, none of the intervention arms resulted in a reduction in diarrhoea prevalence
- In Bangladesh, there was a reduction in diarrhoea across all arms, except the water only arm
- In Kenya, after year 1 the combined WASH and nutrition interventions had improved child motor development (although no difference was seen after 2 years).
- In Bangladesh, improvements in WASH or nutrition, supported by intense interpersonal communication, either in combination or alone, contributed to improvements in child development.
- **In both Bangladesh and Kenya studies, there was no additive benefit of integrating WASH with nutrition on linear growth and stunting.**

Interpretation of the findings

- The differing results from Bangladesh and Kenya highlight that these findings should be interpreted in light of the specific intervention in that specific setting. The following points suggest that these results are not necessarily generalizable to all contexts and regarding all “WASH interventions” on nutrition outcomes.
- That said, the findings do highlight a number of key factors that help build understanding about how WASH programmes need to be designed, implemented and monitored to contribute towards improving nutrition outcomes. These fall into 4 broad categories:

1. All critical pathways of faecal-oral transmission need to be adequately blocked:

- The effect of the intervention on the surrounding household and compound environment (with the exception of free chlorine residues which were used as proxy measure for water quality/microbial safety) was not measured, and as such it was unknown if any environmental transmission pathways were effectively interrupted. In both studies, not all pathways were blocked, particularly transmission via food and from animal faeces.

2. Coverage and quality of WASH interventions need to be higher:

- **Community coverage not high enough:** Since the latrine intervention targeted pregnant women only at the compound level this meant that the intervention only reached 10% of the village residents in Bangladesh (unreported in Kenya). This means that the overall faecal contamination of the community did not change substantially. Existing studies highlight that stunting is not so much related with household access to a toilet, but instead show that where there is incidence of higher levels of open defecation (per sq km) then the stunting rates continue to remain high¹. In other words, the value of sanitation does not come from use of improved household sanitation but from improving community coverage, and therefore most of the health benefits from WASH will only be achieved as this becomes universal.²
- **Behaviour change:** The study used presence of infrastructure and supplies as indicators of uptake but these do not represent actual use and behaviour change. Other behaviours such as safe disposal of child faeces were self-reported which is also open to substantial bias. Food hygiene practices and the likelihood of ingesting contaminations through different food were not monitored.

¹ Spears D, Ghosh A, Cumming O (2013) Open Defecation and Childhood Stunting in India: An Ecological Analysis of New Data from 112 Districts. PLoS ONE 8(9): e73784.

² Harris, M., et al. Community-Level Sanitation Coverage More Strongly Associated with Child Growth and Household Drinking Water Quality than Access to a Private Toilet in Rural Mali. *Environ Sci Technol.* 2017. 20;51(12):7219-7227. DOI: 10.1021/acs.est.7b00178

- **Intensity of intervention:** The differences in outcomes seen between Bangladesh and Kenya studies indicate that a high intensity of promoter visits was an important factor in encouraging behaviours and in doing so reducing diarrhoea.
- **Water treatment:** In both studies, chlorine (either in tablet or liquid form) was provided to treat household water. Chlorine, however, is not effective against *Cryptosporidium* spp. and can be ineffective against *Giardia* when not used as instructed³. As the authors from the Kenya study also note, *Cryptosporidium* spp is one of the most common causes of moderate-to-severe diarrhoea in children 0-23 months in a neighbouring part of Kenya to this study. This may help explain why the Kenya study results contrast with multiple other studies that have shown WASH interventions reducing the prevalence of diarrhoea.

3. Diarrhoea and stunting are complex outcome measures:

- Baseline conditions in the sample villages were not bad (open defecation was below 10% in Bangladesh; in Kenya, 75% of household had an improved drinking water source), and diarrhoeal prevalence in Bangladesh was unexpectedly low at 5.7%. As a result, transmission of enteric pathogens through all pathways was likely lower and may explain why no additive effect was seen by the combined WASH + nutrition interventions. The low transmission means that there were fewer opportunities to interrupt transmission and have the necessary statistical power to show this.
- Diarrhoea prevalence was measured by caregiver reported diarrhoea during the last 7 days. Given that the intervention did impact on diarrhoea rates (in Bangladesh) but not on growth this suggests there may have been reporter bias, due to being grateful for the intervention and out of courtesy, report less diarrhoea. That diarrhoea reduced only where promoter visits were most frequent reinforces the bias concern. Use of self-reported diarrhoea is inherently biased and subjective in nature and may not meet the test required for sufficiently robust evidence.
- Stunting may have intergenerational factors which may not be sufficiently addressed in this intervention.

4. More research is needed to understand the key underlying causes and pathways leading to diarrhoea and stunting:

- Reducing a complex outcome such as stunting and diarrhoea may require improvements across multiple/all underlying causes, higher level of compliance on behaviour change and transmission routes before a significant improvement is seen.

³ *Giardia* and *Cryptosporidium* spp are parasites commonly found in contaminated water and cause diarrhoea and other symptoms.

Implications for policy and practice:

- Interventions need to address the multiple complex determinants of faltering growth, including various direct and underlying causes, and the intergenerational cycle of malnutrition.
- The set of basic household level WASH interventions used in both Bangladesh and Kenya (e.g. pit latrines, handwashing station, household water treatment) alone do not necessarily result in a sufficient improvement in sustaining behaviours, and improving the environment/reducing contamination sufficiently to impact on growth and stunting. While in some settings they may reduce diarrhoea there are numerous pathogens which result in diarrhoeal diseases in children, so reductions in overall prevalence will require reducing exposure to all or most of the leading pathogens by addressing all the critical pathways, including from animal faeces.
- Changing behaviours related to diarrhoea prevalence (such as handwashing with soap) appear to require high intensity interventions (as seen in Bangladesh with multiple visits from promoters each month) to reinforce behaviours. Given that this level of intensity might be difficult to achieve in a real world programme, combined with substantial barriers which hinder uptake of positive behaviours, such as availability of piped water, more work is needed to understand how to change behaviours and develop innovative and novel approaches.
- While the findings show no additive benefits of WASH in preventing stunting or growth inhibition when compared across control groups, other benefits are clear and statistically significant, particularly in Bangladesh. These included prevention of hookworm, Giardia, repeated bouts of diarrhoea, and cognitive development.
- The link between faecal pathogens (from human or animal) and stunting was not broken and the 'environmental enteric dysfunction' linkages are not disproved.
- Without moving towards universal coverage of WASH services in a community then household-level interventions in isolation are unlikely to result in significant collective health impacts. Both studies provide further understanding that a more substantial improvement in the WASH intervention and the community level coverage will be needed, alongside a more integrated and holistic approach to environmental sanitation and hygiene behaviour change addressing all key pathways while designing, and implementing the intervention.
- The health and non-health benefits of basic WASH services are well known and proved elsewhere so investing in basic WASH services will remain fundamental pillars of human development, and remain basic human rights.⁴

⁴ UN General Assembly (2010) Resolution adopted by the General Assembly on 28th July 2010: 64/292 The Human Right to Water and Sanitation <http://www.un.org/es/comun/docs/?symbol=A/RES/64/292&lang=E>