

# Uptake of hand washing with soap or soapy water from a large-scale cluster randomized community trial in urban Bangladesh

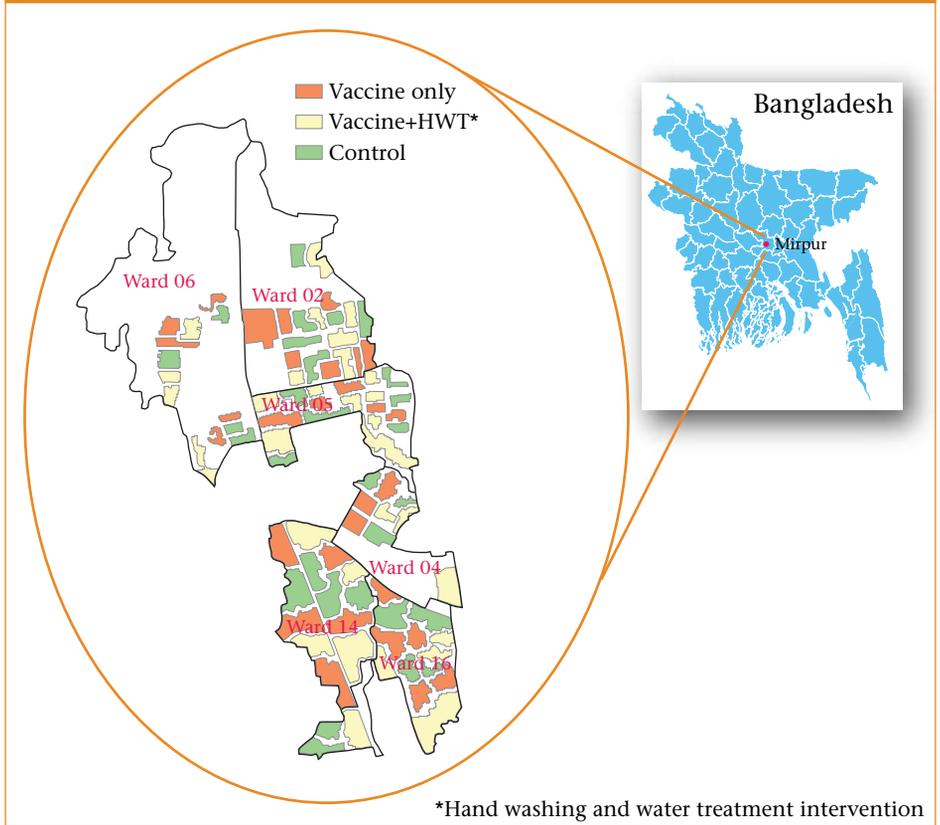
Small-scale studies have shown that intensive hand washing promotion reduces disease, but there is little evidence that large-scale hand washing promotion programs change behaviour. We deployed a community-based hand washing promotion intervention and used the presence of water and soap or soapy water at hand washing stations as a proxy indicator for hand washing behaviour and found encouraging results. A cluster randomized cholera vaccine trial conducted in a low-income urban area of Dhaka included those who received the vaccine only (Vaccine Only group), those who received the vaccine and a hand washing and water treatment intervention (Vaccine+HWT group), and those who were neither vaccinated nor received the intervention (Control group). Among the Vaccine+HWT group, the presence of water and soap or soapy water at the hand washing place increased from 22% (41/190) at baseline to 60% (102/171) at the 11-month assessment point ( $p < 0.001$ ). We found no significant increase in the presence of water and soap or soapy water among the Control group or the Vaccine Only group during the same period. Our findings suggest that hand washing behaviour changed following implementation of a large-scale intervention in a low-income urban setting that provided hardware to enable hand washing and encouraged regular hand washing. Further research on health impact of hand washing with soap in this community and the sustainability of using soapy water could help optimize recommendations for improving hand washing practices in other low-income communities.

Soap and water present together at the hand washing place leads to improved hand washing practices and fewer illnesses (1-3). Numerous small-scale studies have shown that intensive hand washing promotion improves hand washing practices and reduces risks for diarrhoea and respiratory infections (4-7). However, there is little evidence that large-scale hand washing promotion changes hand washing behaviour. As part of a large randomized controlled trial in urban Dhaka, we assessed the uptake of hand washing with soap by using the presence of water and soap or soapy water at the hand washing place as a proxy indicator.

The Introduction of Cholera Vaccine in Bangladesh (ICVB) is a 2-year randomized community trial. It began in 2011 in Mirpur, a resource-poor community of urban Dhaka, to assess the impact of the receipt of a vaccine only (Vaccine Only group), receipt of a vaccine and a hand washing and

water treatment intervention (Vaccine+HWT group) and receipt of neither the vaccine nor the intervention (Control group) on severe dehydrating cholera /diarrhoea requiring hospitalization (Figure 1). Households in Mirpur are usually organized into compounds in which several households share a common water source, kitchen, and a toilet. In the ICVB community trial, 90 clusters of almost 240,000 people in approximately 60,000 households were randomly assigned to the three study arms. Each study arm included 30 clusters (Figure 2).

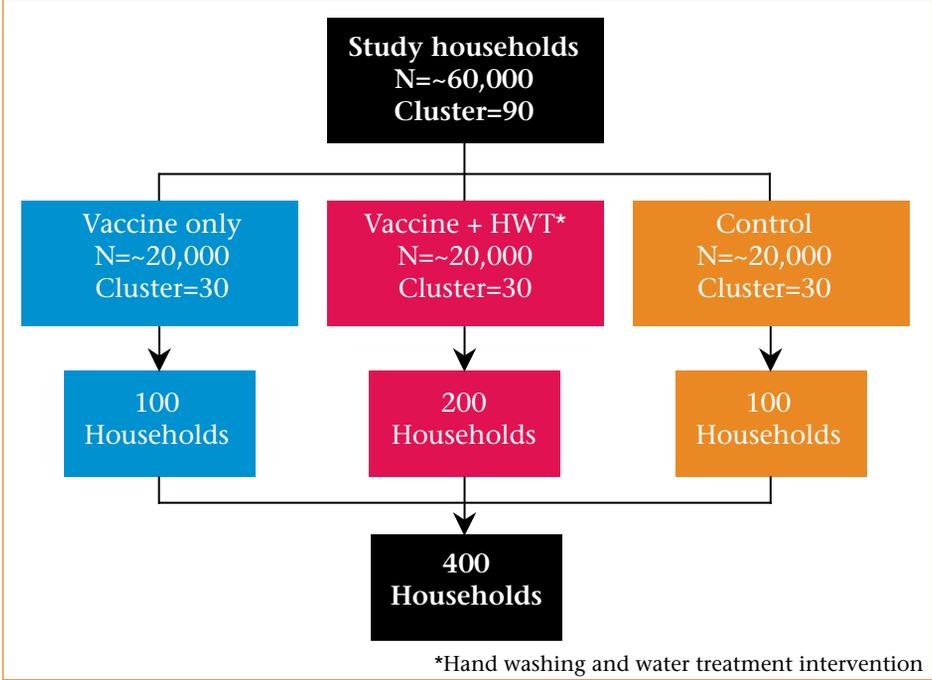
*Figure 1: Study site and distribution of clusters in Mirpur, Bangladesh, April 2011-July 2012*



From June 2011 to July 2012, a local non-governmental organization delivered the hand washing and household water treatment intervention to the Vaccine+HWT households through community hygiene promoters (CHPs). CHPs distributed hand washing supplies to the Vaccine+HWT households free of cost. The hand washing supplies included a bucket with a tap, a basin and stand and a 1.5-liter plastic bottle for making soapy water. CHPs met with household residents to discuss the most convenient place

to set up the hand washing place and also discussed their plans to keep the water bucket full. Residents were encouraged to keep soap or soapy water at the hand washing place at all times. CHPs demonstrated and taught residents how to make soapy water using a 30-gram packet of detergent powder costing less than US\$0.03 mixed with 1.5 liters of water in a locally available plastic bottle. At least twice weekly, CHPs conducted meetings to encourage regular hand washing with water and soap or soapy water. They used flip charts and cue cards to illustrate health problems related to hand contamination and the importance of hand washing practices. They also encouraged Vaccine+HWT households to wash their hands after defecation, after handling child’s feces and before food preparation.

*Figure 2. Flow chart of randomization and monthly household selection*



After conducting a baseline survey in April 2011, we monitored a different set of 400 randomly selected households each month for 11 months (Figure 3). Interviewers collected pre-intervention data on the presence of water and soap or soapy water from 400 households among the three study arms: 100 from Vaccine Only households, 200 from Vaccine+HWT and 100 from the Control households (Figure 2). Field workers made unannounced visits to the randomly selected households at baseline and for each assessment month. If an adult ( $\geq 17$  years old) member of the household provided

informed consent, field workers conducted spot-checks at the primary and secondary hand washing places used by the household to observe whether water and soap or soapy water were present.

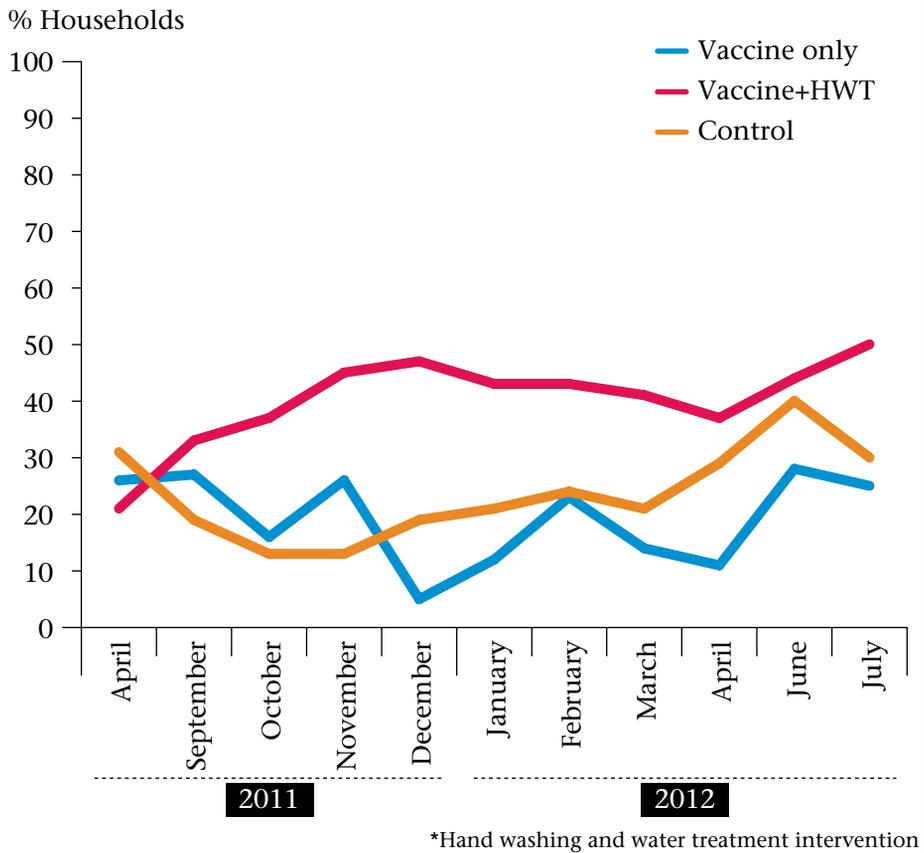
*Figure 3: Timing of key study events*



We evaluated data collected during the 11-month assessment period from the three study arms. We separately compared data collected from Vaccine+HWT households to that collected from Vaccine Only households and Control households. We performed an intent- to- treat analysis, considering households to be from the Vaccine+HWT group if they were initially assigned to this group, even if they refused the hand washing supplies or missed any part of the hand washing intervention due to absence. The proportion test was used for all comparisons and the data were analyzed using STATA version 10.

The presence of water and soap or soapy water at the hand washing place increased from 22% (41/190) at baseline to 60% (102/171) in the Vaccine+HWT households ( $p < 0.001$ ) (Figure 4). At the 11 month-assessment, the presence of water and soap or soapy water was 30% higher in the Vaccine+HWT households compared to the Control households and 35% higher compared to the Vaccine Only households ( $p < 0.01$ ; Vaccine+HWT compared to each of the other groups; Figure 4). There was no increase in the presence of water and soap/soapy water among the Control households at baseline [31% (30/96) at baseline; 31% (28/90) at 11-months] or the Vaccine Only households [28% (26/92) at baseline; 25% (23/91) at 11-months].

**Figure 4: Proportion of households with observed presence of water and soap or soapy water at hand washing place in Mirpur, Bangladesh from April 2011-July 2012**



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**Comments**

**H**and washing with soap is difficult to measure. Although self-reported hand washing practices are easy to collect, they are not considered reliable (8,9). In our study we used the presence of water and soap or soapy water together at a hand washing place as a proxy indicator of hand washing behaviour. Based on this indicator there was a significant uptake of hand washing with water and soap or soapy water resulting from a large-scale intervention in a low-income urban setting that provided hand washing supplies and encouraged regular hand washing. The strength of our study

was that collecting the proxy indicator was relatively easy to implement and not labor intensive thus could be replicated in other settings.

This study is subject to at least one important limitation. The presence of hand washing supplies does not necessarily mean that the supplies were used for hand washing or that they were used at the critical times promoted by the intervention, such as after defecation, after handling child's feces and before food preparation. However, evidence from earlier studies has shown that the presence of soap and water together at the hand washing place reflects improved hand washing behaviour (1-3).

Our findings suggest that hand washing behaviour changed following implementation of a large-scale intervention in a low-income urban setting that provided hardware to enable hand washing and encouraged regular hand washing.

Validation of using the presence of water and soap or soapy water together at a hand washing place as a proxy indicator should be considered. Further research on the health impact of hand washing with soap in this community and the sustainability of using soapy water could help optimize recommendations for improving hand washing practices in other low-income communities.

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## **Outbreak of illness and deaths among children living near lychee orchards in northern Bangladesh**

**U**nintentional pesticide poisoning among children is a global public health concern. In June 2012, the Institute of Epidemiology, Disease Control and Research (IEDCR) and icddr,b investigated an outbreak of possible unintentional pesticide poisoning among children aged two to ten years in Dinajpur and Thakurgaon Districts. The outbreak involved 14 children, 13 (93%) of whom died. In 64% of the cases, the illness started with a sudden outcry in the morning and most cases went on to have convulsions followed by unconsciousness within several hours. Medical files were available for nine cases, and four had mid-dilated or fixed pupils and six had lung crepitations on auscultation. The median time from onset to unconsciousness for six cases for whom information was available was 2.5 hours. The median time from onset to death for all cases was 20 hours. During the 24 hours before onset of illness, all of the cases either visited lychee orchards (n=11) or consumed lychees from nearby orchards (n=7) in which multiple pesticides were frequently used during a short lychee harvesting period. The clinical manifestations and course of illness suggest that this outbreak was due to poisoning, likely from pesticides used in nearby lychee orchards. Interventions are needed to limit children's exposures to pesticides in Bangladesh.

**G**lobally, pesticide poisoning is a growing public health concern (1). In Bangladesh, pesticide poisoning related deaths represented 8% of all hospital deaths for people aged 15-49 years in 2009 (2,3). However, pesticide poisoning among children may be underreported in Bangladesh since many poisonings are unintentional and the exposure to pesticides may be unrecognized. Since 2008, the Institute for Epidemiology, Disease Control and Research (IEDCR), in collaboration with icddr,b, has identified three clusters of unintentional pesticide poisoning among children living in areas pesticides were being used, although the exact route of exposures remains unknown (4).