

The role of handwashing in improving hygiene and health in low-income countries

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The World Health Organization (WHO) estimates that more than 2 million persons die each year from diarrheal illness. These deaths occur almost exclusively among children younger than 5 years living in low-income countries. This article reviews the results of interventions promoting handwashing in communities with a high incidence of diarrhea and examines the roles of public health institutions and soap manufacturers in extending the benefits of handwashing to these communities.

In 1987, Stanton and Clemens¹ published the first controlled study of the promotion of handwashing in communities with a high incidence of diarrhea. They first conducted a case-control study in urban Dhaka, Bangladesh, and identified 3 behaviors associated with childhood diarrhea: open defecation in the living areas by children, lack of maternal handwashing before preparing food, and lack of attention to garbage and feces disposal. In a follow-up intervention project, they identified 25 intervention communities and 26 similar control communities among dispersed, impoverished areas of Dhaka. The intervention was an 8-week, community-based health education program focusing on 3 central messages: proper handwashing before food preparation, defecating away from the house at a proper site, and suitable disposal of waste and feces. The education program included both small group discussions and larger meetings, with posters, games, and

pictorial stories. Soap was not provided to the households. Although after the intervention no differences were noted in defecation practices or in the prevalence of feces and garbage between the intervention and control communities, mothers in the intervention area were more likely to be observed washing their hands before preparing food (49%) than in the non-intervention areas (33%). The intervention communities had a 26% lower incidence of diarrhea ($P < .001$).

In 1989, Han and Hlaing² published their handwashing promotion study, which was conducted in low-income communities in Rangoon, Burma. They enrolled 350 households randomly assigned to intervention or control groups. Mothers were asked to wash their hands after defecation and before preparing the 3 main meals. The message was reinforced at daily visits, and 2 bars of soap were provided to the families in the intervention group every 2 weeks. During follow-up, children in intervention households experienced 30% fewer episodes of diarrhea than did children in control households.

In a periurban slum outside of Dhaka city, Bangladesh, Shahid and colleagues³ selected adjacent communities, both of which obtained their water from ponds or canals that were heavily contaminated with human feces. One community received an intervention and the other control community did not receive an intervention. The intervention community received a half bar of soap for handwashing twice weekly and a pitcher to facilitate handwashing. Participants were encouraged to wash their hands with soap before eating or handling food and after urination or defecation. These messages were reinforced during follow-up visits every other day. Although the pre-intervention diarrhea rates were similar between the 2 communities, the incidence of diarrhea was 62% lower in the intervention community than in the non-intervention community after the study.

Most recently, Pinfold and Horan⁴ conducted a handwashing promotion study in rural Thailand. Their intervention was a multimedia communication campaign with posters, stickers, leaflets, comic books, songs, slide shows, T-shirts, and badges promoting 2

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principle messages: washing dishes immediately after meals, and washing hands before feeding a baby, cooking, or eating and after defecation or cleaning up a child who has defecated. No soap was distributed. The incidence of diarrhea was 39% lower in intervention communities than in nonintervention communities.

These 4 small-scale, externally funded demonstration projects reduced diarrhea incidence from 26% to 62%. Although not all of the studies were randomized at the household level and none were blinded, together they provide impressive evidence of the efficacy of handwashing promotion in communities with a high incidence of diarrhea. The major problem with increased application of the demonstrated approaches is that to be effective, these methods require substantial resources (especially trained personnel, community organization, and funding) that are typically lacking in low-income communities. Thus, broader benefit from handwashing promotion requires that either more resources be allocated to handwashing promotion or that lower cost methods be developed.

A partnership between public health organizations and soap manufacturers could be effective in promoting handwashing in communities with a high incidence of diarrhea. Two of the demonstration projects showed that persons in these communities with low incomes and high incidences of diarrhea were willing to buy soap. Private industry has expertise in promoting changes in behavior, especially when that behavior change is tied to the use of a product. Indeed, some such collaborations have occurred; for example, Procter and Gamble has worked with UNICEF Mexico⁵ and a consortium of soap manufacturers has worked with the Guatemalan Ministry of Health.⁶ In Mexico, the effort included a school-based education program and a national media campaign promoting handwashing that was explicitly co-sponsored by UNICEF and the specific bar soap marketed in Mexico by Procter and Gamble. Scientific evaluation of the health effects of such collaborative efforts have not been reported in the peer-reviewed public health literature.

Institutional public health organizations have a choice: either continue to support such collaborations in the hope that they are reducing the incidence of diarrhea, or evaluate them as we evaluate other public

health interventions. Although diarrhea that results in death is largely a disease of the poor, soap is most commonly sold to persons with more disposable income. Thus, a national handwashing promotion endorsed by public health authorities could increase soap sales without substantially improving health. On the other hand, evaluation of such collaborative efforts could provide guidance on improving their effectiveness, or, if effective, on increasing their global coverage.

Evaluating such interventions presents several methodologic challenges. Mass market interventions preclude household level of randomization. The most important outcome, death from diarrhea, is relatively rare. Household surveillance for diarrhea requires weekly or biweekly visits, and numerous studies show that people do not accurately report their handwashing behavior. However, approaches can be developed for such an evaluation including before-and-after designs that use existing data sources within counties for diarrhea morbidity and mortality, or side-by-side comparisons between regions with similar rates of diarrhea incidence and socioeconomic status, but with a marked cultural and linguistic barrier.

The good news is that handwashing with soap, a low-cost intervention for which persons are generally willing to pay, reduces the incidence of one of the largest killers of young children worldwide. The challenge is to develop and evaluate cost-effective, sustainable methods to promote handwashing in the communities most affected by diarrhea.

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