



# Diarrhea Prevention

## Lessons Learned

### Environmental Health Project

September 1999

Childhood Illness (IMCI), an evolution from vertical disease programs, such as Control of Diarrheal Disease (CDD). WHO, UNICEF, USAID, and other organizations are collaborating on the development of a community/household component of IMCI, which focuses on care-seeking, promotive, and preventive behaviors. The component will include *primary*

**D**iarrheal disease case management and prevention have played a key role in USAID's Child Survival programs. In the 1980s the introduction of oral rehydration therapy, combined with promotion of breastfeeding, immunizations, and nutritional supplementation, dramatically reduced child mortality from diarrheal disease. From 1982 to 1992, diarrheal disease mortality of children under five decreased from 4.6 million to 2.2 million per year.

However, a 1992 analysis by Bern *et al.* indicated that diarrheal disease *morbidity* remained constant in the 1982-1992 period, even as mortality decreased. ("The Magnitude of the Global Problem of Diarrheal Disease," *Bulletin of the World Health Organization*, Vol. 70, No. 6, pages 705-714.)

To get a picture of the true burden of diarrheal disease, both mortality and morbidity should be taken into consideration. According to the *Global Burden of Disease*, in 1990, the yearly worldwide diarrheal disease burden was

99.2 million DALYs lost. A DALY, or disability-adjusted life year, is a measure developed and used

by the World Bank to combine mortality and morbidity. The 99.2 million DALYs lost is the combined burden in time lost through incapacitation or premature death of just under 3 million deaths (virtually all in developing countries; most among children under five) and an estimated 4 billion diarrheal episodes per year. The developmental and humanitarian effects of this burden must be considered as well as the stress it places on already over-taxed health care systems.

The combination of poor water supply, sanitation, and personal and domestic hygiene is second only to malnutrition in the top risk factors reported in the *Global Burden of Disease*. Six top risk factors accounted for 35% of total DALYs lost worldwide in 1990. Understanding environmental and behavioral risk factors and their interactions is a prerequisite for devising effective preventive approaches.

USAID and other organizations have continued to refine Child Survival approaches for reducing diarrheal disease. Currently these efforts focus on the Integrated Management of

***EHP Goal: Define and test packages of environmental and behavioral interventions for the primary prevention of diarrhea and integrate them into ongoing Child Survival projects.***

*preventive* interventions such as those being developed by the Environmental Health Project (EHP).

Primary preventive interventions reduce environmental risk factors and high-risk behaviors for whole communities by interrupting the disease transmission cycle. For diarrheal disease this means promoting changes in

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hygiene behavior to protect people from ingesting diarrheal disease pathogens and providing sanitation solutions to protect the environment from fecal contamination. Thus, primary prevention involves both water and sanitation “software-” and “hardware-” type activities—behaviors and technologies.

Addressing diarrheal disease risk factors has the potential to reduce morbidity and mortality as well as the ancillary health impacts of repeated bouts of diarrhea, among them stunting and increased susceptibility to other diseases.

**E****H****P** has recognized the need for clearly defined diarrhea prevention interventions that could be part of a child health package and has focused on developing and applying them in the field. Based on its experience, EHP produced a brochure on programming diarrheal disease prevention for personnel in USAID and other organizations: *Preventing Child Diarrheal Disease: Options for Action*. In brief, the brochure presents three practical options.

- **Option 1: *Promote hygiene behavior change.*** Critical behaviors for reducing fecal-oral transmission of diarrheal disease can be promoted through social marketing and through training health care workers to include hygiene behavior in their counseling messages. This simple and inexpensive option can bring about measurable health benefits.
- **Option 2: *Support community action.*** Community actions to prevent diarrhea, such as local production of contamination-proof water containers, latrine construction, or school hygiene programs, can benefit from organizational support. EHP has developed a community mobilization approach known as CIMEP (Community Involvement in the Management of Environmental Pollution).

Another approach available for supporting community action is PHAST (Participatory Hygiene and Sanitation Transformation) developed by WHO.

Two other leaflets in this Lessons Learned series—*Behavior Change* and *Community Involvement*—provide more details about options 1 and 2.

- **Option 3: *Maximize the health impact of activities in other sectors.*** Many development projects outside the health sector have a potential impact on health. The following are examples of how various sectors can help prevent diarrheal disease:

- the *education* sector, by improving teaching methods and materials on food, water, excreta, personal and household hygiene, and helminth control;
- the *water and sanitation* sector, by including hygiene behavior change as a component of infrastructure construction programs;
- the *housing* sector, by providing credit for household water and sanitation improvements; and
- the *private* sector, by manufacturing and distributing safe water storage containers.

The health sector can play a leadership and advocacy role in promoting cross-sectoral collaboration.

The three options were developed through a series of EHP activities: designing a framework for prevention, identifying indicators for diarrheal disease prevention and key behaviors to target (with the assistance of two advisory groups of experts), and examining the cost-effectiveness of primary preventive activities. Reports are available on all of these activities (see list on page 4).

Field activities in several countries contributed to EHP learnings on diarrheal disease prevention. The most

significant effort was in the Santa Cruz area of Bolivia, where USAID funding of water and sanitation infrastructure had not brought about expected reductions in child diarrheal disease. EHP worked in the context of the Community and Child Health Project within the Bolivian Ministry of Health to implement a community-based approach to diarrheal disease prevention. Baseline household morbidity data, collected as part of the activity, revealed that the actual burden of child diarrheal disease was an order of magnitude greater than what clinic data indicated. Furthermore, diarrheal disease prevalence was highly correlated with poor hygiene behavior among mothers and caretakers, not with water source or type of sanitation. Local teams identified risk factors and then worked with communities to design appropriate interventions. Behaviors targeted were feces disposal, handwashing, and water storage; limited physical improvements included latrines and water containers. This effort reduced child diarrheal disease prevalence by 49%, as measured in household baseline and impact evaluation surveys.

Other efforts included

- Ecuador, where cholera incidence in two project areas declined over a three-year period (1993-1996) from 94 to 0 and from 32 to 2, following a community-based approach to diarrhea reduction focused on provision of safe water storage containers and water handling and storage behaviors.
  - Jamaica, where the risk of diarrheal disease declined and hygiene behaviors improved through a health sector/housing sector collaboration to facilitate household construction of sanitation facilities in a slum area in Montego Bay.
  - Central America, where a coalition of soap manufacturers collaborated with BASICS and EHP to combine
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## Diarrhea Prevention: Lessons Learned

### Facts FOR Life

#### Message for Diarrhea Prevention

“Diarrhea can be prevented by breastfeeding, by immunizing all children against measles, by using latrines, by keeping food and water clean, and by washing hands before touching food.”

social and commercial marketing of soap with messages stressing proper handwashing as a key activity for preventing diarrhea.

## LESSONS LEARNED

The lessons below draw not only on EHP’s field experience but also on the project’s participation on the UNICEF/WHO Steering Committee for Community IMCI and its involvement in developing environmental health questions for the Demographic and Health Surveys (DHS).

**Lesson One: For the primary prevention of diarrheal disease three behaviors are key: handwashing at critical times with proper technique, sanitary disposal of feces, and protection of drinking water and food from fecal contamination.**

As mentioned above, encouraging health workers to pass on hygiene behavior change messages to the mothers and child caregivers they come in contact with is a simple way to begin the process of integrating primary prevention into child health programs. The messages should focus on the three behaviors known to be highly effective in preventing diarrheal disease. These are consistent with the essential child

health information given in *Facts for Life*, a joint publication of UNICEF, WHO, UNESCO, and UNFPA.

These behaviors were selected with the assistance of a Technical Advisory Group. Criteria included a proven efficacy in reducing childhood morbidity and/or mortality from diarrheal disease, and demonstrated effectiveness in operational settings. The EHP Applied Study *Behavior First* summarizes a considerable body of evidence on the morbidity reduction that could be expected from these behaviors.

**Lesson Two: An important role for the health sector is to collaborate with sectors whose activities impact or could impact child health.**

Many activities with an impact on the environment, both privately and publicly financed, affect children’s health—water supply and sanitation are good examples. Health sector involvement in these activities could help insure that the potential health benefits of the activities are realized. The health sector role can range from project design input, to regulation, to hygiene education and advocacy.

The most important cross-sectoral collaboration from the point of view of diarrheal disease control is collaboration between the health sector and municipalities or utilities providing water and sanitation infrastructure. Only in rare cases is such infrastructure paid for with health sector resources. However, the health sector can be more proactive to insure that water and sanitation programs lead to health benefits by designing and implementing hygiene components for all such programs. EHP’s experience in Jamaica is a good example of how such collaboration can work. Originally the latrine construction project was

focused on protection of the environment, especially in tourist areas adjacent to the slum area in need of sanitation. As planning progressed, the health sector was brought in and a hygiene component was integrated. An evaluation showed that the project met both environment and health goals.

**Lesson Three: Multi-dimensional baseline assessments assist in identifying local risk factors for diarrheal disease.**

Data on disease prevalence, environmental conditions, and knowledge, attitudes, and practices (KAP) in the project community collected concurrently can assist planners to identify local risk factors and design and monitor appropriate interventions. Assessments that collect only one type of data or that use several data sets drawn from different sources do not help program planners understand the risk factors in a given community. For example, if KAP data are collected without corresponding information on disease prevalence or household environmental conditions in the same sample, it is not possible to



A safe water supply provides a firm foundation for personal and domestic hygiene.

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identify the behaviors that are associated with disease in the community.

In Bolivia, EHP conducted a baseline assessment that gathered information on KAP as well as environmental conditions and facilities and child diarrheal disease prevalence based on caretakers' two-week recall. The assessment found that knowledge of diarrheal disease prevention practices and appropriate behaviors by mothers and other caregivers were the most critical determinants of the occurrence of diarrheal disease. The children of mothers who did not think it was possible to control diarrhea had three times as many episodes of diarrhea as those whose mothers thought diarrhea was preventable. Based on this and similar findings, the program emphasized changing caretaker knowledge and behavior.

EHP has found that a multi-dimensional rapid assessment can be economical and does not require long periods of time in the field. However, it does demand careful planning, implementation, and analysis.

## Lesson Four: Programs to promote hygiene behavioral change can be highly cost-effective in diarrheal disease prevention.

EHP examined the cost-effectiveness of hygiene behavior change programs—one of the most typical types of health sector interventions—implemented in collaboration with agencies or organizations funding water and sanitation infrastructure. The analysis, which was published in the *Bulletin of the World Health Organization* (Vol. 76, No. 6, pages 617-631) found that hygiene interventions are highly cost-effective in diarrhea prevention, especially where water and sanitation infrastructure is present. The above table illustrates

Interventions	Cost-Effectiveness for Reducing Diarrhea		
	per case averted	per death averted	per DALY saved
Implement a hygiene behavior change effort where W&S infrastructure exists	\$3	\$700	\$20
100% ORT coverage—cost @ \$2 per episode	N.A.	\$800	\$24

some of the findings of the analysis (also available as EHP Applied Study 4). Note that the cost-effectiveness of hygiene behavior change per DALY saved and per death averted is in the same range as that of ORT.

The estimates used in the study are based on different assumptions regarding programs costs, incidence, case-fatality rates, and effectiveness. Its main conclusion is that water and sanitation facilities are not cost-effective in and of themselves as health sector diarrheal disease prevention interventions, but, combined with hygiene behavior change efforts promoted and financed through the health sector, they can bring about significant reductions in diarrheal disease and are highly cost-effective.

minimum, close attention should be paid to monitoring and evaluating diarrheal disease prevention programs, especially the all-important element of gathering both baseline and post-project data.

**Scale-up methodologies need to be developed.** EHP experience in diarrheal disease prevention has been with small-scale pilot-type efforts. Interest in finding ways to scale up these efforts is high, but basic questions remain concerning training of personnel, ways to streamline community processes, and cost-effectiveness.

—*Patricia Billig, EHP Senior Technical Director, and Diane B. Bendahmane, Technical Director for Information Management*

## OUTSTANDING ISSUES

**There is a continuing need to show empirically that environmental health activities can reduce diarrheal disease rates.** A considerable amount of evidence about the effects of primary prevention on diarrheal disease has been amassed. However, operations research is still needed to identify the most effective and cost-effective interventions and to answer questions about the mix and sequence of activities. At a

## Reports Available from EHP

- "Behavior First: A Minimum Package of Environmental Health Behaviors to Improve Child Health" (EHP A.S. 10).
- "Child Survival and Environmental Health Interventions: A Cost-Effectiveness Analysis" (EHP A.S. 4).
- "Diarrheal Disease Prevention through Community-Based Participation Interventions, Santa Cruz, Bolivia" (EHP A.R. 61).
- "Indicators for Programs to Prevent Diarrheal Disease, Malaria, and Acute Respiratory Infections" (EHP A.R. 46).
- "Preventing Child Diarrheal Disease: Options for Action" (EHP brochure).
- "Prevention: Environmental Health Interventions to Sustain Child Survival" (EHP A.S. 3).



To request technical assistance or to find out more about EHP, contact:

Dr. John Borrazzo, Environmental Health Advisor, Office of Health and Nutrition, RRB 3.07-026, Bureau for Global Programs, Field Support and Research, U.S. Agency for International Development, Washington, D.C. 20523-3700  
Tel: (202) 712-4816 • Fax: (202) 216-3702 • E-mail: jborrazzo@usaid.gov