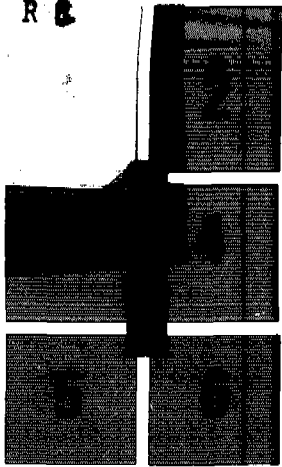


245.11

90RE



REPORT ON IDWSSD IMPACT ON DIARRHEAL DISEASE



**INTERNATIONAL
DRINKING
WATER SUPPLY
AND SANITATION
DECADE**



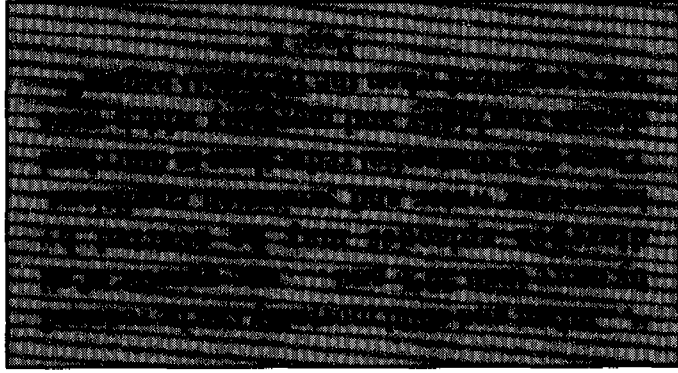
1981-1990

**STEERING COMMITTEE FOR
COOPERATIVE ACTION**

JULY 1990

245.11-90RE-7634

This document was prepared for the World Health Organization, with support from the United Nations Development Programme, on behalf of the Steering Committee for Cooperative Action for the International Drinking Water Supply and Sanitation Decade by Dr Steven A. Esrey of the Water and Sanitation for Health (WASH) Project.





1981-1990

INTERNATIONAL DRINKING WATER SUPPLY AND SANITATION DECADE

STEERING COMMITTEE FOR COOPERATIVE ACTION

REPORT ON IDWSSD IMPACT ON DIARRHEAL DISEASE

CONTENTS

1. Diarrheal diseases and the IDWSSD	2
2. Information about the disease	3
3. Cooperative action	6
4. Accomplishments	6
5. Could more have been done?	9
6. Future steps	10
Bibliography	12

7634
245.11 GORE



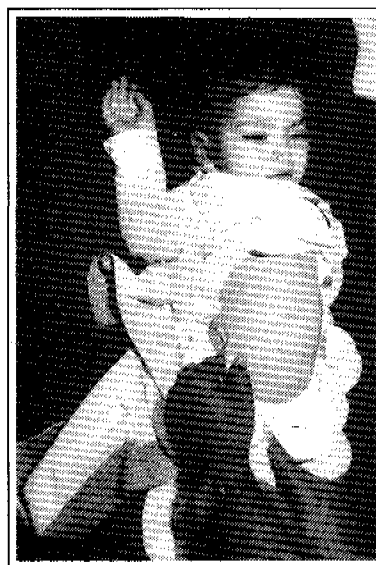
Main Decade goal

1. Diarrheal diseases and the IDWSSD

The main goal of the International Drinking Water Supply and Sanitation Decade (IDWSSD), 1981-1990, was to provide clean water and sanitation worldwide. It was expected that health and productivity would increase as a result of this improvement. Reduction of diarrheal diseases was one of the major health improvements expected.

Children at risk

Today, diarrhea still remains a public health problem throughout the world. It is a major cause of the high morbidity and mortality rates, particularly among children less than 5 years of age. Although adults also suffer from diarrhea, nearly all attention has been focused on children because they are most vulnerable to diarrhea and the adverse consequences. All children in the world are at risk of diarrhea. The annual incidence of diarrhea per child in the developing world is 3.5 episodes a year. Some children suffer more than others, and they will have 10 or more episodes of diarrhea per annum. Several million children die each year from diarrhea.



A doctor examines a child dehydrated by diarrhea. Children are most vulnerable to the debilitating consequences of the disease.

Infection routes

Diarrhea is a symptom and usually is a consequence of infection from one of many enteric organisms that cause disease. Diarrhea can also result from other non-enteric infections such as measles or even be caused by intestinal abnormalities not related to infection such as lactose intolerance. These enteric organisms are usually transmitted through excreta (human and animal) and may be ingested through contaminated drinking water, food, hands, or other objects. Thus, improving excreta disposal, increasing the amount of water for personal and domestic hygiene, and improving drinking water are all expected to reduce diarrhea rates.

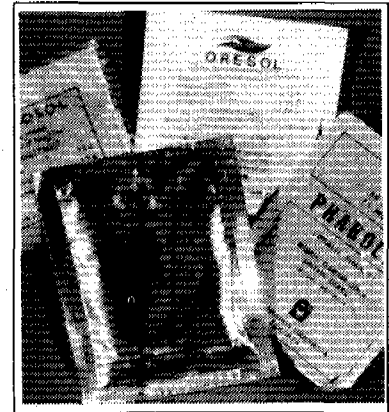
Collaboration needed

Many organizations and institutions throughout the world provided funding for implementation of services, evaluation of interventions, and dissemination of information about how to control the spread of diarrheal diseases. During the IDWSSD new knowledge and approaches to reducing the diarrheal disease burden have been generated, but those working in water and sanitation and diarrhea have not collaborated significantly with each other.



*Prevention and/or
cure?*

More than 100 countries throughout the world now have diarrheal disease control programs. Although prior to the Decade most attention was given to case-management (e.g. oral rehydration), recently increasing attention is devoted to the prevention of the diarrheal episodes themselves. The preventive activities that are either effective or under development are improved water and sanitation, promotion of breast-feeding, reduction of food contamination, better weaning practices, vaccine development, and personal and domestic hygiene. Many of the preventive activities require knowledge of and ways to alter behavior. This includes the water and sanitation sector, which is moving away from the technical issues and into ways of sustaining behavioral changes to achieve the desired health impacts. Thus, the IDWSSD has witnessed the increased participation of non-engineering disciplines, such as social science, public health, training, etc. in tackling diarrheal disease issues.



Oral rehydration treats the symptoms, but is not a preventive action.

Water quality issue

Another trend has been the move toward providing adequate water for personal and domestic hygiene in addition to providing safe water for drinking and cooking. A consensus is building that an acceptable quality of water used in the proper way is more important to reduce diarrheal diseases than is the provision of pure drinking water.

2. Information about the disease

*Distressing
symptoms*

Diarrhea is a condition that results in watery or bloody stools, and it usually includes one or more of the following symptoms: fever, vomiting, cramping, loss of appetite, and malabsorption of nutrients. Most often diarrhea is caused by the ingestion of pathogenic organisms, which may be bacteria, viruses, or parasites. Some of the major organisms are *Campylobacter jejuni*, *E. coli*, *Shigella* spp., *V. cholerae*, rotavirus, *Cryptosporidium*, *Entamoeba histolytica*, and *Giardia lamblia*. Although each organism may provoke different symptoms, depending on the severity of infection, the transmission for all of them can be reduced by installing improved water supply and sanitation facilities near the home and improving hygiene practices.

Each diarrheal episode lasts from 2-3 days up to 2 weeks or more, and usually results in weight loss. The severity depends on the infectious organism, the intensity of infection, and other host factors such as age of



**Continuous
weakening**

the child, level of malnutrition, and host immunity. The weight loss that accompanies diarrhea usually leads to acute malnutrition, and repeated episodes will lead to chronic malnutrition, which is difficult to correct. The risk of dying from diarrhea is greatly increased in severe cases and in malnourished children. Thus, although a specific case of diarrhea may not lead to death, the continual weakening of the child through repeated episodes of diarrhea will increase the probability that a subsequent episode will lead to death.

Some immunity may be acquired during diarrhea against specific organisms. Other diarrheal disease agents, however, are so ubiquitous that diarrhea will continue to occur when the child becomes exposed to these other organisms. Thus, only by preventive measures will the diarrheal disease burden be effectively managed.

Transmission route

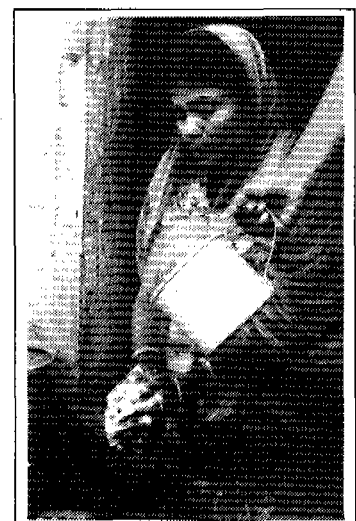
All of the major organisms that cause diarrhea are transmitted via excreta and subsequently ingested and swallowed. The organisms can go directly from person-to-person, person-object-person, or person-water-person. In some instances a person can continue to reinfect themselves; this is the case with *Giardia*.

**Sanitation is the
key**

Thus, limiting excreta from the open environment should reduce diarrheal disease transmission. This also means having adequate water for handwashing following defecation or after handling feces. Once excreta gain access to the environment, other methods of control become important, such as personal hygiene and drinking water. Thus, adequate water for personal and domestic hygiene and clean drinking water should reduce transmission of pathogens.

Economic loss

Diarrhea among children leads to significant economic loss in the community. Mothers must spend time with sick children or transport them to health care facilities. This reduces the mother's purchasing power by reducing income-generating activity, and it often requires the outlay of money for treatment. When children die, it is not only the expected economic contribution of the child in future years that is lost, but the cost of investing in the child is also lost. Thus, repeated episodes of diarrhea among children take a significant economic toll among families and communities.



Washing hands with soap and water before eating and after defecation reduces the risk of disease transmission.



***Management and
treatment***

A great deal has been learned about proper management of diarrhea in the last 20 years, and the last decade has seen many gains from disseminating this knowledge to the community. Case management of diarrhea now includes promotion of oral rehydration, either with prepared packets or home-made sugar-salt solutions, and feeding of high quality foods during and after each episode.

This case management however does not prevent episodes from occurring and does not guarantee that death will not ensue. This is in part because some diarrhea episodes do not respond to oral rehydration. Recently (Martinez et al, 1989), the effectiveness of case management has been criticized as being ineffective in reducing diarrheal disease mortality.

***Danger of local
remedies***

Local remedies for diarrhea still persist in many parts of the world, and these practices are hard to change. Some remedies include administration of drugs, many of which produce adverse symptoms. Such drugs, and other traditional remedies, are dangerous for children, and pose serious health risks. Sometimes during diarrhea, the child may be abruptly weaned, and this increases the risk of contracting the disease again in the future.

Prevention is best

The best treatment of diarrhea is to prevent the episodes from arising. Evidence accumulated during the IDWSSD shows that providing improved water and sanitation prevents both morbidity and mortality. Recently, the focus is shifting from water quality and technical issues to overall environmental improvement, use of more water, and behavioral changes.



New toilets, like this one, under construction in Papua New Guinea, provide the best guarantee against diarrhea.



*Benefits of
collaboration*

3. Cooperative action

In the past, the water and sanitation sector has not linked its activities adequately with other sectors, including efforts being made in diarrheal disease control. Though efforts in the two sectors have been disjointed, they have expanded and increased in visibility in parallel. Activities during the Decade did not overlap, but they do complement each other. Much can now be gained from future collaboration.

Both sectors stand to benefit from their combined experiences in the last ten years, as both try to attain similar goals (reduced diarrhea), and both recognize the need for community participation and the reliance on local initiatives to achieve sustained impacts.

The panel opposite shows some of the significant meetings and declarations during the IDWSSD as they relate to water, sanitation and diarrhea. Though not evident from the panel, it is significant that, throughout the IDWSSD, the declaration of "Fresh water for all" has led to activities, meetings and declarations on diarrhea that have built on new and continuing knowledge. Through this knowledge sharing, new issues have been addressed, and the approach to combating diarrhea has moved towards behavioral and preventive aspects, community participation, environmental issues, expanding sanitation, and increased use of water for personal and domestic hygiene.

4. Accomplishments

During the 1970s, two significant papers influenced child survival strategies and funding of water and sanitation interventions as a means of controlling diarrhea. A 1975 World Bank paper stated that efforts to measure the health benefits of water and sanitation programmes were too expensive, too time consuming, and too difficult to justify. The other paper, published in 1979 by Walsh and Warren, stated that providing safe water and sanitation was too expensive as a child survival strategy when compared with other interventions.

So, water and sanitation provision began the IDWSSD in a climate in which major funders saw it as an expensive intervention, in which health impacts could not be estimated. Fortunately, programmes went on, and during the Decade the cost of water and sanitation facilities has come down considerably, and the number of good quality studies indicating substantial health impacts (including less deaths) has gone up. It is now generally recognized that reductions in diarrheal morbidity and mortality can be achieved through improved water and sanitation. The reductions have been quantified in a recent review of all available studies relating

*Early
discouragement*



Milestones in Water, Sanitation and Diarrhea

- 1976** *Fresh water for all* declared at HABITAT Conference in Vancouver, Canada.
- 1977** United Nations declares the International Drinking Water Supply and Sanitation Decade in Mar del Plata, Argentina.
- 1978** Declaration that safe water and sanitation are essential for achieving primary health care in Alma Ata, USSR.
- 1982** WHO's Control of Diarrheal Disease Programme begins a series of reviews on possible interventions to control diarrheal diseases, including improvement of water and sanitation facilities.
- 1983** Meeting to discuss methods of health impact evaluation of water and sanitation projects held in Cox's Bazaar, Bangladesh.
- 1984** Published review paper (Feachem) states that personal and domestic hygiene interventions are effective and feasible in controlling diarrheal diseases.
- 1985** Published review paper (Esrey) states that water and sanitation interventions are effective and feasible in controlling diarrheal diseases.
ICORT II meeting on oral rehydration therapy – attention given to non-case management issues in diarrhea.
- 1987** *Beyond the Decade* proposed in Interlaken, Switzerland; activities to expand beyond water supply, sanitation and hygiene education to encompass other environmental issues.
- 1988** Meeting in The Hague, The Netherlands, External Support Agencies (ESAs) propose creation of a Collaborative Council and make a call for intensified efforts to expand coverage and share information on strategies, programmes and needs.
- 1989** Meeting of the Collaborative Council's 1990 Committee set objective to maintain Decade momentum and to focus on unserved rural and periurban populations.
ICORT III meetings on oral rehydration therapy – attention given to behavior issues on management of diarrhea.
First full meeting of the Collaborative Council held in Sophia Antipolis, France, emphasizes raising awareness of the need to expand water and sanitation efforts.
- 1990** Global Consultation, New Delhi, India, seeks to determine global strategies for the next Decade.

Lower costs, proven impacts

water and sanitation improvements to diarrheal disease morbidity and infant and child mortality. The results (Table 1) indicate that infant and child mortality can be reduced by more than 50% and that one-quarter of all diarrhea episodes may be averted by improving water and sanitation conditions. These are substantial reductions in diarrheal disease morbidity and mortality which were not recognized when the IDWSSD began.



Table 1 Health impacts from improvements in water and sanitation

Health indicator	Number of Studies	Percentage reduction	
		Median	Upper Range
Diarrhea incidence	55	26	68
Diarrhea mortality	3	65	79
Total child mortality	9	60	81

From Esrey SA, Schiff C, Roberts L, Potash J (1990) Health benefits from improvements in water supply and sanitation: Survey and analysis of the literature on selected diseases. *WASH Project Technical Report No. 66.*

Water and sanitation improvements can reduce diarrheal mortality rates in two ways. First, deaths are reduced by averting many episodes of diarrhea. Second, better water and sanitation reduce the number of organisms a child ingests and swallows. Though diarrhea may still occur, the severity of episodes will be less, and more children will survive.

As a result of the IDWSSD, health education, community participation and training are recognized as necessary components of water and sanitation programmes. Education materials cover maintenance of systems, proper use of services, and information on the transmission of diarrheal disease agents. Films, posters, flipcharts and slides have been developed in a variety of languages, for bringing key messages to the general public, schoolchildren, engineers, and health educators.

Publications such as *Dialogue on Diarrhea*, *Waterlines*, *World Water*, *IRC Newsletter*, and *Technical Literature Update on Diarrhea* report regularly on issues related to diarrhea and its prevention. The range of issues covered includes preventive and treatment aspects of diarrhea, such as use of improved water and sanitation facilities, promotion of breast-feeding, and case management.

In the course of the Decade, funding has been provided for a number of organizations to study diarrheal diseases. Supporting organizations have promoted institution building, while funding studies on prevention and case management of diarrhea. Among the many organizations supporting diarrheal disease research, special mention should be made of: the Diarrheal Disease Control (CDD) Programme of WHO, the International Centre for Diarrheal Disease Research, Bangladesh (ICDDR,B), the International Development Research Centre (IDRC) of Canada, and the Applied Diarrheal Disease Research Program (ADDR) in the US. These institutions have funded work throughout the developing world, encouraged the development of local expertise, and reported their findings to governments and policy makers, as well as to the scientific community.

Dramatic evidence

Health education

In the news

Institutional support



*Common
approaches*

5. Could more have been done?

Water and sanitation activities during the IDWSSD did not include working with those involved in the control of diarrheal diseases. Nevertheless, efforts of both groups gained momentum simultaneously in the last ten years. In the second half of the Decade, the two groups were moving in similar directions. Common approaches on hygiene behavioral issues provide a good launching point for linking diarrheal disease programmes with water and sanitation efforts, but the state of knowledge is still evolving.

Quantity v quality

At the start of the IDWSSD, many experts seemed to think that drinking water was of paramount importance in controlling diarrheal diseases. Now, it is generally recognized that the *quantity* of water available for personal and domestic hygiene has more influence than the purity of the drinking water. Hence the diversion of resources towards behavioral issues and the effective use of facilities.

Community issues

A major success of the IDWSSD has been the development of cheap and reliable water and sanitation technologies (e.g. handpumps and VIP latrines). Now the trend is towards developing appropriate solutions for community issues such as willingness to pay, community participation, and community control of finances. Water and sanitation approaches are also moving towards decentralization. Non-governmental organizations, the private sector, and local initiatives to maintain and sustain interventions are now encouraged by major donors.

These lessons of the IDWSSD will contribute to more productive efforts to prevent diarrheal disease on the part of water supply and sanitation agencies in the coming decade. Such efforts will be assisted by the changing emphasis from case management to prevention, driven by the conclusions of WHO's review of 20 possible interventions to control diarrheal diseases, begun in 1982. Case management itself was not reviewed, and seven were

Traditional birth attendants in the Philippines learn about oral rehydration salts. A combination of prevention and case management is the best strategy for the future.





identified as being highly effective and feasible. They included water and sanitation interventions and the promotion of personal and domestic hygiene, which are now integrated in the *Decade Approaches* to successful water and sanitation investments.

6. Future steps

There is now a clear mood of support for extending IDWSSD activities into the 1990s. This should provide the impetus for parallel and coordinated efforts from agencies involved in diarrheal disease control. Other activities and policies will need to be developed too, to achieve the original goal of improved health and increased productivity. It is rightly felt that water and sanitation interventions have a major impact on the overall development of communities and countries, going beyond the prevention of one disease, however significant that impact may be.

Wider goals

Having established that improved water and sanitation *can* reduce diarrheal morbidity and mortality, the challenge now is to ensure that the desired effect is actually achieved in as many cases as possible. Simple installation of services does not guarantee health benefits. Impacts are greatest, for instance, if water and sanitation are improved together. Though engineering or funding considerations may make them separate interventions, they complement one another in reducing the diarrheal disease burden.

Complementarity

Preliminary indications are that strategies for the 1990s will strengthen collaborative linkages with other sectors. As well as establishing stronger links with health education, water and sanitation specialists need to initiate collaborative efforts with those involved in immunization, maternal and child health, and agriculture.

As these linkages are made, two general questions need to be considered by those responsible for funding, designing and implementing projects:

Measuring the benefits

- How do improvements in water and sanitation, in conjunction with other outputs (e.g. growth monitoring activities), affect diarrheal disease transmission? and
- How do reductions in diarrhea from the implementation of water and sanitation programmes affect other aspects of community life, such as worker productivity, rates of immunization or ORS use, and expenditure on health care or overall purchasing power?

Future projects need to monitor programme and community activities that relate to impacts on both diarrhea and other diseases. Reliance on technical inputs is not enough to guarantee diarrhea reductions. Knowledge



is also needed of behavioral practices related to water use and excreta disposal. Methods have been developed for monitoring behavioral changes, and these could readily be incorporated into ongoing and future programmes. Health monitoring should also be included, so that, when the opportunity arises, health impact evaluations can be carried out.

Hygiene emphasis

The change of emphasis from provision of *pure* water to provision of *enough* water and its effective use is encouraging. When safe water is provided, an adequate quantity of water should also be made available for purposes other than drinking and cooking, and proper hygiene behavior should be encouraged. In this connection, significantly more resources and attention need to be devoted to excreta disposal. This is the first line of defence in controlling transmission of diarrheal disease agents. Provision of proper sanitation facilities also demands that enough water be available.

Community participation

As a result of the IDWSSD, many technical issues about water and sanitation have been adequately resolved. Systems have been developed which work more efficiently and last longer with less maintenance and repair than was the case ten years ago. The emphasis now is on non-technical issues such as community participation. This has to include selection of sanitation facilities which are culturally appropriate, developing appropriate messages for changing behavior, and developing methods to sustain behavior which will combat diarrheal disease.

Priority setting

Community participation in water supply and sanitation, and in diarrheal disease control, means specifically involving women as well as men in all aspects of programmes. It means developing local financing capabilities. And it means encouraging efforts to develop appropriate education materials for local communities on the proper use of facilities.

Applied research

In determining priority areas for receiving water and sanitation improvements, an important criterion should be high disease rates which can be reduced by such improvements. Such areas usually have uninterrupted transmission of diarrheal disease organisms, and the people have low rates of breast-feeding, little education and crowded living conditions. The emphasis on rural and periurban communities proposed in draft strategies for the 1990s will direct resources towards the areas at greatest risk.

Knowledge is still incomplete. To help design more effective projects for reducing diarrheal disease morbidity and mortality, data need to be collected and applied research projects initiated to determine:

- how close to homes services should be provided;



Resource needs

- the minimum water necessary and hygienic behavior required to achieve substantial health impacts;
- methods to sustain behavioral change;
- preconditions and additional inputs necessary to maximize health benefits.

All these activities require extra resources, and ESAs will need to help and encourage developing country agencies by making funds available for appropriate activities. Resources will also have to be maintained for the production and dissemination of educational materials. Health and behavioral specialists should be part of the development and implementation of water and sanitation interventions, and regular monitoring activities need to be included in project budgets.

Much has been learned about the control of diarrhea during the IDWSSD. Now that Decade activities are to be extended, it is time to capitalize on the information gained and the lessons learned. We know that diarrhea can be reduced by improving water supply and sanitation, and we are learning more about the behavioral changes and community cooperation necessary to ensure these reductions. The knowledge and expertise developed during the IDWSSD should not be lost. One way to protect this knowledge is to establish local capacity. The chances of success are improving all the time, and will be further enhanced if water and sanitation practitioners collaborate more frequently and formally with those involved in diarrheal disease control efforts.

Bibliography

Briscoe J (1986) Evaluating the health impact of water supply, sanitation and hygiene education programs. IDRC, Ottawa, Canada.

Esrey SA; Feachem RG; and Hughes JM (1985) Interventions for the control of diarrhoeal diseases among young children: improving water supplies and excreta disposal facilities. *Bulletin of the World Health Organization*, 63 (4): 757-772.

Feachem RG (1984) Interventions for the control of diarrhoeal diseases: promotion of personal and domestic hygiene. *Bulletin of the World Health Organization*, 62 467-476.

Martinez J; Phillips M; and Feachem RG (1989) Diarrheal diseases: The World Bank health sector priorities review. In *Evolving health sector priorities in developing countries*, edited by Dean T Jamison and W Henry Mosley.

Walsh J; and Warren K (1979) Selective primary health care. *New England Journal of Medicine* 301 (18) 967-974

World Bank (1975) Measurements of the health benefits of investments in water and sanitation.

This document is one of a series of booklets prepared on behalf of the Steering Committee for Cooperative Action for the International Drinking Water Supply and Sanitation Decade. Titles in the series are:

- 1. Report on IDWSSD impact on Diarrheal Disease**
- 2. The IDWSSD and Women's Involvement**
- 3. Human Resources Development in the IDWSSD**
- 4. IDWSSD activities in Technical Information Exchange**
- 5. Report on IDWSSD impact on Dracunculiasis**
- 6. Report on IDWSSD impact on Schistosomiasis**

Copies of the documents are available from the CWS Unit, World Health Organization, 1211 Geneva 27, Switzerland.