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**IMPROVING WATER AND SANITATION  
HYGIENE BEHAVIOURS**  
*FOR THE REDUCTION OF DIARRHOEAL DISEASE*

**THE REPORT OF AN INFORMAL CONSULTATION**  
Geneva, 18-20 May 1992



Community Water Supply and Sanitation Unit (CWS)  
Control of Diarrhoeal Disease Programme (CDD)  
WORLD HEALTH ORGANIZATION, GENEVA, JUNE 1993.



## Summary

Epidemiologic evidence shows that diarrhoeal morbidity can be reduced through improved hygiene behaviours, even when the provision of appropriate water and sanitary hardware is not feasible. However, hygiene education interventions often target too many behaviours or behaviours that would have limited impact in reducing the disease burden. In addition, the water and sanitation sector suffers from a lack of innovative approaches to hygiene education. After reviewing the epidemiological evidence, this consultation first identified a set of key hygiene behaviours which, if adopted, can lead to reductions in diarrhoeal morbidity, then stressed the need for the dissemination of more effective approaches to hygiene education, especially public health communications, participatory methods and school hygiene education.

The recommendations of the consultation can be found in Section 2. Fuller details of the consultation's consideration of key hygiene behaviours, and of the promotion and implementation of these behaviours, is to be found in Sections 3 and 4 respectively.

**The informal consultation was hosted by WHO's Diarrhoeal Disease Control Programme (CDD) and Community Water Supply and Sanitation Unit (CWS).**

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### **Water and sanitation hygiene behaviours and the risk of diarrhoea**

Diarrhoeal diseases are a major cause of morbidity and mortality in infants and young children in the developing world. On average a young child suffers 3.3 episodes of diarrhoea in a year, and each year over 3 million children under five years die from diarrhoea. Of the interventions to reduce the risk of diarrhoea, the promotion of improvements in personal and domestic hygiene ranks among the potentially most effective, with recorded median reductions in incidence of between 14% and 48%.

Over recent years, as epidemiologic evidence has been accumulated, our knowledge of the hygiene behaviours associated with increased risk of diarrhoea has been refined. At the same time, we now have more information about the implementation of various interventions, and about the effect each intervention can have in promoting improved hygiene. In order to facilitate its implementation, this information needed to be coherently reviewed.

### **This consultation**

Often hygiene education interventions target too many behaviours or behaviours that would have limited impact in reducing the disease burden. Difficulties are often encountered in measuring and assessing the relative importance of the large number of factors that have been associated with increased transmission of diarrhoea pathogens.

The identification of a set of key hygiene behaviours would help water and sanitation hygiene education programmes to choose how to intervene and will enable them to focus staff training, materials development and the development of appropriate technologies in order to support the most relevant behaviours.\*

The water and sanitation sector suffers from a lack of innovative approaches to hygiene education, with demonstration and message-giving being the predominant activities. A review of newer approaches was required, as well as recommendations about which approaches might most positively effect behaviour change in communities.

In addition, epidemiologic evidence shows that even when the provision of appropriate water and sanitary hardware is not feasible, diarrhoea morbidity can still be reduced if improved hygiene behaviours are adopted. If this is the case, hygiene activities can occur prior to large improvements in water supply and sanitation, with consequent improvements in health.

With this in mind, an informal consultation was jointly organized by WHO's Diarrhoeal Disease Control Programme (CDD) and Community Water Supply and Sanitation Unit (CWS), calling upon the expertise of epidemiologists, anthropologists, sanitary engineers, health education and communications experts to review the available information and provide recommendations for future action. The list of participants can be found on the inside back cover of this report.

### **The consultation had two primary goals:**

- **To define and recommend a minimum complex of water and sanitation hygiene behaviours which should be promoted to reduce diarrhoeal morbidity**
- **To identify and recommend approaches to the promotion of improved water and sanitation hygiene behaviours**

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\*Only water and sanitation hygiene behaviours were considered:

Both contaminated food and contaminated water are key routes for the transmission of diarrhoea. Whilst food and water are closely linked, this consultation's primary function was to consider a minimum set of water and sanitation behaviours which the water supply and sanitation sector should address. For guidance on food safety, see *The WHO Golden Rules for Safe Food Preparation*.

### Recommendations on key water and sanitation hygiene behaviours

The epidemiological review (presented in Section 3 of this report) indicated that programmes should focus on preventing the faecal contamination of the environment and removing or destroying pathogenic organisms before they contaminate the new host.

Three key hygiene behaviours could lead to the greatest reduction in diarrhoeal morbidity:

- **Safer disposal of faeces**, particularly faeces of young children and babies, and of people with diarrhoea
- **Handwashing**, after defecation, after handling babies' faeces, before feeding and eating, and before preparing food
- **Maintaining drinking water free from faecal contamination**, in the home and at the source

### Policy recommendations relating to key hygiene behaviours

#### 1. **Minimizing risks of faecal-oral transmission**

The overriding goal of hygiene programmes must be to minimize opportunities for the ingestion of faecal pathogens by a new host. To achieve this goal a set of key hygiene behaviours, ideally the set listed above, should be promoted.

#### 2. **Aiming for gradual realistic goals**

Small improvements in hygiene standards are better than no improvements at all. People must not be expected to wait for perfect systems. Even modest improvements can bring health benefits.

#### 3. **Using hygiene behaviours as an indicator**

Scientific evidence shows that water and sanitation improvements protect individual and community health. To judge whether programmes are having a health impact, it is acceptable to rely on such intermediate indicators as safer hygienic behaviour.

#### 4. **Promoting improved hygiene behaviours, even in the absence of improved hardware**

Handwashing and other behavioural changes for reducing faecal contamination, as described above, constitute important and valid programmatic goals. Programmes designed to help people to reduce high-risk behaviours can precede broader water supply and sanitation programmes, as well as be incorporated into such programmes.

#### 5. **Maximizing community participation**

Water supply, sanitation and hygiene programmes should be community-based and designed for maximum participation during all stages. Such activities should begin with an identification of what people are already doing, by recognizing the meaning and benefits of these behaviours, and by building upon these in ways which enable people to make informed decisions about possible changes.

### Recommendations to WHO on strengthening hygiene education

In reviewing hygiene education programmes with widely varying characteristics, Consultation participants were able to formulate a series of action-oriented recommendations for strengthening programmes to improve hygiene behaviours. These were divided into recommendations for identifying, securing and disseminating existing information; promoting interventions shown to be successful; studying and evaluating new approaches or combinations of approaches, based on experiences in hygiene education per se or taken from related developmental fields.

#### **Information-Related Recommendations:**

1. Drawing on information already available, WHO should take a vigorous role in guiding hygiene education developments within field projects, at training institutions, in schools, and within implementing institutions.

2. WHO should assist in documenting descriptions of the benefits of key hygiene behaviours, appropriate technology which would facilitate behavioural change, and descriptions of programmes for stimulating safer behaviours. These should be widely distributed so as to create a common understanding among donors, and to serve as a basis for regional and country-level planning.
3. WHO should sponsor forums in order to bring together policy-makers to consider recommended these key behaviours, to consider epidemiologic evidence which supports them, and to plan ways of converting them to national and programme policies.
4. Effective training of workers responsible for promoting hygiene behaviour changes requires drawing upon innovative training techniques which are skills-based and which stress participatory methods. WHO should produce a manual which supports such training and describes how such training programmes can be best evaluated.

#### **Implementation-Related Recommendations:**

5. WHO should promote the application of formative research methodologies, such as those being successfully employed by social marketing specialists, as a basis for planning and monitoring hygiene education programmes.
6. WHO should promote the application of "Rapid Appraisal" methodologies to hygiene programme planning.
7. WHO should assist in implementing programmes which are based upon a sound understanding of behavioural and social components rather than on physical, technical or demographic factors alone.
8. At the country level, WHO should seek to identify ways to assure that staff are available to support behavioural concepts and change strategies. WHO should support identification of appropriate staff to be trained and should make provisions to implement such training.

#### **Research and Evaluation**

##### **Recommendations:**

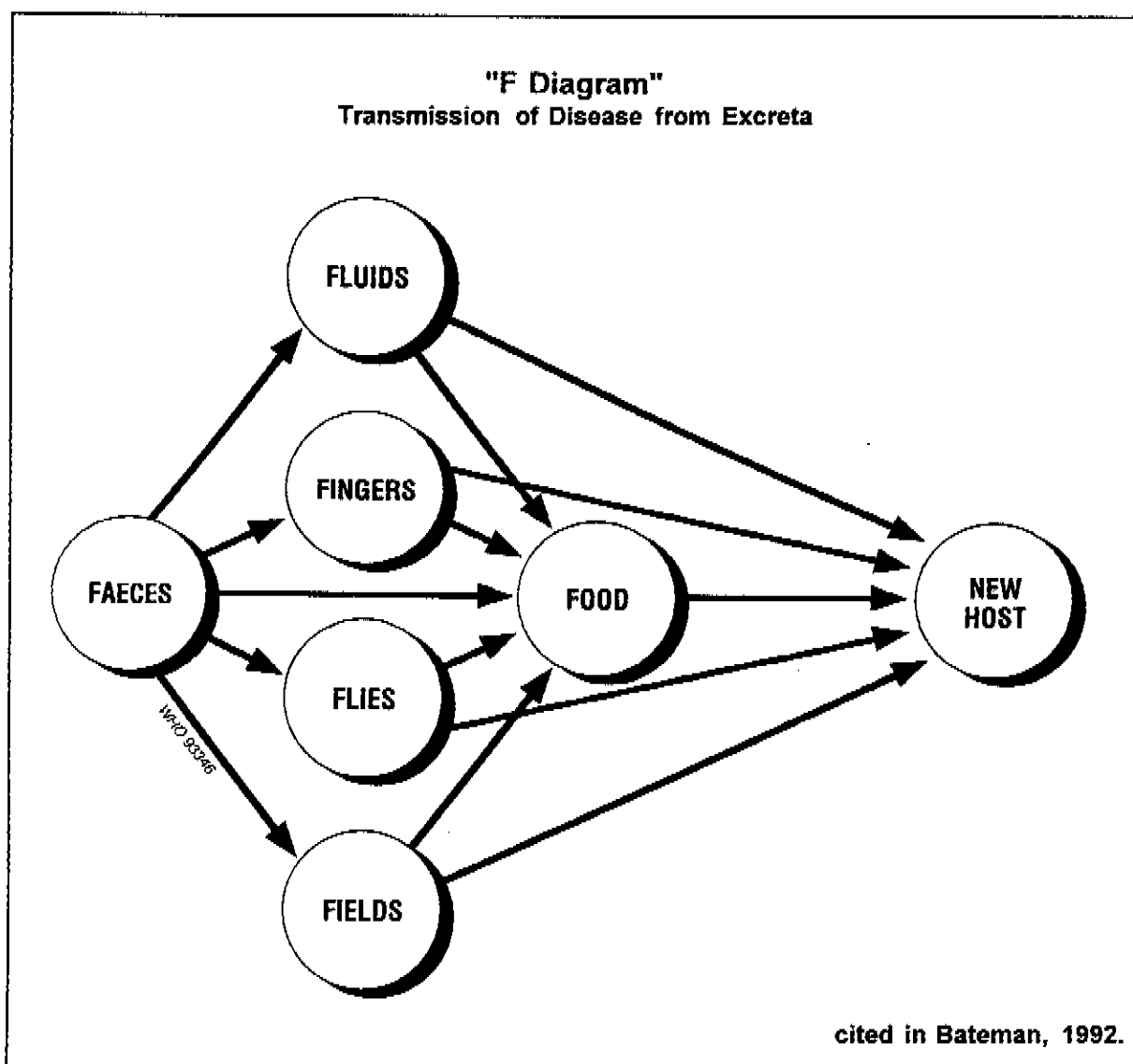
9. Additional support from WHO is needed for appropriate hygiene technology research, development and evaluation. Emphasis should be on low-cost technology which builds on existing local tradition and tools.
10. Such research should be sharply focused upon key hygiene behaviours. For example, if safe disposal of children's faeces is a clearly defined goal, disposal technology needs to address that specific need. If handwashing is not feasible as a result of long distances to water sources, research might be focused on simple water collection or conservation techniques.
11. WHO should use its leadership to assure coordination of research related to hygiene behaviour both within WHO and most other concerned agencies so as to set realistic priorities and to avoid duplication of effort. Formation of a Hygiene Research Steering Group should be considered.
12. Academic research is important, but not sufficient. Field trials of programmatic and technical interventions and innovations are encouraged, including field testing in at least three countries. This is particularly essential for promoting participatory or community-based behavioural changes.
13. Reliable participatory tools are only partially available. WHO should support further developments, such as how to stimulate local participation in assessing how local water becomes contaminated, determining who is responsible to prevent such contamination, and deciding how communities can rectify such situations. This should lead to development of simplified methodologies for programme planning, including data collection and application of SARAR techniques, as well as those methodologies used by social marketing specialists.
14. Indicators of safer hygiene behaviour need to be tested to assure their feasibility and accuracy. Management information systems will require modification, so as to incorporate such indicators as routine components of project monitoring and evaluation.

### 3.1 Evidence from observational studies

Human faecal contamination of the environment, water, fingers and hands creates the conditions for the transmission of diarrhoeal disease to a new host. Some animals also harbour pathogenic organisms in their faeces, such as *Campylobacter* in chicken's faeces.

Contaminated water may be ingested directly, or used in the preparation of food and in the cleaning of feeding utensils, storage vessels and food, thereby directly or indirectly leading to

the ingestion of pathogens. Fingers and hands are commonly contaminated during defecation or by touching contaminated objects and surfaces. Contaminated fingers and hands may lead to faecal-oral transmission when they come into direct contact with the mouth, or to contamination of food, water, and feeding or drinking utensils. These routes of diarrhoea transmission are summarized in the following "F diagram":



Just as there are many routes for faecal-oral transmission, so there are many points at which interventions may be brought in to interrupt this transmission. These opportunities to interrupt transmission can be classified into two major types; primary and secondary barriers.

**Primary barriers:**

Preventing infectious organisms from getting into the environment

**Secondary barriers:**

Avoiding, removing or destroying infectious organisms before they enter the mouth

The primary barrier to transmission in the case of faecal-oral disease is the safe disposal of faeces. When this does not work, or works imperfectly, secondary barriers are needed. Secondary barriers include:

Avoiding:

- Unsafe water sources
- Contamination of water during handling, transport and storage
- Contamination of hands by contaminated water, soil, objects
- Contamination of cooking and feeding utensils, food containers, preparation surfaces by contaminated hands, water, objects, food
- Contamination of food by contaminated cooking and feeding utensils, food containers, preparation surfaces, hands, water, objects, soil
- Ingesting contaminated foods
- Putting contaminated objects, including hands, in the mouth

Removing or destroying infectious organisms:

- Disinfecting water before drinking and food preparation
- Cleaning hands, especially before handling food
- Cleaning utensils and surfaces before food preparation and consumption
- Cooking food thoroughly

Many epidemiological studies have provided

information substantiating the importance of these barriers in the prevention of the transmission of diarrhoea. Some of this information is summarized on the next few pages.

**Primary Barriers: Preventing infectious organisms from getting into the environment**

Observational studies have shown an association between the incidence of diarrhoea and indiscriminate defecation near the home (Han & Moe, 1990), or children defecating in living areas (Clemens & Stanton, 1987). The unsanitary disposal of children's stools was found to be associated with a 34% increase in clinical diarrhoea and a 64% increase in pathogen positive diarrhoea, when compared with children from families where stools were adequately disposed of (Baltazar & Solon, 1989).

Animal faeces may harbour a number of organisms, including *Salmonella*, *Cryptosporidium*, *Campylobacter*, *Aeromonas* and *Plesiomonas*. A number of studies have noted the presence of animals and of these organisms in environments where the incidence of diarrhoea is high (Black et al, 1989; Blaser et al, 1980; Cruz et al, 1988; Wadstrom & Ljungh, 1991). A specific association has been found between the presence of chickens in the home and an increased incidence of diarrhoea in children (Georges-Courbot et al, 1990; Grados et al, 1988).

**Secondary Barriers: Avoiding, removing or destroying infectious organisms**

**Contaminated water**

A high degree of water contamination was found in settings where the incidence of diarrhoea was high (Black et al, 1989; Henry et al, 1990; Molback et al 1989). In one study, where facilities for water storage were poor, water was found to be more contaminated in storage containers in the home than at the source. This suggests that water was contaminated during handling (Molbak et al, 1989).

In India, the risk of diarrhoea in children increased when water was taken from household storage containers using a dipper, rather than poured (Saran & Gaur, 1981). An increased risk of diarrhoea has often been observed in situations when unimproved, and presumably contaminated, water sources are used (Mertens et al, 1990; Huttly et al, 1987). These findings are consistent with the literature that shows an overall decrease in the incidence of diarrhoea with better access to improved water sources.

#### **Contaminated hands**

Hand contamination has been consistently associated with increased risk of diarrhoea. In Bangladesh, children with more contaminated hands were 3 times more likely to have diarrhoea than children with less contaminated hands (Henry & Rahim, 1990). An association has been identified between the mother not washing her hands before food preparation (Clemens & Stanton, 1987) or after cleaning her child (Saran & Gaur, 1981), and increased risk of diarrhoea in the child. Lack of soap in the

home has also been associated with increased risk of diarrhoea (Huttly et al, 1987).

#### **Other sources of contamination**

The presence of contaminated objects in the domestic environment has been associated with increased risk of diarrhoea in children (Huttly et al, 1987), as has the observation of children placing garbage and waste products in their mouths (Clemens & Stanton, 1987).

#### **Flies**

Although research evidence suggests that flies are able to transmit enteric pathogens from faeces to human beings via food or drink, the extent to which this actually takes place remains unknown. Equally the potential impact of fly control programmes on diarrhoea is unknown. *Because the available evidence suggests that fly control is difficult to achieve and sustain and, even if successfully implemented, is not a cost effective intervention for diarrhoeal disease control, fly control measures were not considered during this consultation.*

## **3.2 Evidence from Intervention Studies**

Many of the existing studies of hygiene interventions relate to the improvement of water and sanitation facilities. Increasingly, interventions of this nature have included a hygiene education component alongside the hardware improvements, and a number of intervention studies have been conducted to evaluate the impact of the promotion of improved personal and domestic hygiene.

In recent years comprehensive reviews have been published summarizing the evidence of the impact of improvements in water and sanitation facilities on diarrhoea (Esrey et al, 1985; Esrey & Habicht, 1986; Huttly, 1990; Esrey et al, 1991). Overall they indicate that improvements in water supply and sanitation facilities may reduce diarrhoeal morbidity by 25% (median), diarrhoeal mortality by 65% (median), and overall child mortality by 55% (median). Results from seven studies on the impact of interventions to promote personal and domestic hygiene are presented in the table on the following page (from Huttly S.). They show a median reduction in diarrhoeal morbidity of 33%. Three of these studies

concentrated on the promotion of handwashing while the other three involved combinations of hygiene behaviours.

A study in peri-urban Lima examined the relative impact of several hygiene intervention strategies, including: improving water quality, promoting handwashing, providing playpens for young children, and caging chickens. Of these only the promotion of handwashing was observed as having a significant effect in reducing the incidence of diarrhoea (Lanata, personal communication).

A striking factor of these studies is the wide range of impacts observed. Several reasons have been advanced for the differences in health impact:

- Differences in the level of provision, functioning and utilization of improved water and sanitation facilities.
- The presence of other factors, such as a minimum level of sanitary improvement which might be needed before any health benefit can be expected.

- The multiple transmission routes for diarrhoea-causing pathogens: improvements in water supply and sanitation facilities may be a necessary, but not sufficient, condition for improving health.
- The level of pathogen exposure: water and sanitation improvements are likely to have more impact on high infectious dose pathogens (such as in cholera) than on low infectious dose pathogens.
- The type of intervention: combined improvements in water quantity and excreta disposal appear more effective than those in water quality alone.
- The effectiveness of the intervention to change behaviour: as morbidity decreases with improvements in hygiene behaviours, improvements in water and sanitation facilities alone may not result in lowered morbidity.

Impact of the promotion of personal and domestic hygiene on diarrhoeal morbidity (Huttly S, 1992)		
Location	% Reduction in diarrhoeal morbidity	Reference
<u>Handwashing</u>		
Burma	30	Han & Hlaing
USA	48	Black et al.
Bangladesh (Urban)	35*	Khan
<u>Combination</u>		
Bangladesh (Urban)	26	Stanton & Clemens
Bangladesh (Rural)	>40**	Alam et al.
Guatemala	14	Torun
Zaire	11	Haggerty et al.
* Impact on shigellosis		
** Impact seen in both intervention and control areas; reduction due to intervention is approximately 17%		

### 3.3 Conclusions on key behaviours

Following discussion of those studies, the participants concluded that the most important water and sanitation behaviours to be promoted are:

1. *Safer disposal of human excreta, particularly the faeces of young children and babies, and of people with diarrhoea.*

The faeces of babies and young children are the most dangerous as they have a higher concentration of pathogens. It is the faeces of these two groups that are most frequently found in the environment. The faeces of babies and young children are not considered to be dirty in many societies. People with diarrhoea are often too sick to walk long distances to latrines or away from domestic areas. Programmes should focus on developing appropriate supportive technologies especially for these two groups.

Safer disposal of human faeces means that sanitation programmes should help communities work towards improvements in excreta disposal which they can afford and sustain. Many latrine programmes fail because the technologies offered, such as the VIP latrine, are not affordable to the population. Smaller improvements, such as the "dig and bury" approach, should be acceptable as an advanced up the hygiene scale.

2. *Handwashing, after defecation, after handling babies' faeces, before feeding and eating, and before preparing food.*

Even with safer disposal of human faeces, hands can be contaminated with human excreta when cleaning babies and small children after defecation, assisting people suffering from diarrhoea, and during anal cleansing in the absence of toilet paper.

The promotion of handwashing is demonstrated to be effective in the reduction of diarrhoeal diseases and should be promoted vigorously.

3. *Maintaining drinking water free from faecal contamination, in the home and at the source.*

Whereas every effort should be made to improve access to larger amounts of cleaner water, efforts should also be made to keep existing supplies clean and safe. In the absence of improved water quantity, consumers can benefit from improved water quality.

Participants drew up a set of policy recommendations, listed in Section 2, to facilitate the adoption of these key behaviours by water supply and sanitation programmes.

### 3.4 References

Selected documents listed below are available from WHO:

\* These documents can be obtained from The Division of Environmental Health (EHE) Service of Information and Documentation, WHO.

\*\* These documents can be obtained from Distribution and Sales (DSA), WHO.

Alam N, et al. Mothers' personal and domestic hygiene and diarrhoea incidence in young children in rural Bangladesh. *International Journal of Epidemiology* 18(1): 242-247, 1989.

Baltazar JC and Solon FS Disposal of faeces of children under two years old and diarrhoea incidence: a case-control study. *International Journal of Epidemiology* 18(4, Suppl.2): 516-519.

- \* Bateman, OM Diarrhoea Transmission and Hygiene Behavior: Personal and Domestic Hygiene, International Center for Diarrhoeal Disease Research, Dhaka, Bangladesh, May, 1992 (unpublished) prepared for Consultation.

Black R et al. Handwashing to prevent diarrhoea in day-care centers. *American Journal of Epidemiology*, 113: 445-451, 1981.

Black RE, De Romana GL, Brown KH, Bravo N, Baltazar OG, Kanashiro HC Incidence and etiology of infantile diarrhoea and major routes of transmission in Huascar, Peru. *American Journal of Epidemiology* 129(4): 785-799, 1989.

Blaser MJ, LaForce FM, Wilson NA, Wang WL Reservoirs for human campylobacteriosis. *Journal of Infectious Diseases* 141(5): 665-669, 1980.

- \* Booth, E M Selecting and Prioritizing Target Behaviours in Public Health Programs, (unpublished) prepared for Consultation, May, 1992.
- \* Booth, EM and Hurtado, E The Application of Public Health Communication in Water and Sanitation Programs, (unpublished), prepared for Consultation, 1992.

Briscoe, JA Role for Water Supply and Sanitation in the Child Survival Revolution, *Bulletin of the Pan American*

*Health Organization*, 21 (2): 93-105, 1987.

Clemens JD and Stanton BF An educational intervention for altering water-sanitation behaviors to reduce childhood diarrhoea in urban Bangladesh. Application of the case control method for development of an intervention. *American Journal of Epidemiology* 125(2): 284-291, 1987.

Cruz JR, Cano F, Caceres P, Chew F, Pareja G Infection and diarrhoea caused by *Cryptosporidium* sp. among Guatemalan infants. *Journal of Clinical Microbiology* 26(1): 88-91, 1988.

- \*\* Esrey SA et al. Effects of improved water supply and sanitation on ascariasis, diarrhoea, dracunculiasis, hookworm infection, schistosomiasis, and trachoma. *Bulletin of the World Health Organization* 69(5): 609-621, 1991.

- \*\* Esrey, SA, Feachem, RG and Hughes, J M. 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, 1985.

Esrey SA and Habicht J-P Epidemiologic evidence for health benefits from improved water and sanitation in developing countries. *Epidemiologic Reviews* 8: 117-128, 1986.

Esrey, SA, Potash, et al. *Health Benefits from Improvements in Water Supply and Sanitation: Survey and Analysis of the Literature on Selected Diseases*, WASH Technical Report No. 66, 1990.

- \*\* Feachem, RG Interventions for the Control of Diarrhoeal Diseases Among Young Children: Promotion of Personal and Domestic Hygiene, *Bulletin of the World Health Organization* 62(13): 467-476, 1984.

- Georges-Courbot MC, Cassel-Beraud AM, Gouandjika I, Monges J, Georges AJ A cohort study of enteric campylobacter infection in children from birth to two years in Bangui (Central African Republic). *Transactions of the Royal Society of Tropical Medicine and Hygiene* 84(1): 122-125, 1990.
- \*\* Grados O, Bravo N, Black RE, Butzler JP Paediatric campylobacter diarrhoea from household exposure to live chickens in Lima, Peru. *Bulletin of the World Health Organization* 66(3): 369-374, 1988.
- Haggerty PA *Community-based hygiene education to reduce diarrhoeal disease in rural Zaire: a prospective, longitudinal study*. PhD Thesis, University of London, 1991.
- Han A & Hlaing T Prevention of diarrhoea and dysentery by hand washing. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 83(1): 128-131, 1989.
- Han AM and Moe K Household faecal contamination and diarrhoea risk. *Journal of Tropical Medicine and Hygiene*, 93: 237-241, 1990.
- Henry FJ and Rahim Z Transmission of diarrhoea in two crowded areas with different sanitary facilities in Dhaka, Bangladesh. *Journal of Tropical Medicine and Hygiene* 93: 121-226, 1990.
- Henry FJ, Huttly SRA, Patwary Y, Aziz KMA Bacterial contamination of weaning foods and drinking water in rural Bangladesh. *Epidemiology and Infection* 104: 79-85, 1990.
- \* Hurtado, E, Bartlett, A and Schroeder, D Material and Cultural Determinants of Hygiene Behaviour, (unpublished), prepared for Consultation, 1992.
- \* Huttly, S Hygiene Interventions and Health Impact Studies, prepared for Consultation, 1992.
- \*\* Huttly, S The Impact of Inadequate Sanitary Conditions on Health in Developing Countries, *World Health Statistics Quarterly* 43(3): 116-126, 1990.
- Huttly SRA, Blum D, Kirkwood BE Emeh RN, Feachem RG The Epidemiology of acute diarrhoea in a rural community in Imo state, Nigeria. *Transactions of the Royal Society of Tropical Medicine and Hygiene* 81: 865-870, 1987.
- Khan M Interruption of shigellosis by handwashing. *Transactions of the Royal Society of Tropical Medicine and Hygiene*, 76(2): 164-168, 1982.
- Mertens TE, Fernando MA, Cousens SN, Kirkwood BR, Marshall TF, Feachem RG Childhood diarrhoea in Sri Lanka: a case-control study of the impact of improved water sources. *Tropical Medicine and Parasitology* 41(1): 98-104, 1990.
- Molback K, Hojlyng N, Jepson S, Gaarslev K Bacterial contamination of stored water and stored food: a potential source of diarrhoeal disease in West Africa. *Epidemiological Information* 102: 309-316, 1989.
- Saran M and Gaur SD Epidemiologic correlates of diarrhoea in a slum community in Varanasi. *The Indian Journal of Pediatrics* 48(393): 441-446, 1981.
- Stanton BF and Clemens JD An educational intervention for altering water-sanitation behaviours to reduce childhood diarrhoea in urban Bangladesh. *American Journal of Epidemiology* 125(2): 292-301, 1987.
- Wadstrom T and Ljungh A *Aeromonas* and *Plesiomonas* as food and waterborne pathogens. *Journal of Food Microbiology* 12(4): 303-311, 1991.
- \*\* WHO. *Our Planet, Our Health: Report of the WHO Commission on Health and Environment*, Geneva, 1992.
- \*\* WHO. *Readings on Diarrhoea: Student Manual, Programme for Control of Diarrhoeal Diseases*, Series 90.13, Geneva, 1990.

### 4.1 Promoting improved hygiene behaviours

The consultation considered three types of interventions for improving hygiene behaviours:

- Public health communications (social marketing)
- Participatory methods
- Promotion through schools

#### Public health communications (social marketing)

Public health communication is a systematic process aiming to influence positively the health practices of large populations. Its goal is to facilitate changes in health-related practices and so to improve health status. It seeks to create demand and teach correct and continued use of technologies, products and health practices. It can promote policies and issues with decision-makers and improve the technical and educational skills of health workers.

Public health communication draws from a variety of disciplines and fields, including medical anthropology, social marketing, behaviour analysis, education (diffusion of innovation and instructional design<sup>1</sup>), health education and mass communication. Fifteen years of experience in the application of public health communication have provided the following lessons:

1. The audience should be at the centre of the programme. It is essential to listen to the target audience; communication needs to be two-way to be effective.
2. The audience should be segmented by beliefs or perceptions of the problem in order to assure that the programme responds to their needs.
3. A flexible and responsive management approach should be adopted, which is cyclical and continuous. Community participation depends on the interaction of research and action, using systematic and continuous research with target audiences, in order to make decisions and design

programmes and strategies, is critical to communication impact.

4. The intervention should be organized around the 4 "P"s of marketing: product, place, price and promotion:
  - **Product** can be a commodity, a health practice or an idea. It must be defined in terms of the users' beliefs, practices and values.
  - **Place** refers to the channels through which products and materials flow to users and the points at which they are offered.
  - **Price** refers to the cost of the product to the consumer which may be a monetary expenditure, an opportunity cost, a status loss, or a cost in time.
  - **Promotion** is more than simple advertising. It also requires consumer education to teach skills and assure appropriate use of products.
5. The "product/behaviour" should be promoted in terms of the benefit that it provides to the target audience.
6. It is most effective to focus on a few measurable or observable behaviours. A limited number of feasible behaviours should be identified that can have the highest potential impact on the health problem.
7. An integrated and consistent combination of channels should be used, including mass media, print and face-to-face communication to transmit intervention messages.
8. Persuasion, as well as information and education, should be employed to introduce, support and maintain health practices. Appeal should be made to the audiences' emotions as well as to their intellects.

*An example of a public health communications project can be found as an annex to this report.*

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## Participatory methods

Participatory methods are those which seek to involve individuals actively and meaningfully in decision-making and action for community improvements. The SARAR methodology, the approach presented at the consultation, was adapted by the UNDP/PROWESS<sup>2</sup> Project from 1983-1988 for use in the water supply and sanitation sector. The objective of the project was to devise a method or tool that would encourage and enable women to be active partners with men in community participation. The SARAR methodology, which had been created much earlier, was used as a starting point and adapted for this purpose.

The SARAR Methodology seeks to build within individuals and communities the following skills:

S elf esteem  
A ssociative Strengths  
R esourcefulness  
A ction Planning  
R esponsibility

This approach consists of interactive discussion techniques, supported by carefully prepared visual aids, which guide community members in defining their concerns and priorities, and planning a course of action. It assumes that a great deal of knowledge and skills already exist in communities, and this has been found usually to be the case. SARAR techniques seek to draw out this knowledge and to raise people's self-confidence in solving their own problems. They also help to prepare communities to negotiate with outside agencies about project activities.

In the SARAR approach there are no directed messages. The activities try to help people grasp concepts - ones they already have and new ones. The dissemination of health education through the media and health personnel means that there is usually considerable knowledge collectively, but an individual may be aware of only a part of this information. The collective strength of this knowledge is discovered during the group activities and channelled toward action. Communities define their own actions and their own messages.

The main drawback of this approach is that community development workers need to be trained to be "facilitators" in the methodology. It also takes much more time to get population coverage with this method than with mass communications. In addition, officials who are used to making independent decisions about field-level activities may not be comfortable with sharing such decisions with communities. Despite these difficulties the participatory approach is an effective way to achieve sustainable change.

The SARAR method has been adapted for health education on diarrhoeal diseases and promotion of oral rehydration therapy in Mexico. This methodology could be further developed for other aspects of hygiene education and for the promotion of the three key behaviours identified by this consultation. The SARAR method is also taking root in school health education in a number of countries. School teachers are finding that learning through discovery may be far more lasting than didactic methods currently in use.

The SARAR method is currently promoted through the UNDP/World Bank Water and Sanitation Programme, UNICEF and WHO.

## Promotion through schools

Working through schools involves the development of a curriculum (not necessarily formalized) for hygiene education, and the provision or upgrading of school hygiene facilities. Ideally, it would not just focus on the school facilities and the teaching but would reach out to the homes and the community with messages and activities to promote visible improvements in water supply and sanitation and in hygiene behaviours.

The potential for schools to make a larger impact on community knowledge, beliefs, attitudes and practices is great. School children are often the caretakers of younger children, who are those most vulnerable to diarrhoeal disease. They are also the next generation of parents. Schools are often highly regarded in communities, and much of what is learned at school is passed on, either in children's conversations with family and friends or through homework brought back into the household.

WHO's experience with the promotion of school-based hygiene education was briefly reviewed. It often involves using the Organization's contact with the Ministry of Health to assist the Ministry of Education in revising the curriculum and upgrading facilities in schools. The curriculum revision is usually

comprehensive, involving all grade levels and including a wide variety of health messages. Together with UNICEF, two prototype curriculum guides for school health education have been produced; *Food, Environment and Health* (1990); and the more comprehensive *Prototype Action-oriented School Health Curriculum for Primary Schools* (1988). Both of these guides are intended as teacher resource books from which the curriculum could be built or revised. They can be used by the individual school teacher or by a board of curriculum planners.

WHO's Division of Health Education specializes in working on comprehensive school health education, an approach to health education which views health holistically, addressing the factors that influence health; utilizes all educational opportunities for health, whether formal or informal; strives to harmonize health messages from the various sources that influence students; and empowers children and youth to act for healthy living and to promote conditions supportive of health<sup>3</sup>.

WHO's Community Water Supply Unit supports research and development of participatory learning tools for use in schools and the use of children's cartoon magazines to disseminate messages through schools to the wider population.

## 4.2 Implementing water and sanitation hygiene education

Hygiene education programmes, their implementation and institutionalization, are still relatively new. As methodologies for hygiene education evolve, a clearer understanding of the roles of the various actors is emerging.

Policy makers need to understand clearly the role of communities in sustaining improvements in hygiene. The behavioural changes expected from communities cannot be sustained if policy makers and administrators do not support them.

Central and regional or district levels of government each have distinct and specific roles to play in a national health promotion programme. Whilst leadership, relationships between ministries, and responsibility for training, technical assistance, and monitoring must be clearly established at the national level, most of the responsibility for implementation

should occur at the regional or district level, which should organize communities, provide community-level training, monitor performance, and resolve problems as they arise.

If sustainability and continuity are to be achieved, long-term needs of hygiene education programmes must be addressed. Costs and responsibilities must be met, either by local communities or by central authorities. When central authorities place too much responsibility upon unprepared communities, hygiene education and community health will suffer. Staff training and retraining, transportation, and other critical issues require the action and support of central authorities. It is increasingly understood that decentralization requires far more than simply assigning or shifting responsibilities from the central government and hospitals to communities.

A set of factors have been observed in several countries that are of assistance in the institutionalization and sustainability of water-related hygiene education interventions:

1. A collaborative government-donor relationship
2. A supportive policy framework
3. Clearly defined key functions
4. Clearly defined staffing and organizational needs
5. Clearly defined training needs and plans
6. Logistical support
7. Awareness of importance and demand for hygiene education
8. A management information system
9. Information on the process for hygiene behaviour change

### 4.3 Conclusions on promotion and implementation

The participants concluded that existing innovative methodologies for promoting better hygiene behaviours are not well known in the sector. Greater efforts must be made to disseminate more effective approaches to hygiene education, especially public health

communications, participatory methods and greater emphasis on schools, school children, child-to-child and child-to-parent approaches. Recommendations to WHO on strengthening hygiene education approaches were drawn up and appear in Section 2 of this report.

### 4.4 References

*Selected documents listed below are available from WHO:*

- \* *These documents can be obtained from The Division of Environmental Health (EHE) Service of Information and Documentation, WHO.*
- \*\* *These documents can be obtained from Distribution and Sales (DSA), WHO.*

**Boot, MT** *Making the Links: Guidelines for Hygiene Education in Community Water Supply and Sanitation*, Occasional Paper No. 5, IRC International Water and Sanitation Centre, PO Box 93190, 2509 AD The Hague, The Netherlands, 1990.

**Boot, MT** *Just Stir Gently: The Way to Mix Hygiene Education with Water Supply and Sanitation*, IRC Technical Paper Series No. 29, 1991.

**Burgers, L, Boot, M and Wijk-Sijbesma, CV** *Hygiene Education in Water Supply and Sanitation Programmes*, Technical Paper Series No. 27, IRC, 1988.

*Child-to-Child Activity Sheet Series*. Institute of Education, 20 Bedford Way, London WC1H 0AL.

**Hubley, J** *Barriers to Health Education in Developing Countries*, *Health Education Research*, 1(4): 233-245.

**Hubley, J** *Communications and Health Education Planning for Sanitation Programmes*, *Waterlines*, 5(3): 2-5, 1987.

\*\* **Hubley, J** *Hygiene Education - Draft Chapter for WHO Guidelines in Drinking Water Quality Volume 3*. 1991 (unpublished).

\* **Hubley, J** *Promoting Behavioural Change*, (unpublished), prepared for Consultation, 1992.

*Hygiene Handbook: For Health Workers, Teachers and Other Extension Workers*. Ministry of Health, Government of Botswana, 1992.

\* **Karlin, B** *Hygiene Education Experiences with Thai and Papua New Guinea School Children*, (unpublished), prepared for Consultation, 1992.

**IRC International Water and Sanitation Centre.** *Water Supply and Sanitation in Primary School Education in Developing Countries*, Occasional Papers Series 13, 1988.

*Mazingira Magazine.* Mazingira Institute, PO Box 14550, Nairobi, Kenya.

*Pied Crow's Environmental Special Magazine Series.* CARE-Kenya, PO Box 43864, Nairobi, Kenya.

**Rasmuson, MR, Seidel et al.** *Communication for Child Survival*, Academy for Educational Development, HEALTHCOM, 1255 23rd. St. NW, Washington D.C. 20037, USA, 1988.

**Rice, M and Quevedo, F** Promoting Safer Foods in Latin America and the Caribbean, *International Quarterly of Community Health Education*, 8(4): 375-382, 1987-88.

**Srinivasan, L** *Tools for Community Participation: A Manual for Training Trainers in Participatory Techniques*, PROWESS/UNDP Technical Series, 1990. (Order from PACT, Inc. 777 UN Plaza, NY 10017).

**Srinivasan, L** *Designing SARAR Materials: A Manual for Artists*, PROWESS/UNDP, July, 1991.

**Thorun B** Environmental and educational interventions against diarrhoea in Guatemala. In: Chen LC & Scrimshaw NS (ed). *Diarrhoea and malnutrition: interactions, mechanisms, and interventions*. New York, Plenum Press: 235-266, 1982.

**UNICEF.** *Facts for Life*, from: "Facts for Life", 3 UN Plaza, NY 10017, USA.

**Unified Local Government Service Handbook for Village Water Supply Operators**, ULGS Training Unit, Private Bag 0052, Gaborone, Botswana.

**WHO** *Achieving Success in Community Water Supply and Sanitation Projects*, WHO Regional Office for South-East Asia, World Health House, Indraprastha Estate, Mahatma Gandhi Rd., New Delhi 110002, India, 1985.

\* **WHO** Community Water Supplies Activities in Hygiene Education, in *WHO Newsletter of Environmental Health* 13, January 1992.

\*\* **WHO** *Working Toward Prevention: A Training Course*, Programme for Control of Diarrhoeal Diseases, Geneva, 1988.

**WHO/UNICEF** *Prototype Action-oriented School Curriculum for Primary Schools* (7-volume set), Eastern Mediterranean Regional Office, P.O. Box 1517, Alexandria-21511, Egypt, 1988.

\*\* **Williams, T, Moon, A, and Williams, M** *Food, Environment and Health: A Guide for Primary School Teachers*, WHO, 1990.

\* **Yacoob, M** *Hygiene Behavior: Institutionalization and Sustainability*, WASH Project, (unpublished) prepared for Consultation, 1992.

**Young, B and Durston, S** *Primary Health Education*, Longman, London, 1987.

## **A public health communications example: Increasing handwashing and improving sanitation in the absence of improvements in facilities in Guatemala (The WBDE Project)**

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In 1989, the World Health Organization funded the Nutrition Institute for Central America and Panama (INCAP) to implement "The Introduction of Piped Water in Traditional Rural Guatemalan Households: Evaluation of the Impact on Behaviours Related to Water and Sanitation of Diarrhoea, with Development of an Education Intervention to Increase this Impact": the WBDE Project. One of the objectives of this study was to test whether a public health communication intervention could change water-related hygiene behaviours and lower diarrhoeal disease morbidity in Santa María de Jesús, a rural village 55 kilometers from Guatemala City. The study was conducted in three stages:

### **Phase I: Risk Factor Study**

To measure the association between certain behaviours and aspects of the health status of the population.

### **Phase II: Determinants Study**

To understand the cultural and social determinants of certain behaviours of the population.

### **Phase III: Education Intervention**

To improve certain health-related behaviours of the population.

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### **Phase I Risk Factor Study (1989)**

Three rounds of spot and continuous observations were conducted to measure the association between water-related behaviour indicators and personal and domestic hygiene with diarrhoea morbidity and child growth in children 0-36 months of age. Nine behaviours were identified as most highly associated with diarrhoea morbidity; two of these - mothers' handwashing and drinking water storage (covered and uncovered) - were selected for the Phase II study, since they were the behaviours most closely related to water usage.

An interdisciplinary team made up of an epidemiologist, an anthropologist, a health communicator, a health educator, a physician, and a social worker met to define the ideal behaviours related to these two health practices and to identify the areas of formative research to be conducted during the Determinants Study.

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### **Phase II Determinants Study (June-July 1990)**

This study was conducted to understand the material and cultural determinants of handwashing and water storage. Focus group discussions were held with mothers and grade school children; in-depth interviews were conducted with mothers with effective water-related hygiene behaviours and with others whose hygiene behaviours were poorer; and a new and simple handwashing device, the "tippy tap", was tested in home trials.

The team defined the behavioural steps necessary to wash hands correctly and identified the complexity and high cost of handwashing to mothers, the primary audience of the programme. The team realized that they needed to lower this cost and decided to use home trials to test the tippy tap, a simple device, originally developed in Africa, which reduces the amount of water needed for handwashing and, at the same time, is an attractive, new technology which could motivate this health practice.

The behavioural analysis of "correct handwashing" with the tippy tap identified 121 potential behavioural steps within eight categories:

1. Enabling knowledge
2. Materials necessary for handwashing with the tippy tap
3. Steps for correct handwashing
4. Steps for making the tippy tap
5. Steps for installing the tippy tap
6. Steps for using the tippy tap
7. Tippy-tap maintenance
8. Reinforcement

The team then decided to use focus groups and in-depth interviews in order to understand how other family members could be incorporated into the communication strategy to perform some of the steps needed to make, install and maintain this device and lower the cost to mothers.

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Several key results from this research shaped the communication strategy:

1. The target audience perceived no relationship between drinking water and handwashing water. The taxonomy and management of "inside" (drinking) and "outside" (handwashing) waters were different from the moment of collection to the moment of usage.

It would not be possible to develop a communication strategy which linked management of drinking water and handwashing into one integrated package under the umbrella of water cleanliness.

2. There was high knowledge that handwashing is important to prevent diseases, but very little actual practice.
3. Clean children were seen as being "pretty" and "happy", but not necessarily healthier.
4. Many people, especially children, reused the same water to wash hands.
5. The materials (soap, water, towel) necessary for handwashing were scattered around the compound. It would take the mother several minutes to gather the materials necessary to wash her hands correctly.
6. Handwashing represented a very high cost to mothers in terms of time, energy and materials.
7. Older siblings were frequently in charge of taking care of their younger brothers and sisters when their parents were absent from the home.
8. The father's approval was critical to adopting any changes in the home.
9. Mothers wanted educational materials in both Cakchiquel and Spanish because "We live in Cakchiquel, but we learn in Spanish".
10. Families like the tippy tap because it "saved water" when washing hands. They gave it the name "cachipop" in Cakchiquel.

11. Mothers did not want to attend group meetings in order to receive health messages; they preferred home visits. However, they asked that the visits be short, around ten minutes each.

After the research was analyzed, the interdisciplinary team met again to plan the communication strategy. The application of the Behaviour Analysis Scale assisted the team in the selection of handwashing as the health practice to be focused on in the communication intervention. It also assisted the team in reducing the number of target behaviours from 121 to 76, 54 of which were related to the fabrication, installation and maintenance of the tippy tap.

The goal of the resulting communication programme was to reduce diarrhoea morbidity in children under three years old by twenty-five percent. The specific objective was to increase "correct handwashing" before touching food which will enter the mouth of the child under three years old. Correct handwashing was defined as:

1. Using "clean" running water
2. Using soap
3. Drying hands without recontaminating them.

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### ***Phase III Education Intervention (January-October 1991)***

A public health communication intervention related to handwashing and use of the tippy-tap was conducted with 150 families in the intervention group. A similar intervention on immunization was conducted with 150 families in the control group. Simultaneously throughout the three phases, a household-based longitudinal surveillance study measured diarrhoea morbidity and made an anthropometric assessment of study children.

#### **Target audiences**

**Primary audience:** Those people who will actually perform the target behaviours - mothers and mothers-in-law.

**Secondary audiences:** Those people who most influence the primary audience in these specific behaviours - older siblings (8-13 years old) and fathers.

## **Products**

Three inter-related "products" were introduced:

### **Correct handwashing**

Benefit promoted - correct handwashing "makes your child pretty and happy ("utz" in Cakchiquel).

### **The cachipop**

Benefit promoted - the cachipop is the most economical way to make your child pretty and happy.

### **The "pretty corner"**

A specific area in the compound where all of the materials necessary for correct handwashing (cachipop, soap, towel) were installed. Behavioural theory suggests that a person is more likely to perform a behaviour if all of the materials necessary are in a specific place. The materials then serve as a visual antecedent to perform the behaviour.

## **Price**

The communication strategy reduced the high cost handwashing represents to the target audience in terms of time and energy, by involving other family members to perform some of the behaviours.

## **Message content**

The determinants study identified what the appropriate role was for each of the secondary audiences. It also identified the concept of the "nino choj-chic", a word in Cakchiquel which means a child who is especially smart and learns quickly. The following describes the behaviours which were taught to the secondary audiences:

### **Nino Choj-Chic**

1. To decorate and maintain the cachipop - fill it with water each day, change the towel and keep the pretty corner clean
2. To motivate the father to buy soap when necessary
3. To help wash younger siblings hands
4. To reinforce mother's behaviours by telling her that she is making her child pretty when she washes his/her hands

### **Fathers**

1. To make and install the cachipop
2. To supervise the nino choj-chic

3. To check infant's hands before dinner to see if they are clean
4. To reinforce the mother's and nino choj-chic's behaviour by telling them that they are making the infant pretty when they wash his hands

## **Place and Promotion**

Both the place for messages and the promotion techniques selected were limited by the design of the study. The need to avoid the messages reaching the control-group limited the types of channels (particularly mass media) and locations (such as schools and market places) through which messages could be delivered. For this reason, the communication strategy depended largely on interpersonal communication channels. Seven five-minute dramas, which taught the key enabling messages, were recorded in Cakchiquel and Spanish. This helped to standardize the messages and provided materials which could later be adapted for broadcast by radio or over loud speakers in central locations.

## **Phases**

The communication plan was implemented in three phases, each with its own objectives:

### **I Setting the Stage**

1. Teach the seven key knowledge concepts
2. Create demand for the cachipop

### **II Product Introduction**

1. Introduce the cachipop as the most effective and efficient way to wash hands
2. Introduce the concept of the pretty corner
3. Teach and reinforce the target behaviours of the primary and secondary target audiences in the use and maintenance of the cachipop and pretty corner
4. Reinforce the key knowledge concepts

### **III Maintenance and Reinforcement**

1. Introduce the concept of praising family members for correct handwashing
2. Strengthen and reinforce target behaviours in each target audience
3. Strengthen and reinforce the key knowledge concepts

## The promotional strategy by target audience

### **Mothers**

The recorded dramas were played during the weekly visit and the health promoter evaluated how much the mother understood before she went on to the next drama. At the end of the first phase, mothers participated in a contest. If they could answer questions concerning the seven key knowledge concepts, they won a hand-drying towel.

### **Fathers**

Initially, the plan called for three group meetings using recorded dramas and a slide tape show, a flyer and demonstrations on how to make and install the cachipop. However, mid-course monitoring identified that fathers, for a combination of cultural and historical reasons, were reluctant to meet in groups, and the promoters had to visit them individually.

### **Nino choj-chic**

Group meetings were conducted using the recorded dramas, the slide tape show, songs and simple print materials which the children coloured as support materials. The print materials made by the children were taken home to decorate the pretty corner.

## Results

Initial analysis of the longitudinal surveillance system demonstrated that diarrhoea morbidity was significantly lower in the intervention group than in the control group. INCAP is currently analyzing the post-intervention spot observation data which will provide a more in-depth understanding of the effects of the communication intervention.

## Lessons learned

The following are some of the lessons learned from this application of public health communication to a water and sanitation programme:

### **1. Control group**

The need for a control group severely limited the communication strategies and channels. These were selected to minimize the potential of contaminating the control group, rather than in response to target audience needs. Future applications of public health communication in water and sanitation programmes should avoid using a control group to evaluate programme impact.

### **2. Target audience**

Target audiences should be segmented on the basis of their shared perceptions, values and practices, not simply in terms of control group and intervention group. Audiences at highest risk for infant diarrhoea morbidity probably have different constraints and perceptions than the wider community and should be seen as a separate group.

### **3. Conducting a public health communication project is a full-time job**

The evaluator should not be responsible for the development and implementation of the communication strategy, as well as the evaluation. Future studies should include a full-time communicator, as well as an evaluator.

### **4. Use of professional artists and media professionals**

Professional artists and media professionals should be contracted to develop and produce materials so that hygiene education materials can compete in the marketplace. This will increase funding needs but will also increase impact in populations who are receiving messages and materials within a commercial context.

### **5. Learning from evaluation**

The communication plan should allow for sufficient time after the evaluations, to allow communicators to build on research results when making decisions about the succeeding phases. This kind of evaluation, which provides future orientation for a project, is known as "formative evaluation". The relationship between research, decision-making, and action is critical to successful public health communication.

### **6. Time and funds for the maintenance of new behaviours**

Due to political constraints, the public health communication intervention was ended before it could be systematically applied to the entire community. It is probable that, without at least a year-long "maintenance phase" in which the target behaviours are introduced and supported for the entire community, the behaviours learned by the intervention group will slowly erode. Future studies should include sufficient time and funding for the introduction and maintenance of new behaviours.

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## Notes

1. Instructional design - the breaking down of each task into its smallest component parts to make sure that nothing is overlooked and to make learning easier.
2. PROWESS stands for *Promotion of the Role of Women in Water and Sanitation Services*. It focuses on women, in the context of their communities, because they are the main collectors and users of water, and the guardians of household hygiene and family health.
3. *Comprehensive School Education: Suggested Guidelines for Action*. Report of a joint WHO/UNESCO/UNICEF Consultation on Strategies for Implementing Comprehensive School Education/Promotion Programmes. WHO Geneva, 1992.

## Participants

### Visiting Participants

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