Safe Water Systems for the Developing World: A Handbook for Implementing Household-Based Water Treatment and Safe Storage Projects

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Department of Health & Human Services
Centers for Disease Control and Prevention

Safe Water Systems for the Developing World: A Handbook for Implementing Household-Based Water Treatment and Safe Storage Projects
was produced by the CARE/CDC Health Initiative,
the Estes Park Rotary Club and the
Gangarosa International Health Foundation
through a contract with Patricia Whitesell Shirey,
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The Centers for Disease Control and Prevention (CDC) and the Pan American Health Organization developed the household-level water quality intervention described in *Safe Water Systems for the Developing World: A Handbook for Implementing Household-Based Water Treatment and Safe Storage Projects* to help bridge the enormous gap in developing countries between populations served by existing water projects and those most in need. This handbook, produced by the CARE/CDC Health Initiative, is a valuable tool for providing inexpensive and feasible appropriate-technology alternatives in situations where resources are not available for improvements in infrastructure.

While we fully support efforts to build the infrastructure necessary to create a healthier living environment for people in developing countries, we also recognize that such efforts will not meet the enormous global need in the near term. Because of that, CARE and CDC have joined together under the CARE/CDC Health Initiative to conduct implementation projects in Kenya and Madagascar that build on the successes of projects in other countries. We have designed this manual for program managers and technical personnel in other parts

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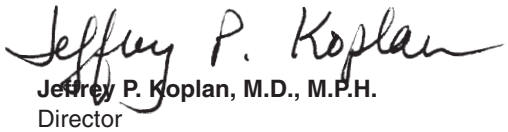

Jeffrey P. Koplan, M.D., M.P.H.
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Introduction

There is no question that, for many populations in developing countries, the need for safe water is great. The ultimate solution for the problem is to provide systems of piped, disinfected water, but this approach is expensive, time-consuming, and will take decades to realize. To address immediate needs, other approaches are required while progress is made in improving infrastructure.

In our experience, alternate locally available approaches are few in number and often impractical. Boiling water is expensive, time-consuming, and, in areas where wood is needed for fuel, harmful to the environment. The use of commercial bleach to disinfect water is not always practical or acceptable because the price can be high, the concentration variable, and the product is often marketed for unappealing activities not related to consumption, such as washing clothes or cleaning toilets. A variety of alternative technologies have been developed, but most are unavailable in developing countries, and many are expensive or have not been adequately field-tested.

In 1992, in response to the Latin American cholera epidemic, the Centers for Disease Control and Prevention (CDC) and the Pan American Health Organization (PAHO) developed a household-based intervention to meet the immediate need for improved water quality, which is called the Safe Water System[1]. The Safe Water System is inexpensive, easily disseminated, and has the potential for recovering some of the costs of implementation. The Safe Water System has been extensively field-tested and several non-governmental organizations are implementing large-scale projects. We feel that the Safe Water System adds a useful, practical, flexible approach to interventions for water quality and hygiene.

The Safe Water System: What is it?

The Safe Water System is a water quality intervention that employs simple, inexpensive and robust technologies appropriate for the developing world. The strategy is to make water safe through disinfection and safe storage at the point of use. The basis of the intervention is:

- point-of-use treatment of contaminated water using sodium hypochlorite solution purchased locally and produced in the community from water and salt using an electrolytic cell;

- safe water storage in plastic containers with a narrow mouth, lid, and a spigot to prevent recontamination;
- behavior change techniques, including social marketing, community mobilization, motivational interviewing, communication, and education, to increase awareness of the link between contaminated water and disease and the benefits of safe water, and to influence hygiene behaviors including the purchase and proper use of the water storage vessel and disinfectant.

Potential target populations for the Safe Water System

The Safe Water System was designed for populations that must obtain their water from the following sources:

- surface water sources such as rivers or lakes;
- shallow groundwater that is potentially contaminated, particularly open shallow wells;
- piped systems in which the water is inadequately treated or flow is intermittent, allowing contamination through leaks where pipes are connected;
- piped water systems in which intermittent flow requires households to store water;
- water tankers;
- water vendors whose source of water is not safe or whose tanker or storage tank is not likely to be clean.

Other potential target populations are those that exhibit poor hygienic behaviors in the collection and storage of water. Such behaviors would include not cleaning containers before filling them with water and using wide-mouthed containers to collect and store water. Disinfection is not always necessary in these cases (e.g., if the source water is safe) but the practice of disinfection ensures safe water and supports the essential improvements in behavior including the use of a safe storage container.

Field trials

Field trials of the point-of-use water disinfection and safe water storage system conducted by CDC in South America, Africa, and Asia have demonstrated that it is practical, acceptable, effective, inexpensive, and a potentially sustainable means to improve water quality and prevent waterborne diseases:

Acceptability and microbiological effectiveness

- Families in rural and in peri-urban communities in Bolivia, Ecuador, Nicaragua, Peru, Pakistan, and Zambia used the Safe Water System to dramatically improve household drinking water.[2, 3, 4, 5, 6, 7]
- Street vendors in Bolivia and Guatemala used the Safe Water System to dramatically improve the quality of the beverages they sell and of the water they use to prepare beverages, and wash hands and utensils.[8] (Quick, unpublished data)
- Health care workers in Guinea-Bissau used the intervention to dramatically improve the quality of oral rehydration solution prepared, stored, and dispensed to patients on a cholera ward.[9]

Prevention of waterborne diseases

- Families in Bolivia and Zambia who used the Safe Water System had between 44% to 54% fewer episodes of diarrheal diseases when compared with control families who did not use the intervention. The largest protective effect was among infants and young children.[3, 10] (Quick, unpublished data)

Potential sustainability

- Large scale social marketing projects in partnership with Population Services International (PSI) in Bolivia, Zambia, and Madagascar have demonstrated the potential for sustainable Safe Water System projects through partial cost recovery.
- In Madagascar, a partnership between CARE, PSI, and CDC has enabled the Safe Water System to be implemented as part of a community mobilization project and serve as a tool to facilitate the mobilization process.[11]
- Safe Water System projects in Bolivia, Zambia, and Madagascar have mobilized their programs rapidly to respond to cholera epidemics and natural disasters.[12]
- Field trials in Zambia conducted by the Medical University of South Carolina (MUSC) have demonstrated increased rates of utilization of water disinfection and safe storage practices of up to 70% in target populations through the use of motivational interviewing, a novel behavior change method.[13]

The Safe Water System vs. other technologies

Results of the above field trials and implementation projects show how the Safe Water System has been successfully applied in rural and peri-urban settings in Latin America and Africa for populations of up to 200,000 people. The results have been carefully documented, and this manual reflects the extensive experience gained. We believe that the Safe Water System is appropriate in many situations. Before you decide to design a project around the system, however, two important questions must be answered:

- Is household treatment an appropriate priority for the target population?
- What type of household treatment should be selected?

Is household water treatment an appropriate priority?

The effectiveness of different interventions in preventing the transmission of diarrhea is well documented. Safe excreta disposal, improved hygienic behavior, and use of an adequate quantity of water all typically result in greater reductions in diarrhea than improved water quality.[14] This hierarchy of effect is counterbalanced, however, by a number of factors relating to household-level water quality interventions in general, and the Safe Water System in particular:

- In many communities, the demand for an improved water system both in terms of quantity and quality is greater than that for improved excreta disposal.
- In many communities, there is a lack of awareness of the effect of improved sanitation and hygiene.
- A household-based intervention, like the Safe Water System, can be a low-cost method of improving water quality.
- The Safe Water System offers the possibility of at least partial cost recovery.
- A household-level water quality intervention can be implemented as a stand-alone activity or as a low-cost component of an environmental health program.
- When social marketing and participatory processes are used effectively for promotion and education on water quality, there is potential additional benefit of increasing the general awareness of hygienic behavior.

Each of the above factors should be taken into account when deciding on an intervention for a community. This manual will help you decide if the Safe Water System is appropriate for your community. Other interventions for household water treatment are briefly discussed in the section of this handbook, entitled Alternative Water Treatment Technologies, beginning on page 137. Information about sanitation, water supply, and hygienic interventions will need to be obtained locally from NGOs, Ministries, and other agencies.

What type of household treatment should be selected?

A number of methods for water disinfection at the household level have been developed. In deciding which methods would be most appropriate for a given population, a program manager must consider a variety of factors:

- Is water quality improvement a priority for the target population?
- Do representatives of the population believe that a particular method is appropriate for them?
- Is that method affordable to the target population?
- Is the target population willing to pay for it?
- What is the potential for cost recovery?
- How complex is the process of implementation?
- What is the complexity of behavior change required?
- How difficult will it be to monitor key processes and evaluate impact?
- Do potential donors feel that this approach is justified?

This manual focuses on the Safe Water System because, in a variety of field trials and implementation projects, we have found it to be relatively inexpensive, easy to implement, easy for target populations to accept, adaptable to a variety of conditions, and effective in improving water quality and preventing diarrhea. We recognize that other appropriate technologies are available and that some of them might be more appropriate in some settings than the Safe Water System. In a final section, we provide information about a variety of other appropriate technologies for household water treatment, including a brief description, advantages and disadvantages, and cost. We do not pretend that the list of technologies is complete, or that the information is comprehensive. We hope that it is enough to provide interested

people the basis for beginning to investigate technologies that might be appropriate for the populations they serve.

Purpose of this manual

This manual was developed for program managers, technical staff, and other organization personnel who would be involved in implementing a project to improve water quality. The manual is designed to take people through the necessary steps to initiate the planning process, assemble a team, decide between various water treatment and storage options, and devise strategies for distribution, cost recovery, promotion, behavior change, and monitoring and evaluation. We hope that the manual is thorough enough to provide local program people with information and tools to plan and implement their own projects, but we have included contact information for people with experience in similar projects who may provide technical assistance.

We also hope that the manual in future revisions can become a clearinghouse for new approaches and technologies for the improvement of water quality as knowledge and experience are gained in the laboratory and the field. This manual is available in hard copy and also on the Safe Water web page, which can be accessed through the CDC Home Page (www.cdc.gov). We invite anyone with questions, comments, criticisms, suggestions for improvement, or information on different technologies to contact us through the website. We plan to update the website on a regular basis so that it can become an evolving resource to the community of people who are working to create a safer environment for people around the globe.

How to use this manual

This manual is organized into 14 sections plus annexes. Following the introduction, 12 sections take program personnel through 12 steps to plan and implement a project using the Safe Water System. Because many of the steps take place concurrently, the responsibility for tasks described in different sections can be assigned to different people. Nine annexes provide additional detail for some steps, model forms, worksheets, example brochures, and monitoring instruments. The final section describes other water treatment technologies that some projects may want to consider.

We hope that this manual will be a useful resource. We welcome your comments and questions and look forward to working together toward the goal of providing safe water for all.

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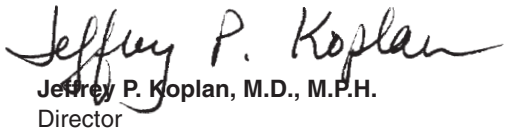

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We hope that this manual will be a useful resource. We welcome your comments and questions and look forward to working together toward the goal of providing safe water for all.

STEPS FOR A SAFE WATER SYSTEM PROJECT

1.0 GATHER BACKGROUND DATA ON THE NEED, TARGET POPULATION, AND FEASIBILITY OF A WATER INTERVENTION

Tasks:

- → Specify the data needed as background for the project
- → Plan how to collect the data
- → Collect the data
- → Organize and analyze the data
- → Interpret the data

Good background information is essential when deciding whether to implement a Safe Water System project. It is also necessary when writing a proposal for funding.

To assess the need for intervention, you need to:

- identify the populations at risk (that is, lacking potable water)
- define the nature and extent of disease problems that may be attributable to unsafe water
- assess the feasibility of a water intervention in terms of the infrastructure and other support available
- determine the community's interest and likelihood of acceptance of the intervention

Gather data from available sources, and undertake informal observational surveys or interviews. Possible sources of data include groups and individuals who work with water supply or water projects, and reports of studies of water supply, demand, or quality. These individuals and reports may be found in:

- the Ministry of Health (MOH)
- other government ministries responsible for water
- NGOs such as CARE
- UNICEF
- universities
- local governments
- water companies
- water testing labs at universities or municipal governments

Consider working with local committees or organizations, such as mothers' clubs or water committees, to participate in data collection, analysis, and planning. If you involve community representatives in the assessment, their participation can pay dividends later in terms of greater community adherence to, and ownership of, the project.

This step is not a baseline survey for evaluation purposes. However, these data will supplement information that will be obtained from formative research for project implementation. Useful information to gather and analyze is listed in Figure 1. See Annex A for a sample questionnaire with questions about relevant knowledge and practices.

Figure 1: Background Data for a Safe Water System Project

Epidemiological data (Sources of data: MOH, special studies)
- How common are diarrheal diseases? What proportion of clinic visits?
- Which populations are most affected?
- Have cholera outbreaks occurred? When and where do cholera outbreaks typically occur?

Water infrastructure (Source of data: Ministry responsible for water)
- What proportions of urban and rural populations are not served with potable water systems?
- Where are underserved populations located?
- What is the microbiologic quality of source water in target populations?

Water handling practices (Source of data: Survey)
- Who collects and handles household water supplies?
- How common is it to store water in the home?
- Is household water storage particularly common in certain populations?
- What types of water storage containers are used?
- Do target populations use unsafe water handling practices, such as dipping?
- What water treatment practices are commonly used, if any?

Socio-cultural aspects (Source of data: Survey research)
- What do target populations understand about disease transmission through water?
- What do target populations understand about causes and prevention of diarrhea?
- Is clean water a high priority for target populations?
- Are there cultural barriers to water interventions (e.g., religious or ancestral associations with water supply)?
- Who makes decisions about household expenditures?

Economic aspects (Source of data: Donor agencies, NGOs, water ministry)
- What are potential sources of external funds?
- What donors have previously funded water projects?
- Can target communities pay for products?
- Is ability to pay seasonal (e.g., in agricultural communities)?

Possible support and infrastructure (Source of data: government, NGOs)
- Which government departments and officials can be approached for support?
- What NGOs are present in country?
- Which areas have a government or NGO infrastructure to build on?
- Which organizations are potentially available for the various aspects of implementation (e.g., hospitals, health centers, NGOs, women's groups, local companies)?

2.0 DECIDE TO DO A PROJECT AND SET PROJECT OBJECTIVES

Tasks:

- → Consider the major steps and resources required to begin and sustain a project
- → Specify overall goals of a Safe Water System
- → Select target population, appropriate pilot project site and area for later expansion
- → Specify measurable, specific objectives of the project

Every country's resources for health and development are limited. It is crucial that each country use its own and donated resources in ways that will have the greatest benefit. It is unwise to invest in projects that are unsustainable or that provide little real benefit. Therefore, before deciding to undertake a Safe Water System project, decision makers must realistically assess the work and resources required and the likely benefits of the project.

2.1 Consider the major steps and resources required to begin and sustain a project

A Safe Water System project requires careful planning and coordination of a broad range of activities. The Safe Water System is a potentially useful tool to improve water quality and reduce diarrhea. It is flexible and adaptable to a variety of conditions. It consists of:

- hardware – the products: locally produced disinfectant solution and the safe water storage vessels
- software – the project components: promotion, education, motivational interviewing, and/or community mobilization designed to create behavior change, that is, the purchase and use of the products

Safe Water System projects will differ considerably from country to country and from region to region within a country. There are significant possible variations in each of the components of the intervention, such as:

- type of water storage container
- method of manufacture of the disinfectant
- infrastructure to distribute the containers and disinfectant
- approaches to behavior change.

Planners should study the background information (collected in step 1.0) and the rest of the guidelines presented in this manual to plan a project. The project design should:

- address the need for improved water in households
- suit the socio-cultural characteristics of the population
- build on available infrastructure
- be appropriate for the level of funding and other resources

- be creative so as to best engage persons who need the intervention
- enable the target populations to obtain the necessary products
- effectively change key behaviors of the target populations.

If plans or resources are inadequate or short-sighted, the intervention will be short-lived (for example, if it is based on donation of water storage vessels and disinfectant to a population in need). In that situation, decision makers should wisely decide to postpone a Safe Water System project until adequate resources are available and a plan is in place for full or partial cost recovery.

It is recommended to begin with a pilot project, in order to test the best products and procedures while working in a small area. The intention should be to expand later to include more families and other areas needing safe water.

Base a decision to undertake a project on a realistic consideration of the major steps and resources required to start and sustain the project and the results possible. Plan an approach to the major components of the project, so that you have an idea of the work and resources that would be involved. Then make a final decision whether to proceed.

Resources required will vary according to the approach to the project. For example, a social marketing project budget for 22 months (total population of 200,000 in Madagascar) was about $175,000 (in 2000).

2.2 Specify overall goals of a Safe Water System

The goals that you set for the project will help guide decisions. The overall goals of the project are:

- to improve water quality in homes by means of a sustainable technology
- to decrease death and diarrhea from contaminated drinking water
- to improve hygienic behaviors related to water use

2.3 Select target population, appropriate pilot project site and area for later expansion

Broadly, the target population will be a group of households that do not have safe water. The specific project site and target population should be a particular group of households that need improved water storage and disinfection in the home. This might include one or more of the following groups:

- a population with surface water sources (river, lake), or unsafe ground water sources, especially shallow wells
- an urban population with piped water where flow is intermittent and storage is required, or piped water source is of questionable quality (contaminated)
- a population that must store water because the source is outside the home
- a population that stores water in wide-mouthed containers

Select an appropriate pilot site. Possible criteria for a selecting an appropriate pilot site and target population include:

- There is a need for safe water in homes, as evidenced by waterborne diseases and/or observed unsafe water handling and storage practices.
- Community leaders recognize that drinking water safety is a major problem.
- There are government or NGO infrastructures to build on. (Whenever possible, it is better to use and strengthen existing systems than to establish separate structures which are project-dependent and which may not be sustainable in the long term.)
- Local population has interest in participating in the pilot project and is motivated to help with preparatory work.

- There is a functioning neighborhood organization, such as Neighborhood Health Committee, with active and effective health promoters.
- A pilot project is feasible (i.e., includes a number of households that can be supplied with vessels and disinfectant and can be reached with education, promotion, and behavior change activities consistent with levels of funding, staff and other resources).
- Local authorities give permission to implement the pilot project.

The project may also choose an area for later expansion. This may be an enlargement of the pilot area, or a different area with similar characteristics as the pilot area.

2.4 Specify measurable, specific objectives of the project

The objectives will depend on the overall goals and information available regarding the transmission of waterborne diseases, local infrastructure, socio-cultural factors, and economic factors. Objectives should be **s**pecific, **m**easurable, **a**chievable, **r**ealistic, and related to a **t**imeframe. These criteria for good objectives are easy to remember if you think of the acronym SMART.

The objectives should contribute to achievement of the overall goals but will be more specific and limited, so that they are feasible to achieve during the pilot project. You must have a rough plan for the major components of the project, so that you can estimate key areas of progress and feasible levels of achievement.

Project Objectives

Specific
Measurable
Achievable
Realistic
and related to a
Timeframe.

The objectives should be measurable with specified time frames. They should be measures of progress, not merely process (actions that do not necessarily produce results). For example, a radio campaign is a process, favorable recognition rates in the target populations are progress. Examples of objectives for a pilot project's first year of operation include:

- 60 retail shops in the target area will have a consistent supply of vessels and disinfectant
- Sell 1,200 vessels to households in the target area
- 7,500 bottles of disinfectant will be produced
- 25% of homes in the target area will use an approved water storage vessel
- 70% of target population will recognize the brand name of the Safe Water System products

Objectives must be feasible to monitor or evaluate. For example, possible objectives state desired levels of sales of vessels, sales of disinfectant, acceptability of products, water quality, reduction of diarrheal diseases. Of these, sales and acceptability are easier to measure. Water quality is somewhat more difficult. Change in the level of diarrheal diseases in a population is difficult to measure. Consider monitoring and evaluation of the project before specifying the objectives (see section 11.0).

Below are some example objectives for a Safe Water System project. Objectives are specified for 4 areas: access to the intervention, water treatment and storage behaviors, improvement in health, and satisfaction with the intervention.

Figure 2: Example Objectives For a Safe Water Project

1. Increasing access to the intervention (products)

1.1 Sell 20,000 bottles of disinfectant in first 3 months
1.2 Sell 1,000 water storage vessels in first 3 months

2. Changing water treatment and storage behaviors

2.1 70% of target population will recognize the brand name of the Safe Water System products (vessel and disinfectant) after 6 months
2.2 30% of households will report use of approved water storage vessel and disinfectant after 6 months
2.3 25% of households will have knowledge of correct dose of disinfectant after 6 months
2.4 25% of households will have observed safe water storage practices after 6 months
2.5 10% of households will have measurable residual free chlorine levels >0.2 mg/liter after 6 months
2.6 10% of households will have zero *E. coli* colonies in stored water after 6 months

3. Improving health

3.1 Reduce diarrhea rates in target population by 20% after 1 year

4. Achieving satisfaction

4.1 80% of users in target population will report satisfaction with products after 6 months

In later steps, you will plan activities to be done so that the project will achieve these objectives. (See sections 7.0, 9.0 and 10.0.) If you then find that some objectives are too ambitious, modify them to be consistent with activities planned.

3.0 WRITE A PROPOSAL TO DONORS FOR A SAFE WATER SYSTEM PROJECT

Tasks:

- → Study this manual to become familiar with the components of a Safe Water System project and the activities involved.
- → Study the background information gathered in step 1.0.
- → Become informed about potential donors and the type of proposal they will need.
- → Draft the proposal using all available information and current plans. Refer to Annex B for guidance, and other references and contacts.
- → If a detailed proposal will be required, continue with planning and decisions as described in this manual until sufficiently detailed plans are developed to put into the proposal.

Figure 3: Example Outline for a Proposal

Application Form for Health Grant Program
Project Description

Core Elements

A. Title of project

B. Summary: Include project location(s), project staff, contact persons, target population, duration, budget

C. Introduction: Describe background on the country/region water situation and overview of the project

D. Problem statement: Specify the problem and its causes, needs assessments, rational for project

E. Project description: List goals and objectives, process and impact indicators, main activities

F. Operational plan: Propose specific intervention strategies, how the Ministry of Health, communities and other agencies will actively participate

G. Project management: Indicate staffing required, management structure and lines of communication, physical requirements and purpose

H. Monitoring and evaluation: Specify information systems, baseline studies if any, timing of evaluation, reporting and feedback system, role of partners in monitoring and reporting

I. Budget

Supplementary Elements

J. Innovative aspects of the proposal

K. Capacity building to be achieved

L. Sustainability

M. Leveraging/multiplier potential for additional funding beyond this donor.

Usually a proposal will describe details of the major components of the project, such as the water vessels and disinfectant, how they will be produced or obtained, and plans for distribution, education of households, promotion, monitoring and evaluation, and a budget. Therefore, you would need to complete the decisions and plans described in steps 4.0 – 8.0 (that is, plans for assembling a team for the project, the products, method of distribution, strategy for behavior change, and cost recovery) in order to write the complete proposal. It is also important to know the likely level of funding to make realistic plans.

In some situations, however, a donor will give funds based on a general plan; the proposal could be written and submitted earlier and the detailed planning can be accomplished when funds are available and the project team is working. In this case, you will need to study the rest of this manual to learn about Safe Water System projects before writing the proposal, but would not need to make all the decisions described until afterwards.

Some countries have a clear need for a Safe Water System project, a promise of funding, and an infrastructure suitable for distribution of the products and education of users. Some countries have only one or more of these building blocks and must obtain the missing elements. It may be necessary to investigate the need for a project and the best target area. It may be necessary to investigate whether the project may make use of an existing infrastructure or will need to build one. If there is clear need and infrastructure, the project team will need to do research on the most feasible approaches, and then estimate funding needed.

It may be necessary to investigate to find donors and estimate the possible levels of funding. Perhaps the most feasible option is to identify NGOs with a water or health focus that are working in the target population, and try to work with them in developing a proposal. Some donors that have supported Safe Water System projects are listed on the next page:

DONORS THAT HAVE PROVIDED FINANCIAL OR IN-KIND SUPPORT FOR HOME TREATMENT AND SAFE WATER STORAGE PROJECTS (as of August 2000):

United Nations agencies:	PAHO
Government agencies:	CDC JICA USAID
Non-governmental organizations:	Bibosi Institute CARE Caritas GTZ Population Services International Project Concern International Rotary International
Private sector:	Coca Cola Foundation Equipment and Systems Engineering Exceltech International Corp Los Alamos Technical Associates Millipore Foundation Procter and Gamble Western Union Woodruff Foundation

Some proposals are written with great uncertainty about funding. In this situation, you will need to investigate the options described in steps 5.0-8.0 and get estimates of what the different options might cost in your country or area. The extent of the target area (number of households targeted) could also vary. You may then write a proposal that describes a project with certain parameters and funding required, or you may describe different options that are possible at different funding levels.

It is often easier to get a small amount of money rather than fund a large project. It may be possible to target specific donors for

certain aspects of the project that appeal to them. In this way, you may be able to piece together several donations into one complete project. **In Bolivia**, for example:

- Rotary International and the Procter and Gamble Fund purchased a mold to produce the vessel
- Exceltech International donated a hypochlorite generating machine
- USAID donated money for implementation activities
- Bolivian municipalities and NGOs subsidized the distribution

of vessels and disinfectant solution to impoverished villages. Where funding for a large project is unlikely, it may be possible to fund (for a few hundred or a few thousand dollars) a regional conference to review the situation in the district, region or country. A local university may agree to host the conference, and potential donors would be invited. The working group from the meeting may outline a modest proposal and seek money for a demonstration project. When a small demonstration project is funded and implemented, the working group gains expertise, self-confidence and credibility. Funding for the next stage is then easier to obtain.

Annex B provides guidance on points to address in a project proposal. Before the proposal-writing team begins to write a proposal, they should:

- study this manual to become familiar with the components of a Safe Water System project and the activities involved
- study the background information gathered in step 1.0
- identify potential donor organizations that fund this type of

project
- meet with potential donors to determine their interests and needs; if you are reasonably sure that they are interested, find out as much as possible about the type of proposal and the level of detail they will need
- estimate the level of funding to request

Then the team can draft the proposal using available information and formulating plans as progress is made. If a detailed proposal will be required, the project team will continue with planning and decisions as described in this manual until sufficiently detailed plans are developed for the proposal.

In Madagascar and Kenya, some communities were implementing CARE community mobilization projects. When people in those communities identified improved water quality as a priority need, project personnel applied for funding from the CARE CDC Health Initiative for a household Safe Water System project. The Safe Water System activities were able to build on the community interests and resources already in place. They received the funding.

In Ecuador, some hypochlorite generating machines were present in the country but were not in use. When El Nino disrupted the water supply and many families were left without safe drinking water, this disaster presented an opportunity to look for funding to train staff and put the existing equipment into use. Funding was obtained initially from the Embassy of the Netherlands, and was then augmented by USAID, and the project was successfully implemented in 5 provinces to relieve disaster conditions. Good results and the recognition that the country had insufficient potable water coverage led the Ministry of Public Health to create a National Program for Household Water Disinfection.

In Peru, a donation was obtained from an NGO for a pilot project, and then a loan was secured for an expanded project.

In Zambia and Bolivia, small field trial studies were conducted to determine if the household use of disinfectant and special water storage vessels could improve water quality and decrease diarrhea. When these proved successful, PSI wrote proposals to USAID for funding small pilot social marketing projects in discrete regions of the country, and USAID funded these projects.

4.0 ASSEMBLE TEAM TO DO THE PROJECT

Tasks:

- → Consider possible roles of government, NGOs and the private sector for this project
- → Identify potential donors, implementers, and evaluators
- → Select a core team to do the project
- → Establish a management committee
- → Add to the team later, according to need and interest

Roles of government, NGOs and the private sector

Implementing a business-like project is usually outside the scope of government services and is better done by the private sector or an NGO. Even when government is not involved in the implementation, its support of the project and collaboration with non-governmental organizations remains critical. Government involvement can provide credibility and strengthen implementation by offering access to government resources, and promoting the project through existing public health networks.

Projects implemented by NGOs require government support, donor funding, and motivated, well-trained staff with good technical back up. Non-local NGOs also need a plan for eventually turning the project over to local institutions.

The private commercial sector often has the capability to provide high quality products, an efficient distribution system, and marketing through advertising.

Partnerships of private and public sectors aim to involve the private sector from the start in a commercially viable operation that makes products widely available at affordable prices. The process aims to ensure success with market research, a marketing strategy and a promotional campaign and involves the following steps:

- forming partnerships between donor, NGO, public and private sector partners
- developing consumer-oriented market research
- developing a marketing strategy including a business plan, monitoring and evaluation
- producing/procuring materials
- launching and monitoring a promotional campaign
- expanding project to additional groups and areas

NGO involvement focuses on complementing and expanding the reach of the commercial sector during the market development phase and concentrates later on the poorest populations who are unable to procure products through the private sector.

Consider a range of possible organizations for a range of roles:

- **Product registration and certification:** Roles for the Ministry of Health are to register and certify the products, give their seal of approval, provide existing data, collect epidemiological information, and assist with promotion of the project. Include representatives from Ministry of Health water/environmental departments and from diarrheal disease control staff.
- **Data on water coverage:** A key role for the government ministries responsible for water is to provide information on populations, their water sources, and quality of water sources. Depending on the division of responsibilities in the government, they may also have a role in certifying products and monitoring water quality.
- **Donors:** Possible donors include USAID, World Bank, non-governmental organizations, foundations, bilateral and

multilateral donors, Rotary Club or other service organizations, and the private sector. Consider trying a sponsorship program with a private company in which the company buys "advertising," for example, paying to put logo on water vessel. Local government/municipalities may share some costs and health workers.

- **Importation of supplies:** Organizations with tax-free status, such as embassies, donor and UN agencies, can help save money through customs duty waivers if supplies need to be imported. Rotary and Lions Clubs may be able to advise about import procedures.
- **Implementation:** Implementers' roles include production, behavior change, promotion, education, sales, and distribution. Possible implementers include non-governmental organizations such as Population Services International (PSI) and CARE, private business (such as bottle manufacturers), municipalities, and workers at public health clinics. Organizations with experience with Safe Water System projects include PAHO (in Peru, Bolivia, Ecuador), PSI (in Bolivia, Zambia, Madagascar), and CARE (in Kenya, Madagascar).
- **Distribution:** Potential outlets for distribution of products may include health facilities, hospitals, shops, supermarkets, church groups, schools, cooperatives, community groups and local companies. Government, non-government or commercial organizations that distribute medical supplies may assist with distribution. (See step 6.0.)
- **Storage:** Local companies, NGOs, and government offices may be able to provide secure storage space for supplies or space for disinfectant production.
- **Training:** Suitable trainers may be found in the Ministry of Health, universities, development agencies, or non-government organizations.
- **Behavior change:** An NGO that specializes in behavior change through social marketing may be available to design a strategy and materials for promotion and education. It may also provide workers to carry out particular tasks such as developing a brand name and logo, designing promotional posters and other materials, and organizing a kick-off event.

Universities are another potential source for theoretical and practical information about behavior change methods. Advertising agencies may be employed to do marketing research with the implementing agency and help design promotional campaigns and materials. Some may donate services or discount their rates for a public service project.

- **Promotion:** Health facilities and workers can promote use of Safe Water System products. Other organizations, such as schools, community groups, and drama groups, can be involved in education and promotion. Local media may give space to promotional and educational messages. Advertising agencies are expert in promoting products.
- **Educational materials:** Behavior change expertise, health education expertise and facilities for producing educational and promotional materials may be available from the Ministry of Health, educational institutions, non-governmental organizations, advertising agencies, or private business.
- **Evaluation:** Social scientists from universities and from government can help to design community, participatory, or operational research on aspects of implementation. Help in designing evaluation and monitoring or help collecting data may be available from local universities, medical schools, NGOs, and local health departments. International agencies or universities may help with external evaluations.

Although coordination with various organizations is more time-consuming than working alone, the advantages of this approach include:

- potential to reach different groups in the community through different channels
- access to diverse skills and resources
- greater likelihood of sustainability. The chances of sustainability increase if a project has support from a broad range of organizations and is integrated into existing local structures. Existing community structures and committees are more likely to survive in the long run than those established specifically for a project.

Consider staffing needs for the project. Review activities planned. Decide what type of staff will be required for each activity and estimate how much time will be needed. For example:

- **Research** will require a trained researcher to assist with design, planning and analysis, and field workers to collect data.

- **Behavior change, education and promotion** will require specialists in behavior change, health education and communication to develop strategies. Design and implementation will require, for example, specialists to develop messages and materials, an artist to develop posters, field workers to pretest messages and materials, trainers for field workers and door-to-door promoters, someone to work with community drama groups.

- **Production** will require a technician to set up production, train production staff, and supervise quality. It will also require production staff to run and maintain equipment, bottle the disinfectant, and keep records of production.

- **Distribution and sale** will require staff to provide information, demonstrate water treatment, and record sales activities.
- **Management and administration** will require staff for tasks such as stock-keeping, financial control, procurement of supplies, training, supervision, analysis of monitoring data and writing reports.

Select a core group of organizations to work on the project. Then establish a project management committee composed of representatives of the organizations. When several organizations are involved in implementing a project, each with different roles, it is important to have a management committee to oversee and coordinate.

In Madagascar, for example, the team included:

Social marketing implementation: PSI
Community mobilization: CARE
Research: CARE/CDC
Production: PSI
Overall management: CARE
Behavior change: PSI/CARE
Distribution and Sale: PSI
CARE
Catholic Relief Services
Commercial sector
Product Certification: Ministry of Mines
Endorsement: Mayor of Antananarivo

5.0 DECIDE ON PRODUCTS

Tasks:

- → Choose a production method for disinfectant (sodium hypochlorite)
- → Choose vessel for water storage
- → Choose process or product to use if water is turbid
- → Choose bottles for disinfectant solution

A Safe Water System project enables households to disinfect and store essential quantities of household water in safe containers.

The products ("hardware") of a Safe Water System include:

- disinfectant solution and its container
- a vessel for safe water storage in the home
- a filter, if local water is turbid

Project planners must decide how these products will be manufactured or obtained. There are a variety of ways to produce a disinfectant solution, and there are many different safe water storage vessels.

5.1 Choose a production method for disinfectant

The disinfectant should kill or inactivate pathogens that are likely to be present in the water sources of the target population. An ideal disinfectant should:

- be reliable and effective in killing pathogens under a range of conditions likely to be encountered
- provide an adequate residual concentration in the water to assure persistent disinfection during water storage
- neither introduce nor produce substances in concentrations that may be harmful to health, nor make the water unsuitable for human consumption or aesthetically unacceptable
- be safe for household storage and use
- have an adequate shelf life without significant loss of potency
- be affordable for users

There is no perfect water disinfectant that will work optimally under all circumstances. Each has advantages and disadvantages.[15] However, in our experience, demonstration projects have identified chlorine, specifically 0.5% to 1% sodium hypochlorite solution, as having the best overall characteristics for both production at the local level and convenient dosing for household water disinfection. It is also extremely inexpensive to produce, making it an affordable option for economically disadvantaged populations. Sodium hypochlorite solution at this concentration is also safe, with evidence that ingestion of sodium hypochlorite at 10 times greater concentration causes no lasting damage.[16]

Sodium hypochlorite has two disadvantages that must be addressed. The first is the issue of taste. Some populations object to the taste of chlorine, which may decrease use of disinfectant. Behavior change interventions should be designed to address the issue of taste (see section 7.0). **In Zambia,** one approach was to teach people to associate chlorine taste as an indicator of the safety of drinking water. **In Bolivia**, an approach was to teach people to treat water in the evening for the following day, so that the taste would dissipate. The second disadvantage is the potential for degradation of chlorine concentration during storage, particularly in hot climates. This problem can be mitigated by alkalinizing the solution and by storing it out of sunlight

in opaque containers in the coolest possible place. In hot climates, the shelf life can be as little as 1 month, but with alkalinization, the shelf life can be increased to 4 months or more. In cool climates, the shelf life is greater than 6 months. Shelf life must be determined in each new region because of variations in source water and climate.

Another concern about chlorination of water is the health effects of trihalomethanes. Trihalomethanes are disinfection byproducts that are formed when hypochlorite is used to treat water with organic material in it. Research suggests that, over a lifetime, the risk of bladder cancer increases with chronic consumption of trihalomethanes. In populations in developing countries, however, the risk of death or delayed development in early childhood from diarrhea transmitted by contaminated water is far greater than the relatively small risk of bladder cancer in old age.

There are alternative safe and effective ways to produce sodium hypochlorite solution:

a) local production from water and salt with a low cost hypochlorite generator that is simple to operate
b) production by an existing local or multinational business in country

For the Safe Water System, we have decided against using dilute solution of calcium hypochlorite from High Test Hypochlorite (HTH) powder because of the caustic, hazardous nature of the highly concentrated (70%) powder. Also, in most countries, HTH must be imported, and storage can be difficult, particularly in hot, humid conditions.

Another option that is not recommended is to promote use of a locally available commercial bleach to treat water in the home because experience has shown that this approach leads to problems with acceptance. Bleach bottles often display instructions to use bleach to whiten clothes and clean toilets, which deters people from using it to treat drinking water. Another problem with commercial bleach is that it may contain additives or impurities and that concentration can vary, which makes it more difficult to provide dosing instructions. It is best to create a new product especially for treating drinking water.

Each of the preferred options for production of disinfectant solution is described below.

a) Local production from water and salt with a low cost hypochlorite generator that is simple to operate

Using this method, an arrangement can be made to produce hypochlorite in the community. Devices are available from several manufacturers that are designed to reliably produce hypochlorite solutions through electrolysis of ordinary salt and water (3% salt solution).[7, 15,17] Most of these devices, called hypochlorite generators, use electricity from an electrical grid, but solar powered hypochlorite generators can also be used. A suitable place is required to operate the machine and store solutions. A two-person team should be trained to operate and maintain the device and to monitor the hypochlorite concentration. (See Annex C.)

There is a range of sizes and capacities of hypochlorite generators. Different models can produce as little as 10 liters (enough for 40 families) per day up to a maximum of 400 liters (for 1600 families) per day. Running 12 hours per day, an electric-powered hypochlorite generator can produce enough disinfectant solution




to treat water for about 8,000 families (40,000 - 48,000 people) every 2 weeks.

Once production starts, the disinfectant can be produced inexpensively by a community worker. **In Zambia**, disinfectant sold for approximately $0.20 for a month's supply for a family of 6 people. **In Madagascar,** disinfectant sold for $0.30 for 2 month's supply, and **in Kenya**, for $0.20 for 2 month's supply. These prices did not take into account the cost of marketing and distribution. Local production has been employed in Bolivia, Peru, Ecuador, Zambia, and Madagascar.

As the water project expands to reach additional communities, it may be necessary to obtain additional generators to meet increased demand and train more workers to produce and bottle disinfectant.

b) Production by an existing local or multinational business in country

With this method, a business such as a bleach manufacturer produces a disinfectant product of a specified concentration. If an existing business can produce a suitable disinfectant, the manufacturer is likely to have in place procedures for quality control, bottling, labeling, and distribution. When the project is ready to expand, the manufacturer can quickly increase production. This method has been used in Kenya.

Problems may arise, however, because the manufacturer, rather than the project administrators, will control price and production. Business usually requires a certain profit margin, which may make the disinfectant price too high for intended users. There may be increased transportation costs, depending on the distance between the manufacturing plant and the communities that purchase the product.

Figure 4: Comparison of methods for production of disinfectant solution

Disinfectant production options	Cost of solution	Local job creation	Cost of transport	Quality control	Efficiency of bottling, labeling	Start-up costs and staff training	Ease of scaling up	Control over product price	Distribution
Local production with appropriate technology	Low	Good	Low	Good	Good	High	Good	Good	Network must be developed
Production by existing company	Depends on negotiation	Depends on size of project	Higher	Good	Good	Lower	Depends on capacity of company	Poor	Existing distribution network

5.2 Choose bottles for disinfectant solution

Disinfectant is put into bottles that are then distributed to outlets and sold to households. There are several issues to consider in the choice and design of a bottle.

- Returnable or non-returnable bottles?

  Returnable bottles can save project costs and result in a lower price for consumers. When the contents of a returnable bottle are gone, the consumer returns the empty bottle to a sales outlet and gets a discount on a new bottle. Bottles are sent back to the production point to be cleaned, relabeled and refilled. Returnable bottles reduce the likelihood that empty bottles will become solid waste (although this has not been a problem yet because people tend to reuse non-returnable bottles for other purposes when the disinfectant bottle is empty).

  Non-returnable sealed bottles have been preferred by social marketing NGOs because they facilitate quality control and make operations logistically simpler.

- Color

  The bottle should be opaque to extend shelf life.

- Size

  The bottle should not be so small that new ones need to be bought too frequently; nor should it be so large that the supply of disinfectant lasts longer than its effective shelf life. Many projects have found that a 250 ml bottle works well, as

this is approximately the amount that an average household uses in 2 to 4 weeks. Up to 500 ml volume is satisfactory in cool climates. In hot climates, the shelf life is reduced, and 500 ml of disinfectant may begin to lose its strength before it is used up.

- Paper label to be attached or labels to be silk-screened (painted) on bottle?

  The bottle must have a clear label that identifies its contents and provides instructions for use in households. Silk-screened labels wear off in time, so if bottles are to be returnable, paper labels may be more practical.

- Measuring cap

  The bottle's cap should be used to measure the correct amount of disinfectant to add to the quantity of water in the recommended water storage vessel. Therefore the size of the cap and instructions for its use must be designed with the water storage vessel in mind. The dose must be determined using the locally available disinfectant with the locally available water in the vessel recommended by the project because different waters require different doses of sodium hypochlorite for adequate disinfection. This is best accomplished via trial and error, measuring free chlorine levels one half hour after dosing. A qualified person can start by adding ½ or 1 capful, then measuring the chlorine level, and then continuing to add increments of ½ or 1 capful to the vessel until the correct chlorine level is achieved in the stored water. A free chlorine level of 0.5 to 2.0 mg/L is optimal. A cap should facilitate measuring the correct amount of disinfectant for the water storage container. For a 20-liter water vessel, the dose of disinfectant will likely be between 5 and 10 ml, so a cap size of approximately 2.5 to 10 ml will work best.

- How to produce or procure the bottle

  The project may be able to use a locally produced bottle of appropriate size with an acceptable cap to which a label can be applied. However, there can be problems with locally

produced bottles. Sometimes bottles are proprietary and are therefore not available for the project. Also, available bottles may be used for other products such as chemicals, and consumers may mistake one for the other.

Another option is to manufacture a unique bottle. A unique bottle has advantages in that it can be developed to meet the exact specifications required (size, shape, cap) and consumers will come to recognize it. A mold to produce a bottle is expensive (for example, $8000 was the cost in Bolivia), but once produced, the project cost per bottle may become less expensive.

5.3 Choose a vessel for water storage in the home

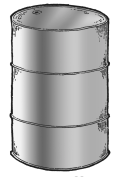
Virtually every type of tank or container imaginable has been used for household water storage. Unfortunately, most do not adequately protect water from contamination. Many are open without lid or cover. Used 55-gallon oil drums and open plastic and metal buckets are commonplace.

Many people obtain or buy previously-used containers because they are cheaper. However, sometimes these containers have held poisonous substances such as pesticides. Families have become ill or have even died after drinking water stored in them.

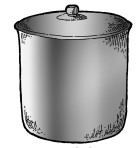
Studies have shown that even if water is microbiologically safe when put into such containers, it can be quickly contaminated during storage and use, primarily by contact with human hands or contaminated utensils that are used to withdraw water. Dust, animals, birds and insects can also contaminate water when the vessel is inadequately covered. Under these circumstances, even when water is initially disinfected, the subsequent contamination is often so great that it nullifies the disinfectant. Water stored in wide-mouth vessels (which allow stored water to be dipped out with hands or utensils) is much more likely to be contaminated than water in vessels that must be poured. Many studies have shown the importance of a suitable household water container to prevent waterborne diseases.[1, 18-21]

Typical containers used for household storage that are often kept uncovered and do not adequately protect water include:
In many countries, clay pots are popular water containers with a


Buckets (plastic or metal)

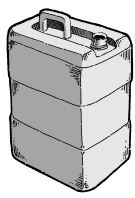

55 gallon oil drums


clay pots

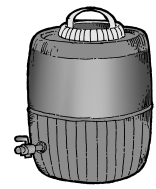

cooking pots

history of use that goes back generations. Many families prefer to use clay pots because they are porous and permit evaporative cooling. They are also accustomed to the taste of water in clay pots. In such cases, it may be difficult to convince people to change to a different type of container. **In Kenya** research suggested that clay pots may be reasonably effective storage containers, if kept clean, if people avoid touching water when they dip it out (in some countries, spigots are placed in clay pots to avoid this problem), and if the water is chlorinated when it is put into the pot.

Commonly used vessels for household storage which may adequately protect water if clean and used correctly include:
CDC and PAHO have designed a 20-liter, plastic vessel with a


jerry cans


plastic bottles

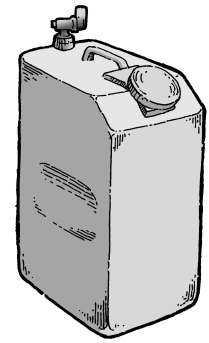

picnic coolers

narrow mouth, lid, and faucet. Recently, the design was improved with assistance from Procter and Gamble. This vessel has been field tested in Bolivia and Zambia with good results. PAHO Peru and PAHO Ecuador have employed containers with similar characteristics in their projects. Oxfam has designed a bucket with a tightly fitting lid, a smaller opening in the lid, and a spigot.

Below are desired characteristics of a container that will prevent

contamination of contents and facilitate disinfection of water:

1. Appropriate shape and dimensions with a volume between 10 and 30 liters so that it is not too heavy, fitted with handles to facilitate lifting and carrying, with a stable base to prevent overturning. If possible, a standard sized container should be used because then dosing can be standardized. 20 liter vessels have worked well in earlier studies. If children often carry water, the vessel will have to be smaller or the child will need to collect water in a smaller container and pour it into the safe storage container.



2. Durable material, resistant to impact and oxidation, easy to clean, lightweight, and translucent. High-density polyethylene (HDPE) is often the most appropriate material that is readily available. HDPE should be specially treated with ultraviolet absorbers, or exposure to sunlight over time will damage the plastic and vessels will crack.

3. An opening large enough to facilitate filling and cleaning but small enough that even a child cannot easily insert a hand with cup or other utensil to dip out water. The inlet should be fitted with a durable screw-on lid, preferably fastened to the container with a cord or chain. A diameter between 6 to 9 cm is optimal.

4. A durable spigot or spout for pouring that is resistant to oxidation and impact, closes easily, and can discharge approximately one liter of water in about 15 seconds.

5. Instructions for use of the container, disinfection of contents, and cleaning the interior, permanently affixed to the container on material that does not deteriorate when wet or moist.

6. A certificate that indicates the container complies with requirements of the Ministry of Health or an equivalent appropriate authority.

Figure 5: Comparison of possible vessels for water storage

Vessel	Durability Easy to clean	Lid	Faucet	Cleaning inside	Volume	Ease of dosing with disinfectant	Cost	Distribution costs
CDC vessel	Good	Yes	Yes (durable)	Yes hand can fit in opening)	20 liter	Very easy (standard volume)	Moderate to high	Higher (may require import)
Acceptable local jerry can) (narrow mouth)	Fair	Yes	Usually do not have faucets	Usually not	Variable	Can be more complicated (variable volume)	Low	Lower because they are locally available
Oxfam vessel	Good	Yes	Yes	Yes	14 liter	Very easy (standard volume)	Moderate to high	Lower (will require import)

In most countries, the choice is between obtaining or manufacturing a specially designed vessel with all or most of the characteristics above or promoting use of a locally available vessel that has some of the desired characteristics.

A vessel that is already available in communities will cost less but may be less effective. A specially designed vessel will always have more of the desired characteristics.

Typically most locally available vessels lack most of the desired features. Many local vessels:

- have a mouth which is too narrow (difficult to clean)
- have no top to keep out contamination
- do not have a faucet
- are less durable
- vary in volume

Education on how to properly disinfect water is much more complicated if households have vessels of different design and volume. Mistakes adding the correct amount of disinfectant are likely. If the vessel is smaller than the standard and the dose is therefore too much, a bad taste results. If the vessel is larger and too little disinfectant is added, the water is not effectively disinfected.

Education on how to clean vessels must be tailored to the type of vessels used. If the opening of the vessel permits the entry of a hand, then the vessel can be cleaned with soap or detergent and water. If the opening is too narrow for the entry of a hand, then instructions for cleaning must be adapted to local conditions. This is one method that has been used:

- Pour 1-2 liters of water into container
- Add double the usual dose of sodium hypochlorite (e.g., 2 capfuls instead of one)
- Add detergent
- Add hard rice grains or gravel
- Agitate vigorously
- Pour out solution
- Rinse

The vessel is more suitable if it has more of the desired characteristics. Sometimes no local vessels are acceptable (only buckets are available). If only buckets or other “unacceptable” vessels are available and production or importation of a specially designed vessel is not feasible, an alternative strategy would be to locate or develop a secure cover for the bucket. Promotion and education would address keeping the bucket covered and being careful not to let anyone’s hands touch the water. **In Madagascar**, this situation occurred in the early stages of the project (before special vessels were obtained). Promotional material stressed the importance of keeping the buckets covered and pouring, rather than dipping, the water.

Inside of Brochure from Madagascar

How to assess possible household water storage vessels:

If your project is considering recommending a local vessel, search the community for possible vessels in common sizes that are widely available and used in the area. Then assess each for the characteristics discussed above. Use a worksheet such as the one on the next page to help make a systematic comparison. There is a blank copy of this worksheet in Annex D. On the next page is an example showing how the worksheet was completed by some planners comparing a specially designed vessel and three particular vessels that are commonly available in their project area (earthenware jug, a plastic jerry can, a 10-litre bucket with lid).

Figure 6: Example Worksheet for Assessing Possible Household Water Storage Vessels

Characteristics	Specially designed vessel	Common earthenware jug	Plastic jerry can	Bucket with lid
Volume: standard, 10-30 L, marked	Standard 20 liters	Varies – 20-40 liters	Variable	Standard 10 liters
Design	Easy to carry, stable	Familiar, difficult to carry, stable	Easy to carry, stable	Easy to carry, stable
Material	Plastic durable & easy to clean	Breakable, porous, holds pathogens, durable in households that take care of them	Cannot see inside – gets discolored	Easy to clean
Inlet with screw-on lid; no access to dip with hands or cup	Yes	Some have lids placed on top. Dipping is usual practice	Yes	Usual practice is to dip
Faucet or narrow mouth to pour water	Faucet	Not usually, but in some countries clay pots are made with faucets	Narrow mouth	Wide mouth
Access to inside for cleaning	Yes – hand can reach in to scrub	Access to clean	Difficult to clean inside	Access to inside for cleaning
Device for measuring disinfectant	Can be designed as part of vessel or disinfectant bottle	Depends on site – if clay pots have a standard size, dosing will be easier; very difficult to design dosing if widely variable volumes	Can design as part of disinfectant bottle for two standard volumes of jerry can - - but measuring mistakes possible	Can design if bucket of standard size. Difficult if bucket sizes vary

Figure 6: Example Worksheet for Assessing Possible Household Water Storage Vessels – continued

Characteristics	Specially designed vessel	Common earthenware jug	Plastic jerry can	Bucket with lid
Instructions for use, disinfection and cleaning affixed	Can be standard for standard volume; can affix before sale	Must provide apart from clay pot	Labels can be produced for households, but must be affixed by owner	Labels can be produced for households, but must be affixed by owner
Certification of MOH	Can be obtained and distributed with vessels	Difficult to certify used items already in the home	Difficult to certify used items	Not recommended for storage, therefore not certifiable
Cost	Expensive but lasts long time	Cheap, already present in homes	Typically less expensive than special vessel; limited safe life; accessibility varies by country	Cheap, accessible
Other comments	Attractive, novel, status item	Familiar, widely available	Likely to be purchased used; may be unsafe–need to assure that it is not contaminated	Familiar, widely available
Performance in field trials	Used correctly, get improved water quality and decreased diarrhea	Recent studies suggest that can maintain chlorine residuals for up to 24 hours.	Performed OK in Zambia if had a lid	Not tested
Overall assessment	Best choice if can obtain for project	If other alternatives unfeasible, it may be possible to develop safe practices with clay pots.	Has drawbacks but acceptable if no other options	Not ideal, but acceptable if there are no other options and if a good, well-fitting lid is available

Whether a specially designed vessel can be used in a project depends on whether quantities of such a container are manufactured regionally or locally, and whether the project can afford to pay for them. Shipping a vessel long distances from point of manufacture to users may cost as much as the vessel itself. Therefore, local or regional manufacture of a specially designed vessel is important. Refer to the web site of the U.S. Centers for Disease Control and Prevention (www.cdc.gov/safewater) for the most current information on manufacturers of vessels and molds. **In Bolivia**, a specially designed vessel was manufactured for $4.00. **In South Africa**, the specially designed vessel sold for approximately $4.00. Oxfam sold their vessel for approximately $3.50. See section 9.0 for more information on production of vessels.

Important decisions are based on the type of vessel used. For example, the dosing of disinfectant depends on the volume of the vessel. Educational materials will need to address advantages and disadvantages of the vessel. The manufacturer's cooperation will be important to attach promotional information to vessel surfaces and to correct any problems identified after vessels are being used.

5.4 Choose process or product to use if water is turbid

In areas where water is turbid, pretreatment to filter out sediment can improve the aesthetic quality of water and increase the efficiency of disinfection, and, in some cases, reduce the degree of microbial contamination.[22] The simplest method is to filter water through locally available, inexpensive cloth such as sari cloth (Bangladesh), or chitenge (Zambia). To make a filter, fold the cloth over a number of times, enough to remove turbidity yet optimize flow. Do a trial with local cloth and local water. The use of the cloth will need to be added to educational messages, especially on the label of the disinfectant.

In some regions with extremely turbid water, it may be difficult to adequately filter water with cloth because the cloth can become clogged with organic material. In such regions, it may be necessary to teach people to let water settle overnight and then decant the cleared water into a new container. Alternatively, other filter systems such as slow sand filters could be considered, although cost and complexity are potential drawbacks.

Filtering Water with Cloth

Using a Settling Technique

6.0 DECIDE ON METHODS OF DISTRIBUTION

Tasks:

- → Consider possible methods for distribution including systems or infrastructures that already exist
- → Assess the possible distribution methods for the project
- → Select the methods of distribution and plan them in more detail

The project will need to make water disinfectant and safe storage vessels available and easily accessible to target households. This will require procurement, storage and distribution of both products.

Factors to remember when planning for distribution are:

- What geographical area will be covered?
- What systems or infrastructures for distribution already exist?

The most common options for distribution are:

A. government systems
B. non-government systems

C. commercial sector
D. social marketing

These systems may be used singly or in combination. Whatever system or systems are selected, education and promotional activities are also necessary to create demand for the products and ensure that households know how to use them correctly. Planning a strategy for behavior change is described in section 7.0. The system of distribution and the behavior change methods must be planned to work together.

Similar steps are involved to plan and implement a project through any system:

- procure products
- establish price
- plan distribution through recognized, reputable and convenient sites
- work out logistics of transportation and distribution
- prepare educational materials
- train or inform staff at outlets
- manage flow of products and money
- plan for emergency response
- evaluate

6.1 Consider possible methods of distribution including existing systems or infrastructures

A. Government Systems

Distribution can be organized through government systems in one or more different ways:

- adding distribution of Safe Water System products onto a distribution infrastructure that is already in place, for example, for supplying government health centers
- an 'ad hoc' approach using government vehicles to deliver products from central government stores to more peripheral government offices, health centers or other outlets
- establishing a separate distribution system specifically for water vessels or disinfectant or both

Government distribution systems can usually distribute large volumes of supplies rapidly and into distant areas that are underserved. However, they require functioning vehicles and staff. Some governments may not have financial and management resources to maintain them. Using a government system for distribution of Safe Water System products may divert resources from other health service activities and may not be as sustainable as private sector distribution.

In Ecuador, a project was initiated by PAHO in response to flooding from El Nino with funding from the Embassy of the Netherlands. Sodium hypochlorite production sites were located in clinics run by the Ministry of Public Health.[5] The disinfectant solution was distributed to local neighborhoods by Ministry of Public Health personnel. Additional funding was provided by USAID. This project was later incorporated into the Ministry of Public Health as a funded program. Now street vendors are receiving training in the use of this method and are preparing food and drinks with safe water, which enables them to be accredited by the Ministry of Health. This method was also used to provide safe water to victims of recent volcano eruptions.

B. Non-government Organization (NGO) Systems

Non-government organization (NGO) systems may approach distribution in one of two ways:

- NGOs implementing a Safe Water System project may organize their own distribution system.
- NGOs that focus on distribution activities, for example supply of essential drugs, may distribute Safe Water System products.

A distribution system organized by an NGO for its own project may work well but may be expensive and unsustainable when donor support is discontinued. If the NGO is small, it may be limited to a small geographical area.

Relying on a larger NGO, such as CARE or PSI, has the advantage of using existing distribution structures and may be more credible and sustainable. This approach requires obtaining permission from the appropriate authorities to distribute Safe Water System products and finding a way to cover distribution

costs. Sustainability of the project depends on the sustainability of the NGO. **In Western Kenya,** CARE used this approach. CARE distributed water disinfection products to villages in its Water and Sanitation for Health Project, using community volunteers as distribution agents. CARE also incorporated an element of social marketing into this project (see below).

Distribution through a **combination of government and NGO systems** is a common traditional approach for distribution of health products. Products are given away or sold through NGO clinics, government health centers and health posts, private or public pharmacies, etc.

The advantage of a traditional distribution system is that it may reach some individuals who may not be served by commercial channels. It also ensures lower initial costs than private sector approaches.

In Peru, the Panamerican Center for Sanitary Engineering and Environmental Sciences (CEPIS—an office of PAHO), ADRA (a 7th Day Adventist-supported NGO), and the Ministry of Health joined together in a GTZ –funded project to provide their unique version of the Safe Water System to communities in 5 regions of the country.[7] Distribution was organized by committees elected by community members.

C. Commercial Sector

Commercial sector distribution involves distributing vessels and disinfectant through existing commercial distribution systems and retail outlets. In most areas there are large or small established companies that can capably manufacture a product. They can also distribute the product through commercial channels that are appropriate for a locality. When the private sector makes a product widely available and prominent, people use it. This approach requires a market of consumers with sufficient demand for the products or a demand-creation campaign. Product prices must be low enough to be affordable and high enough to include sufficient profit margin to motivate distributors. Use of a commercial sector arrangement is generally sustainable.

If a project chooses to work with the private sector for distribution, it is important to arrange an agreement from the outset so that private companies do not price the product above the reach of the target population.

In Zambia and Madagascar, the commercial sector was used by PSI who sold the products to commercial wholesalers for distribution through retail outlets.[11,12] PSI also used social-marketing methods (see below) to increase demand for and promote correct use of the Safe Water System products.

D. Social Marketing

Social marketing is a particular approach to distribution and promotion. It uses commercial marketing methods including the concepts of market segmentation, consumer research, and communication to create demand for a product or service. The main differences are:

- Social marketing aims to increase the acceptability of a product or idea to meet a social need, whereas commercial marketing aims to sell a product to maximize profit.

- Social marketing usually involves subsidy in pricing a product, or of its distribution or promotion, whereas commercial marketing involves no subsidy.

Social marketing is based on research into what potential users know, want and do, and makes use of the best mix of existing channels of communication to give simple, repeated and attractive messages. It means finding out about potential users, and considering “positioning”, in other words, what will motivate these potential users to buy a product or use a service. Developmental testing ensures that brand name, product images and educational messages are appropriate, understood and effective.

Social marketing may include aspects of commercial distribution combined with incentives, subsidies, management or advertising inputs from the public sector or an NGO. The aim is to support distribution systems in the short term while demand is created and until a market is well established. Subsidizing distribution costs and/or introducing price controls may ensure the price is kept as low as possible while providing distributors a reasonable profit. These approaches seek to enable shops or other outlets to sell to the community before a commercial system is established. Once people learn about and use the products successfully, the hope is that they will continue to want the products so significant demand will be created.

Social marketing, like traditional marketing, involves deciding on the best mix of four factors, sometimes called the four "P"s:

- Product – includes decisions about brand development, quality, packaging, logo, size and market positioning to interest the target population so they will use the products.

- Place – includes decisions about distribution channels and outlets for vessels and disinfectant, and coverage.

- Price – includes decisions about affordable prices, subsidies, credit terms and cost recovery goals.

- Promotion – includes decisions about communication channels, advertising, personal selling and sales promotion, promotional materials and events.

The four "P"s are interdependent. For example, distribution and outlets ("Place") will be linked to advertising and sales promotion ("Promotion"). Demand is affected by "Price," as well as by branding and advertising ("Product"), and by education on use and benefits ("Promotion").

"Product" issues are discussed in sections 5.0 and 7.0, "Place" is discussed in this section, "Price" in section 8.0, and "Promotion" in section 7.0.

Social marketing:

- is expensive as it requires start-up funding, marketing expertise, and training for outlet managers and sales agents.
- may focus on urban and periurban populations and may miss rural or marginalized populations.
- can be very effective, combining the advantages of private sector marketing with knowledge and experience of traditional health care delivery.
- generates enthusiasm about a product.
- includes a system of distribution that ensures the product is accessible and sells at a low price (not free) so the product will be valued and used.

An important balance to achieve in social marketing projects is that between coverage (health impact) and cost recovery (financial sustainability).

Alternatively, if financial support is more limited, elements of the social marketing approach could be used in other types of distribution systems. For example, a project could use consumer research to develop a product brand and advertising for disinfectant that could be distributed and promoted through a government or NGO system of outlets.

In Homa Bay, Kenya, CARE hired a social marketing consultant to help market disinfectant and safe storage practices to populations in rural Western Kenya (social marketing). The products were distributed by community health workers (government system) and sold in local stores (commercial sector) as well as in clinics and hospitals run by the Ministry of Health.

As the examples in this section show, existing Safe Water System projects use more than one distribution system. Any project would be wise to explore all potential distribution options. Different options offer unique advantages, and the likelihood of project sustainability and success is enhanced by having many different types of distribution outlets.

6.2 Assess alternate distribution methods for the project

Consider the possible distribution systems (government, NGO, commercial and social marketing) and focus on those which seem most appropriate. Investigate community structures that could be involved in implementation. Then list some possible methods in each system. For example, in the government system, specific methods could include distribution by health centers and health posts. In the NGO system, specific methods could include sale of products to consumers at the clinics of a particular NGO, or distribution of the products by an NGO that distributes food and agricultural goods to villages. In the commercial sector, the products could be distributed through an existing network of pharmacies, or a bleach manufacturer could market them in small retail shops. Another option would be for a commercial company or an NGO to establish a network of door-to-door sales persons who are paid a small incentive for sales of the product.

In reality, no one model will be used exclusively. A mix is typical, as exemplified **in Madagascar**, where the project used social marketing, government certification of the products, NGO-sponsored community mobilization, and commercial sector distribution. In both **Ecuador and Peru**, a combination of NGO and government distribution systems was used.

To assess possible distribution methods for the project, use a worksheet such as the one on the next page to help you make a systematic comparison of the options. There is a blank copy of this worksheet in Annex D. Possible criteria for assessing and comparing options are written across the top of the table.

In the left column, list possible distribution methods. Then assess each according to these criteria and any additional criteria that you want to add. The example on the next page shows how the worksheet was completed by some planners considering four particular options in their area.

Figure 7: Example Worksheet to Assess Possible Distribution Methods

Possible Distribution Methods	Project cost	Demand creation	Product recognition	Effectiveness of distribution	Accessibility of product for consumers	Product price	Control over product price	Potential for sustainability
Government & NGO combination – adding onto **existing** distribution system for NGO clinics, government health centers, health posts	Lower	Low	Low	Good – may reach underserved areas	High where government and NGOs work	Lowest	High	Moderate to low
NGO – establishing **new** NGO-sponsored network of outlets for distribution of vessels and disinfectant	High	Moderate	Moderate	Depends on number and placement of outlets	Depends on number and placement of outlets	Medium to high may be low if NGO subsidizes price	High	Low
Commercial Sector – using network of established pharmacies, shops for household items	High to moderate	High	High	Good but may not reach underserved	Low	High	Low	Moderate to high
Social Marketing -- health centers and shops provided with marketing materials; door-to-door sales	High	High	High	Good, but may not reach some underserved populations, especially in rural areas	Will require special targeting to ensure that at-risk populations have access	Low	High	Moderate to High

Though the final choice will probably be a mix of systems, the worksheet will help make apparent the strengths and weaknesses of each method. An important consideration will be whether a method will use an established infrastructure (such as government health centers) or the system will need to be developed (such as door-to-door sales persons). Development of any new system requires considerable planning, resources and effort.

6.3 Select methods of distribution and plan them in more detail

Select a method or combination of methods that will be able to best achieve project objectives within the budget. Then plan the methods in more detail, that is, plan for actual distribution sites and persons who will sell vessels and disinfectant. For example, specify names of health centers, pharmacies and shops, and plan how to identify and train door-to-door sales people.

Lack of community support and poor communication between a project management committee and the community are common reasons for project failure. Careful planning with community representatives can help. Identify common goals and address issues where there are differences in views as early as possible. Identify key people who could be involved in the project and develop their roles with them.

It may be helpful for project planners to interview prospective distributors about characteristics of their system, such as:

- distribution area
- site of population covered
- type of outlets
- number of outlets
- other products distributed
- distribution costs
- frequency of distribution
- distribution capacity (i.e., number of vehicles, number of units of product they can carry in a given period of time)
- do they have issues with product exclusivity

Caution: The project must pay close attention to distribution. Insufficient follow-up after initial distribution in one project led to failures in some regions. Also, the project grew too large for the capacity of the implementing agency to fill demand. Households obtained initial supplies but when the disinfectant was used up, they were unable to replace it. The education campaign was too short to persuade the target population of the relationship between the consumption of contaminated water and diarrhea.

7.0 PLAN STRATEGY FOR CHANGING BEHAVIOR

Tasks to do:

→ Conduct formative research

→ Identify the specific target population for behavior change

→ Plan the positioning (e.g., brand name product with logo to appeal to mothers)

→ Plan key messages

→ Select methods for behavior change and the communication channels

→ Specify communication materials needed

A Safe Water System project must:

- present to the target population a compelling reason to try the Safe Water System
- create a demand for the products
- change the behaviors of the community to include use of the Safe Water System.

The Safe Water System requires ongoing use to be effective. Initially, there may be good participation in terms of purchasing a container and a bottle of disinfectant. However, for the system to have a health impact, households must purchase and properly use the disinfectant on an ongoing basis.

Success depends on the degree to which the intended target households can be convinced to change their behavior, specifically to:

- acquire the products (vessel and disinfectant)
- try using the Safe Water System, and use it correctly
- use it consistently over time.

Traditional practices of water storage and use may be difficult to change for many reasons:

- Families may not consider the problem of diarrheal diseases as serious as other diseases like fever or measles and may not be motivated to use a product designed for preventing diarrheal diseases.
- Because diarrheal diseases are seasonal, the perception of risk may vary by season. (This was seen in Zambia, where sales peaked during the rainy season and dropped in the dry season.)
- Safe Water System products may seem costly.
- The new behaviors may seem inconvenient.

Behavior change is complex. There are different theories and strategies for bringing about a behavior change in a population that have been used with varying success. Behavior change is always the result of a combination of factors. Changing the behavior of a community in a lasting way is slow and can be difficult.

Health education alone is not sufficient to bring about behavior change[23], but it can be an important contributor by raising awareness of waterborne diseases and how to prevent them. Promotion, using social marketing techniques, can also be an important influence to purchase and use a product.[24] Motivational interviewing can greatly increase effectiveness as this type of communication helps to bring about and support internally-motivated change in people.[25] Community mobilization has great potential for inducing behavior change because the community defines its problems and the programs it wants. This creates a powerful demand even before the project is implemented.[11]

Safe Water System projects have used health education, community mobilization, social marketing and motivational interviewing. Of these methods, health education, when used alone, has

proven to be least effective, but it remains an important supplementary element to each of the other approaches. Experience has shown that if implemented well, each of these methods can have a significant influence on the behaviors of purchasing and using disinfectant solution correctly and storing water safely.

What is Education or IEC (Information, Education, and Communication)?

Educational activities aim to **increase knowledge** in the target population. When planning the educational component of a project, sometimes people use the term IEC, which stands for information, education and communication, to indicate that a broader range of activity is envisioned than just traditional classroom instruction or a health worker telling a group of mothers what they should do.

In a Safe Water System project, educational activities:

- are usually implemented through interpersonal communication with health workers or sellers of the products, print materials distributed in health centers or outlets, street theater, and video presentations.
- generate awareness of the problem of diarrheal diseases, the severity and particular risk to young children, and the link with contaminated water.

- provide information about preventing diarrhea by disinfection and safe storage of water.
- teach households how to use the vessel and disinfectant solution, and inform people where to obtain the products.
- are best planned using results of formative research on the target population's knowledge, attitude and practice.

See Annex E for some example educational materials. Although educational activities are necessary to provide a knowledge base about the problem and practical solutions, they have not been shown to be effective when used alone. The manner and methods that are used to convey educational information can be extremely influential in laying a foundation for people to choose behavior change. When individuals decide on their own to change, it is much more likely to endure. Motivational interviewing (see below) is a potent communication strategy that can enhance IEC activities and promote the initiation and maintenance of behavior change.

It is important to coordinate IEC activities with other activities that are already being conducted by other agencies. IEC messages should be consistent with educational messages of other agencies to avoid confusion in the target population. If other agencies are delivering inaccurate messages that will conflict with Safe Water System messages, then tactful efforts should be made to correct erroneous messages.

What is Promotion? Why is it Needed?

Since information alone is seldom enough to change behavior, it is advisable to employ other approaches to increase the possibilities that people will try and will continue Safe Water System behaviors. Behavior change can be increased when promotional activities supplement educational activities.

Promotional activities:

- aim to **stimulate** individuals to sample new products and behaviors and to continue using those products.
- use messages specifically formulated to encourage the target population and deliver those messages through channels that will be effective with the population.

- are based on research on the population and reasons for their behaviors. (See explanation of principles of social marketing in section 6.1).
- motivate potential users to buy the products and assist them in using the products correctly and consistently. This requires more than giving factual information about diarrhea, water disinfection and storage.

Promotional methods used in social marketing persuade people to use products for reasons that are tangential to the main reasons for the implementation of the project. For example, the main reason for a Safe Water System project is to prevent diarrhea. Social marketing may imply however, that women who use the Safe Water System are better mothers, trend setters, or smarter. Marketing research can determine how best to appeal to potential consumers.

Educational activities are an important partner to promotion because they provide the knowledge needed to understand promotional messages. Education can help to facilitate behavior change by giving people the knowledge to understand the problem, find and purchase the products, and use the products correctly, once they decide to do so. Both promotional and IEC messages can appear on the same materials, such as brochures and posters.

What is Motivational Interviewing?

Motivational interviewing involves an interpersonal communication method that is grounded in health behavior theories, decision-making theory and motivational psychology.[25] It is very useful to enhance IEC, promotional activities and community mobilization efforts. The empirical evidence supports motivational interviewing. It is effective in different cultures in producing internally-motivated changes in a range of health behaviors. However, training in motivational interviewing requires a person experienced in the method. **In Zambia**, it was used successfully to strengthen the initiation and sustained use of the Safe Water System.[13]

Motivational interviewing incorporates the theoretical model of the stages of change, which conceptualizes change as a process that people move through at different levels of readiness.[26] The stages are:

- Precontemplation: The person is not ready to consider change or is unaware of any need to change.
- Contemplation: The person is ambivalent, both considering change and rejecting it.
- Preparation: The person is open to changing and may be preparing to make a change.
- Action: The person is actually engaging in actions with the intention of bringing about change.

Offering advice or suggestions for taking action to a person who is not ready for change can be premature, inappropriate, and ineffective. A more person-centered, stage-based approach such as motivational interviewing has been shown to be more powerful in bringing about sustained changes in behavior.

Motivational interviewing is effective in moving people through the stages of change and towards initiating health-promoting behaviors. The method of motivational interviewing involves:

- listening carefully
- reflecting back certain themes that the person talks about,
- eventually eliciting a person's own reasons for change, and
- helping the person define the personal resources that are the most relevant to accomplish that change.

One of the goals is to create awareness in the person of their behavior and how it may be at odds with their desired goals. Motivation for change comes from within the person and can be a result of this discrepancy. It is emphasized that responsibility to initiate the change, as well as to maintain it, lies with the person. Another goal is to support an individual's self-confidence that he can succeed in his change efforts. So, while there are certain strategies and tools involved, the defining feature of motivational interviewing is a style of communicating in a partnership rather than in an expert role.

In Zambia, the Safe Water System project successfully trained community members from a wide range of experience and educational levels (including community health promotion

volunteers, health professionals, and social scientists) to do motivational interviewing. Training involved didactic instruction, role-plays, exercises, and practice.[27] Following the training, it was important to devote time to supervision, guidance and encouragement in the field. See Annex F for more information about training staff in motivational interviewing.

What is Community Mobilization?

Community mobilization is a process by which the community defines their own problems, decides which are higher priority, and organizes itself to address the priority problems.

In Madagascar, CARE used this method in its Household Livelihood Security Program (MAHAVITA) to help communities form a community organizational structure to diagnose and analyze problems as described below:

Stage 1: Eligible communities were selected as potential participants in the project. Community leaders were informed about Programme MAHAVITA. If the community decided to participate, their leaders signed a memorandum of understanding with MAHAVITA personnel outlining their collaboration.

Stage 2: The community was mobilized to identify community facilitators and form a project committee ('Structure de Development'). The facilitators received special training from CARE teams with special skills in communication or social work. The committee then identified resources available to them such as resource persons, influential individuals,

local community organizations, and outside organizations. All community members were informed of the committee and its activities.

Stage 3: The committee facilitators led the members through a participatory needs assessment and problem analysis of the current situation of the community. The committee studied the history, geography, demographics, existing structures, and socio-economic activities of the community. They identified principal problems faced by the community, including problems faced by different sectors of the community. They then analyzed the causes and effects of the problems.

Stage 4: The committee transformed the results of the problem analysis into a community development plan. The committee and community members began planning strategies and exploring possible interventions by analyzing opportunities that existed for the community (such as NGOs working in the community or available government programs). They determined goals, objectives, activities for projects, and indicators to measure progress.

Stage 5: The committee approached potential partners, such as service providers and NGOs, with their community development plan. Contributions included donated time, funding, technical assistance or services. As resources were acquired, implementation of projects began.

Programme MAHAVITA personnel assisted neighborhoods with each stage of this process to increase the likelihood of success and incorporated the Safe Water System into the process. The Safe Water System intervention helped to accelerate community participation, boosted confidence in the process, and provided an economic incentive (that is, income generated through sales of Safe Water System products). The success of this project led CARE to expand it to other regions of Madagascar. By working through this process with some success, communities achieved a sense of empowerment that stimulated the community to continue efforts to improve its condition.

Steps in Developing a Strategy for Behavior Change

Regardless of the methods that will be used in the strategy for behavior change, there are some general principles and steps that are involved in planning all of them. Those steps are:

- **Conducting formative research** (in addition to research described in section 1.0). This is the foundation for selecting methods and for planning every aspect of each method. Formative research is most effectively done by people with experience in doing such research, so the research group should be selected with care. Formative research will serve as a baseline by which results can be measured, so monitoring and evaluation activities must be coordinated with formative research (see section 11.0).

- **Identifying the specific target population for the behavior change.**

- **Planning positioning** (that is, product identification, brand name, logo, etc).

- **Planning key messages**. These are the key messages to convey, regardless of how messages will be conveyed.

- **Selecting methods for behavior change and communication channels**. These are methods that the project will use to affect the behavior of the community. Possible methods might include education, promotion, social marketing, motivational interviewing and community mobilization. If a marketing approach will be used, selection of a marketing consultant or advertising agency is an important part of this process.

  Communication channels are specific ways that behavior change methods are implemented. Possible channels include, for example, posters, radio spots, house-to-house visitors, community meetings, labels on disinfectant bottles, local drama.

- **Specifying communication materials needed.** These are the exact materials needed to implement the methods planned. They include advertising and promotional materials, educational materials, training for implementers, video, radio spots, etc. Both promotional and IEC messages can appear on the same materials.

The strategy for education and promotion in your project will depend on the level of funding, staff, method of distribution and other resources available. The extent of effort devoted to research and design will vary depending on resources and the size of the target population.

If a project has a generous budget and qualified staff, a substantial effort may be made to implement promotional activities, train staff to deliver education and incorporate motivational interviewing in interpersonal interactions, and support ongoing implementation of educational activities. If the project's budget or other resources are very limited, educational activities might be limited to a smaller target population and facilities used regularly by that population, such as health centers and outlets that sell the products. Promotional activities might be limited to only a few community activities. Perhaps the most attractive feature of community mobilization is that it can be accomplished with a small budget.

In any case, all the planning steps described in this section are done **to some extent**, in coordination with the plans for production and distribution.

7.1 Conduct formative research

Conduct formative research in order to develop an effective strategy for behavior change. Earlier assessment (described in section 1.0) should have identified gaps in people's knowledge about diarrhea and safe water practices that need to be addressed by educational activities. Further research on cultural and language issues, and knowledge and

beliefs about diarrhea and water, will enable the project to develop a meaningful product brand and effective promotional messages. The priorities of the community members and their ways of getting projects done will determine much about how the project will be undertaken.

Behavior change methods to motivate households to change can be only as good as the information they are based on. Formative research seeks to:

- find out from people themselves what will motivate behavior change
- find out what advantages people see in adopting new practices
- identify obstacles that need to be overcome
- find out who in the household makes decisions about purchasing household products and water treatment and storage and who influences those decisions
- identify media channels that reach specific audiences

Some information on current practices was gathered in the assessment in Step 1.0; depending on the completeness of that information for the target population, more or less investigation may be needed. Specific information needed is listed in Figure 8.

Annex G lists some possible methods of research and provides some examples of formative research tools. Local authorities can characterize a town's social institutions, subgroups and occupations. Other research methods include:

- survey of knowledge, attitudes and practices as regards water in the home and the link with diseases
- focus groups
- cohort studies for disease problems
- structured observations
- structured interviews

Figure 8: Formative Research Needs for Planning for Behavior Change

Knowledge and attitudes toward the desired behaviors:

- What do people know about safe water storage and disinfection?
- Why do people practice or not practice certain behaviors (obtaining Safe Water System storage container; keeping stored water safe from contamination by hands, animals; regularly cleaning water storage container; purchasing disinfectant, etc.)?
- What behaviors might need to be addressed by a promotional campaign?
- Are special water vessels affordable?
- Is ongoing use of disinfectant solution affordable?
- What previous experience do people have with water disinfection products? With other water treatment practices, such as boiling?
- Are any subgroups currently using disinfectant or special water storage vessels? Why do they do this? Why do other subgroups not do this?
- What are peoples' attitudes toward treating water with disinfectant?
- In what ways are the recommended water storage and disinfection practices inconvenient or difficult for households to carry out?

Responsibility for water in the household and related purchases:

- Who decides about making household purchases?
- What kinds of purchases do different household members make?
- Who controls the household budget?
- Who takes care of water in the home?
- Who takes responsibility for water treatment?
- Who influences the household decisions about purchases?
- Who influences the person with responsibility for water treatment?

Incentives and barriers:

- What are existing knowledge and perceptions about diarrhea?
- What positive perceptions does the population have about using Safe Water System vessel and disinfectant solution?
- What are the barriers to use of the Safe Water System? – cost of vessels, cost of disinfectant solution, difficulty obtaining vessel or disinfectant, seasonality of income, negative attitudes toward disinfectant (e.g., dislike of taste of chlorine, distrust of treatment of water)?
- What is important to individual (rank, acceptance, being a good mother, etc.)?

Channels of communication:

- What channels reach each specific audience? (Channels can include media and opinion leaders that you want to influence)
- Which of these channels are credible for this sort of message? What are the costs to use each listed channel?

7.2 Identify specific target audiences

Based on findings of formative research, identify particular subgroups (e.g., mothers of small children) that will be target audiences for behavior change. Also identify individuals who influence that target group (e.g., community leaders and opinion leaders) so that they may also be targeted with education and promotion. These main groups in the community should be targeted by different methods through different communication channels.

Specific target groups overlap and may include:

- individuals who make decisions about household purchases and about water storage and treatment
- mothers of young children and other household members who have influence over mothers, in order to decrease diarrhea rates in young children
- specific groups, individuals or opinion leaders in a community who, after becoming informed, then decide to change their own behaviors. This, in turn, can influence behavior change in the community as a whole.[28]
- groups not typically targeted, such as men, who may divert family resources to other uses

7.3 Plan positioning (e.g., brand name product with logo to appeal to mothers)

To "position" the Safe Water System means to present it in a way that will motivate potential users to buy the products and use them (that is, change specific behaviors related to water disinfection and storage.) An effective approach to positioning includes developing a brand name, logo and packaging graphics for the vessel and disinfectant. This is strongly recommended regardless of the other methods and extent of promotion planned. Potential advantages include:

- Brand names are highly desirable to help create a unique identity for the products and project. A brand name improves product identification in the target population.
- Branding can increase the perception of quality and value, create a positive and desirable image, and encourage people to try the product. In projects in **Bolivia, Zambia,** and **Madagascar**, having a branded hypochlorite solution specifically promoted for water disinfection helped avoid the problem of bleach being identified by potential users as a product used for other purposes, like whitening clothes or cleaning toilets.
- Although information, education and communication can provide people with information about the benefits of safe water, advertising a specific brand prompts them to translate this knowledge into behavior change.
- Advertising a particular brand of vessel or disinfectant helps to promote safe water vessels and disinfectant in general. Experience with other products such as condoms suggests that promoting one brand has a "halo effect", boosting sales of all types of condoms. **In Zambia**, a commercial bleach manufacturer began advertising its brand as a water purification product in response to PSI's successful social marketing campaign to promote Clorin.
- Experience shows there is a high demand for subsidized products and that demand decreases as prices increase. Promoting branded products may help to maintain demand at higher prices. (Consider this in planning for cost recovery; see section 8.0.)

7.4 Plan key messages

Messages should address a few feasible and relevant target practices or behaviors that will be the objectives of the behavior change strategy. For example:

- Buy a vessel
- Buy disinfectant

- Add appropriate amount of disinfectant to each container of water
- If water is turbid, use a cloth filter and/or a settling technique to clarify water before treating
- Replace disinfectant when it is gone
- Use the vessel correctly to store water and protect it from contamination
- Do not put or let anyone put hands or other utensils into water
- Clean the vessel periodically
- Use safe water to wash hands, wash produce, and clean cooking utensils

Messages should address important knowledge that initial assessment and formative research found lacking in specific target audiences. For example:

- The risk of diarrhea for young children; the link between contaminated water and diarrhea
- The possibility of preventing diarrhea by disinfection and safe storage of water (the Safe Water System)
- Information about how to obtain and use the Safe Water System vessel and disinfectant solution
- Where to purchase an approved water vessel and disinfectant solution
- Price of the water vessel and disinfectant

Advertising messages highlight qualities desired by target population. For example:

- Be a super mom
- Be the first in your neighborhood to use the Safe Water System
- Smart mothers use the Safe Water System
- For healthier, beautiful children, use Safe Water System

The target population includes households with low income and they will have limited ability to pay for vessels and disinfectant. The project will try to keep the price of these products low by subsidy and other schemes to lower costs. However one of the goals of education and promotion will be to make the Safe Water System a priority household expenditure.

7.5 Select methods for behavior change and specify communication channels

Based on formative research and decisions about target audiences, positioning, and key messages, select several methods to try to change the identified behaviors. Methods might be education, promotion, motivational interviewing and community mobilization. Multiple methods are more effective than one. Methods should be sustainable and expandable.

Also use information from formative research to select an appropriate mix of communication channels to reach each specific audience. For example, reach mothers of young children through interpersonal communication with health workers, brochures for distribution at health centers and points of purchase for disinfectant, and through video trucks at markets.

- Education could be implemented through channels such as school teachers, health professionals, and dramas at market days.
- Promotion could be implemented through channels such as posters and brochures at outlets where disinfectant is sold, face-to-face communication with health workers, and video trucks at markets.
- Motivational interviewing could be implemented by community health promoters making house-to-house visits or by health workers interacting with mothers of young children.
- For community mobilization, the key communication channel is the neighborhood committee or its equivalent.

Potential channels can be categorized as either interpersonal communication, local media, mass media, and printed materials. Annex H describes each of these categories and reviews advantages and disadvantages of each.

Choose communication channels that are:

- available to the target group
- appropriate for the target group
- acceptable
- cost-effective

Using a mix of channels to reach each audience is always more effective. Education and promotion are most effective when delivered through a combination of channels, particularly printed materials along with face-to-face communication to explain the materials. Printed materials can be taken home and viewed repeatedly. During interpersonal communication, individuals can ask questions, get reassurance, etc.

It is important to have educational and promotional materials at points of sale. Educational materials must clearly describe how to use the products. Staff and materials at health clinics should actively promote the Safe Water System and its benefits. Depending on resources, the project may choose to use additional channels, such as house-to-house visits by a neighborhood health committee member or a door-to-door sales person.

For effective interpersonal communications, choose persons who will be credible to the target audience and will have the time to carry out the interactions well. Effectiveness of communication can be greatly increased if staff are trained to communicate messages, use printed materials, and ensure that messages are understood. See Annex I for an example curriculum for training staff who will teach households about diarrhea, use of a disinfectant ("Clorin"), and safe storage of water. Improving the effectiveness of interpersonal communication is the area where motivational interviewing has its greatest impact. If motivational interviewing is selected as a method, the implementers (people having interpersonal contact with consumers) will need to be trained in the particular skills of motivational interviewing. (See Annex F.)

7.6 Specify communication materials needed (e.g., label with dosing instructions)

When target audiences, positioning, key messages, channels, plans for distribution of the products and cost recovery have been determined, you can make a specific list of materials that will be needed. These materials could include items such as:

- label on disinfectant bottle and on water storage vessel (See Figure 9 for guidelines for these labels.)

- training and reference materials for interpersonal communications (for example, for health staff who do health education in the health center, and for neighborhood health committee members who employ a motivational interviewing style when making house-to-house visits.)
- posters for display at health centers, schools
- instructional brochures to distribute to consumers who purchase the products
- point-of-purchase materials to display at sales outlets, such as posters and counter displays
- reference materials for interpersonal communication by sales persons at outlets (such as frequently-asked questions with good responses)
- promotional items with logo, such as t-shirts, drinking glasses
- video on how to use the Safe Water System and its benefits to be shown by a projection truck
- script for radio spot
- support materials for drama group
- materials for use at community meetings

Figure 9: Package Labels

The label on a water storage vessel should include instructions for:

- proper filling
- disinfecting
- keeping water safe (such as not putting hands or dipper into the vessel)
- periodic cleaning of the vessel interior
- suggested applications of treated water, including drinking, hand washing, cleaning utensils and washing produce

The label on the bottle of disinfectant solution should include:

- identification of contents
- instructions for measuring the correct amount for the vessel
- shelf life (when to throw away unused disinfectant solution and get more)
- how to keep disinfectant safe, out of the sun, out of the reach of children

Below are some examples of educational and promotional channels and materials that have been used in different projects. Annex E includes some example materials.

Point-of-purchase information: Signs, stickers, and place cards are used to identify outlets and agents where water vessels and disinfectant solution are sold. If products have a brand name, the brand name is promoted on these materials. Brochures or leaflets and counter cards provide simple instructions on how to use the products. Sales persons in shops or health workers in health centers use these materials to help teach families how to use the products. Posters promote the Safe Water System with simple messages about the importance for preventing disease.

Peer educators: Educators are recruited through neighborhood health committees, or already established community health workers are trained to do household or small group education

on the Safe Water System. Peer educators can provide educational information much more effectively if they are trained in skills of motivational interviewing.

Small group activities: These are presentations at health centers, churches, schools or other appropriate community forums, organized by neighborhood health committees and conducted regularly.

Interpersonal: Health workers at health centers and clinics educate potential users and support the Safe Water System. Sales persons at stores and house-to-house visitors educate potential users as part of their sales efforts. These individuals can also be trained in motivational interviewing to increase the effectiveness of their communications.

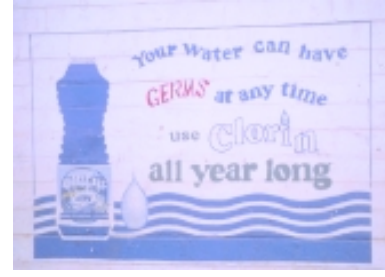
Schools program: Seminars are held to teach teachers about diarrheal diseases and home water treatment and to encourage them to include this information in their curriculum. Presentations are then held in schools to educate students and their parents. Teachers keep Safe Water System vessels in their classrooms. Day to day children take turns adding disinfectant and they all enjoy a supply of safe drinking water at school. When children learn how to disinfect water and keep it safe, they can help their families do the same at home.

Promotional materials: If products are branded (that is, identified with a brand name as part of a social marketing project or commercial

distribution system), branded items such as drinking glasses, cups, t-shirts, stickers and pens may be used to promote awareness of the Safe Water System vessels and disinfectant solution.

Mobile video unit: This is a vehicle that is equipped to show video on a large screen. It travels from place to place to be seen by potential users in different neighborhoods, at schools, markets, festivals, and other public gathering places. Video is most effective when it is accompanied by an educational/ promotional presentation and interaction with an audience.

Special events and local media: Clean water fairs are staged at critical times of the year, such as at the beginning of the diarrhea or cholera season. Sales agents and health workers make presentations and sell vessels and disinfectant solution. Songs, dance, drama, and contests make these a major event for the community and draw large crowds. Local performers deliver essential messages through drama and jingles. Quizzes and competitions involving the crowd reinforce messages.



Small media and outdoor advertising: Posters, billboards, brochures and leaflets are used to promote the benefits of using the Safe Water System. These materials should use low-literacy pictorial images and be written in local languages. Local radio, TV or print media (such as newspapers) are used if they are accessible to households in the project area. (Note that problems of supply and credibility are created if mass media advertise the products in a wider area than they are available.)

In Zambia, the Clorin project was launched with a public event in which local children performed Safe Water System skits and local dignitaries made speeches. Local print and broadcast media covered the event. Subsequently, Clorin signs were painted on walls outside of health clinics. Brochures were distributed at local events and points of sale. Peer educators developed humorous water safety skits that were performed in markets and at other public gatherings. Community health workers were trained to educate their neighbors about causes and prevention of diarrhea and correct use of Clorin. Clorin T-shirts were given away at public events. A video was produced and taken around the country in mobile video units to show to different communities. Clorin billboards were painted in strategic locations.

8.0 PLAN FOR COST RECOVERY

Tasks:

- → Decide on an approach to cost recovery
- → Set the prices of water storage vessels and disinfectant
- → Plan any subsidies or special payment methods
- → Plan how funds will be managed

Possible approaches to cost recovery include:

- Providing vessels and disinfectant free of charge – all funding is covered by donors or government
- Recovering the costs, or part of the costs, of some project components – some funds are generated through sales of products
- Recovering all costs – all costs of the project are repaid through sale of products. This requires sale of large volumes of the products at higher prices.

In a Safe Water System project, the products are low cost items, and the project is conducted in settings with low household incomes. Consumer ability and willingness to pay are critical factors that depend on how much money people have and how much they want to spend on safe water.

8.1 Decide on an approach to cost recovery

Cost recovery plans will depend on the objectives of the project in terms of coverage and sustainability, and the source, amount and timeframe of funding available. Consider feasibility, advantages and disadvantages of different cost recovery schemes.

- ***Providing vessels and disinfectant free of charge*** — Providing products free of charge is likely to result in higher coverage and distribution to the people who are poorest and most in need. However, experience has shown that people do not value items as much when they are given away free. Donation of vessels and disinfectant to families may result in little use initially and no sustained use. Donation is also expensive and unsustainable in the long term. An exception to these recommendations is in disaster settings where sale of any items would not be possible.

- ***Recovering the costs of some project components*** — Most Safe Water System projects decide to try to recover some costs. This is usually done by selling products at prices that generate funds to offset some of the project costs. An advantage of charging for products is that if a product has a cost, people feel it is more valuable. A disadvantage is that some people cannot afford to buy the product. However, this can often be compensated for by some creative payment methods. Also, demand creation, through such techniques as social marketing or community-based promotion, can induce people to buy a product they might otherwise feel they cannot afford.

  Usually, the original donation is used to cover the costs to establish production of water storage vessels and disinfectant, and also initial project costs such as promotion and education. Then by establishing a pricing and a payment collection system for sale of products, the project can generate some revenue. If the project can recover some or all of the ongoing costs of producing and distributing the disinfectant and perhaps vessels, the supply will be more sustainable. **In Zambia**, for example, the project recovered 80% of production costs for the disinfectant; this did not include marketing costs.

- ***Recovering all costs*** — With full cost recovery, a project receives a donation that is placed in a revolving fund. All expenditures for supplies, distribution, promotion, monitoring and management are recovered through sales of the products. Theoretically the project can sustain itself into the future. The disadvantage of full cost recovery is that the necessary price of the products is likely to make them unaffordable, except for relatively wealthier members of the community, and result in low demand. Because of this possibility, full cost recovery may be less likely to succeed.

  In Bolivia, for example, in the CLARO project, full recovery of the cost of 20-liter water vessels led to an initial surplus in the revolving fund, but the project subsequently saw a decline in sales. The CARE project **in Western Kenya** managed to procure inexpensive, locally-produced hypochlorite solution, used locally available containers, and had low marketing costs. In these ways, this project attempted to achieve full cost recovery from products that were affordable to their poorest clients.

In summary, donation of vessels and disinfectant to families is not recommended because it is unlikely to result in sustained use (except in the case of disasters). Full cost recovery requires higher product pricing. Therefore, it is recommended that a Safe Water System project plan some sort of partial cost recovery. To improve the success of any cost recovery scheme, the project needs to plan for:

- a well-implemented behavior change strategy to make the home water treatment system a priority household expenditure
- creative financing schemes to help poorer families purchase the products (see 8.3 below)
- diligent collection of sales revenues to achieve sustainability

8.2 Set the prices of water storage vessels and disinfectant

Issues to be considered include:

- the amount people are able and willing to pay (depends on availability of cash, seasonality of income in agricultural

economies, seasonality of disease, and also factors such as peoples' priority for expenditures, perceptions about diarrhea and water safety, local practices, and effective promotion and education)

- the proportion of costs that needs to be recovered from sales

- the price needed to balance coverage with cost recovery in line with the project's health and financial objectives. If prices are set too low, high coverage may be achieved but less revenue will be generated. If prices are set high, coverage may be low initially but effective promotion can usually increase demand. Also, most projects find that it is easier to lower prices than raise them; rising prices can cause resentment and drop out.

- any changes expected in the local market in the future

Balancing affordability and incentive

Set low prices that most families can afford. Market research determines consumers' ability and willingness to pay for special vessels and disinfectant solution. Where products will be sold through the private sector, they must be priced so that distributors and sellers are motivated to distribute, promote and sell them. Prices should allow sales persons (such as health promoters) to earn a small commission for sales. Health centers and commercial outlets should receive income from sales. These incentives can be extremely effective to stimulate sales. As a guide to an appropriate profit margin, look at margins on products of a similar price and life span.

Pricing special vessels

For specially designed water storage vessels, the price objective may be to recover as much as possible of the manufacturing costs (and the cost of shipping, if significant), plus a distribution margin (some projects have used 25%). If this price is too high for consumers, a pricing option such as price subsidies (for example, through the use of coupons) or credit terms may be established to lower the price or cash outlay.

Options include:

- sale at full price
- sale at subsidized price
- sales on credit
- barter
- payment in kind (e.g., vessel in exchange for work, see Figure 10).

One method to estimate a feasible price for the special vessels is to determine what people pay for the vessels they currently use, or other similar household items such as plastic washbasins. If the special vessel has a price like other commonly-used containers, people will be more likely to purchase it.

Because a vessel is a high-priced item in comparison with disinfectant and can be too expensive for some consumers, some successful projects have sold vessels at a subsidized price and disinfectant at a break-even price.

Pricing disinfectant

For disinfectant, the price objective may be to recover manufacturing and bottling costs, plus a profit margin. It is best to sell disinfectant at a break-even price with perhaps a slight profit, depending on local packaging costs. The break-even price may not include support for sale and distribution.

To set a price for disinfectant, first calculate the cost to produce one bottle of the disinfectant, including salt, electricity, operator and bottler, bottle, label, and transportation. Add a percentage markup, depending on your project's plans for distribution, such as a margin to cover costs of transportation, a profit for retailers, or an incentive for volunteers involved in promotion and sales.

To determine if this price will be reasonable, calculate what the cost would be per household per year. Then compare this with annual household income. (However, data on average household income is often difficult or impossible to obtain.)

For example:

Price of one bottle of disinfectant = cost to produce and bottle plus 30% retail markup = _____

Annual cost per household = Price of one bottle X (number of bottles needed by average household per year) = _____

Average annual household income = per capita average annual income X average household size = _____

Annual cost of disinfectant per household / Average annual household income = _____%

In Zambia, the cost to produce one bottle of disinfectant is $0.20. There is a 25% retail markup, so the price of one bottle is $0.25.
Annual cost per household = $0.25 X 12 bottles = $3.00
Average annual household income = $370 X 6 persons in the household = $2220
Annual cost of disinfectant per household/average annual household income = 3/2220 = 0.1%

It is unlikely families will buy disinfectant if its cost exceeds 2% of the average annual household income.

One method to estimate a feasible price for the disinfectant is to determine what people currently pay for household products they currently use for cooking fuel or hygiene, such as charcoal, wood, soap, or laundry detergent. If the disinfectant is priced like other commonly-used household products, people will be more likely to purchase it.

If it is possible to sell disinfectant in returnable bottles, the unit cost of disinfectant may be lowered substantially. The pricing of returnable bottles and bulk disinfectant will need to include a much higher profit to compensate disinfectant vendors who purchase in bulk and then refill containers returned by consumers. Alternatively, empty bottles can be collected by vendors and returned to the manufacturing location to be cleaned, relabeled and refilled.

8.3 Plan any subsidies or special payment methods

Discuss with community representatives as early as possible the projected costs of vessels and disinfectant. Also discuss their perceptions of the costs and whether subsidies or special payment methods are needed. Ask them which payment methods are most promising in the target communities.

Subsidy

Subsidy is one way to increase the affordability of products, but it may be a short-term option because it relies on external donor support. Subsidy can make vessels affordable to poorer members of the community and increase demand. However, it may result in increased purchases only in the short term, with demand falling if and when the subsidy is removed.

Subsidies may target particular groups or areas. The issues to consider include who should benefit and how to ensure that the target group receives the benefit and not others. For example, the project may target homes with children and sell them the vessel at a reduced price. A potential problem with subsidized projects is that poor households may purchase the vessel at the subsidized price and then resell it at the regular price to earn the difference. This possibility defeats the purpose of the subsidy, which is to increase access to the poor.

Another approach is to sell a basic vessel for a low price and a more expensive vessel with special features, such as insulation, for families who want and can afford it. Profit from the more expensive vessel can help cover the costs of producing the basic vessel, thereby keeping its price low for the neediest families.

PAYMENT METHODS

Cash purchase of a water storage vessel is too expensive for some people. Spreading the cost is one way to make vessels more affordable. Possible payment schemes include:

- sale for a single payment
- sale with installment payments
- payment in kind (for example, water vessel for work project)
- employer or community credit schemes.

To date, water projects have all sold vessels for a single payment. One project sponsored a "Water Vessel for Work" project in which some individuals worked on a community improvement project, such as building a health post or community center, digging drainage ditches to remove standing water, or planting a community garden. When the project was completed, participants were "paid" a vessel and disinfectant. This approach allowed families to obtain a vessel with no cash outlay, but the vessel had value because it was earned. (See Figure 10.)

Administration of credit schemes is not easy and can be time-consuming, but may be considered where the infrastructure is already in place and operational.

Figure 10: Steps of a Water Vessel for Work Project

1. Meet with the community to
   - introduce products,
   - determine interest and motivation, and
   - define community improvement projects in which many can participate.

2. Obtain funding from local government, NGOs:
   - for vessels and disinfectant, and
   - for project materials.

3. Define work day. Purchase products and materials.

4. On work day, register participants, assign tasks, and verify participation for entire work day.

5. Upon project completion, distribute vessels and solution.

Suggested projects:

Build or improve health posts, community centers, or schools
Dig drainage ditches to remove standing water
Prepare, plant, weed, and cultivate a community garden
Build desks and chairs for school or community center

8.4 Plan How Funds Will Be Managed

Important decisions include whether the project or other institutions within the community will manage the money and how it will be handled. Management needs to ensure accountability for funds and supplies. Financial controls are required to prevent misuse or theft. To achieve sustainability, management of funds must include diligent collection of sales revenues. Lenient payment policies will lower cost recovery and sustainability.

Issues to consider include:

- capacity of different organizations, groups or individuals for management of funds
- sustainability of the procedures
- security of funds and supplies

Project management of funds – Some projects have established their own system of collecting funds generated from product sales to community members or retail outlets or through health facilities. Experience shows that allowing health facilities to retain some revenue can improve staff motivation and service quality.

Project management of funds has several potential drawbacks:

- The project may not have the capacity for the work created by managing funds.
- The community is not involved.
- The system is only as sustainable as the project.
- The project may not be able to receive payment for supplies at the time of hand-over if outlets or individuals do not have funds to pay up front. Collecting money in arrears can be difficult.

Project managers also need to consider the safety and security of project staff, who may be expected to transport funds generated from product sales.

Community management of funds – Some projects work with community organizations, such as women's groups, neighborhood health committees, and community pharmacies, that can

buy and sell products, bank funds generated, and use the funds for resupply. The ability of local health centers or neighborhood committees to manage inventories and collect and manage funds will vary widely. Commercial retail stores and shops will have these abilities. Although community involvement can potentially increase sustainability, any project considering this approach needs to consider carefully the experience of community committees:

- Policies must be clearly defined, written down and understood by all members of the committee, project and community to avoid misunderstandings.
- Procedures to control money handling, banking and access to banked funds must be established to prevent theft.
- In anticipation of the end of external support, systems must be created to enable the community to use funds generated to procure and distribute new supplies.

The most important policies to define are the roles and responsibilities of the project, the committee and its individual members, and how the income generated will be used.

Procedures to control money handling can reduce the risk of theft of community funds. Procedures can be quite complex and time-consuming, and outside regulation of village committees may sometimes be required. But they can also be quite straightforward, such as requiring signature of both a neighborhood health committee member and an appointed health worker to withdraw funds from the bank. Some projects have found that women are more trustworthy in handling revenue and managing funds.

9.0 PREPARE FOR PRODUCTION, PROCUREMENT AND DISTRIBUTION OF PRODUCTS

Tasks:

- → Set up production of vessels or procure vessels
- → Set up production of disinfectant bottles, caps and labeling or procure a source
- → Set up production of disinfectant or procure a source of supply
- → Set up distribution system for products
- → List the activities and desired outputs (quantities)

9.1 Set up production of vessels or procure vessels

If the project plans to sell a specially-designed vessel, the options available (as of August 2000) are:

- CDC vessel (Africa): Purchase from Megapak, Johannesburg, South Africa. Contact *gtpage@nampak.co.za*.
- CDC vessel (Bolivia): Purchase from PROSIN, Telephone 591-2-782498, Fax 591-2-782400. Contact Yale@mail.zuper.net or prosin@ceibo.entelnet.bo
- CEPIS vessel (Peru): Purchase from PBEX S.A., Los Calderos 120, Urb. Vulcano, Ate., Lima Peru, 51-1-348-3835, 51-1-348-0278

- Ecuador vessel: Purchase from Plasticos Ecuatorianos. Contact alarconf@gye.satnet.net or katty@gye.satnet.net
- Oxfam vessel: Contact: psherlock@oxfam.org.uk

If the project plans to manufacture a special vessel in a country without current production, the project needs to obtain molds for making the vessel, spigot and lid (estimated cost for 3 molds was $100,000). The first step is to identify a factory that will have the capability to manufacture the vessels and to determine the machinery they use. Most blow-molding machines produced after 1990 are capable of producing the special vessel, but the molds will need to be made to suit the particular machine that will be used. After molds are made, they are shipped to the factory, installed and tested. If a project chooses this option, it should request technical assistance from CDC (safewater@cdc.gov).

If, instead of a specially-designed vessel, inexpensive, locally-produced or locally-acquired jerry cans are selected as the vessel of choice, then the use of these containers can be promoted. Alternatively, the containers can be purchased by the project and distributed to target areas.

9.2 Set up production of disinfectant bottles, caps and labeling or procure a source

If the project plans to manufacture a unique bottle for disinfectant, this will require a mold for the bottle and one for the cap. The mold used to make a small bottle in Bolivia cost $8000. Often a mold can be designed locally so a locally available cap, such as for a soda bottle, will fit the bottle, eliminating the need for a new mold for the cap.

If the project plans to use a locally available bottle, make arrangements with the manufacturer to procure a supply (and re-supplies) of the bottle. One potential problem with this approach is that the local producer might not be able to keep up with demand. This happened in Madagascar.

Labels for the bottle should be carefully designed as a part of planning for education and promotion. Options for applying labels to the bottles include:

- silk-screening the labels directly onto the bottles, or
- printing a paper label and gluing paper labels onto the bottles

Explore the options available locally. Decide how the bottles will be labeled and what tasks to contract out to local printers. If the labels will be printed on paper and applied to the bottles, be sure to test the paper and glue before large quantities are produced.

9.3 Set up production of disinfectant or procure a source of supply

Obtain the necessary equipment and set up for hypochlorite production (see Figure 11). The manufacturer of the hypochlorite generator will provide detailed information on the use of their equipment.

Below are four different hypochlorite generators with information for contacting the manufacturers.

AquaChlor
Equipment and
Systems Engineering
Miami, Fla. USA
Jotoma1@shadow.net
Telephone (305) 378-4101

Sanilec
Exceltec International Corp.
Sugar Land, Texas USA
Exceltec@sanilec.com
http://www.sanilec.com
Telephone (281) 240-6770

Clorid
Av. Gonzalez-Suarez 4-121
y Octavio Diaz
Cuenca, Ecuador
http:// www.clorid.com
clarid@cue.satnet.net
Telephone 593-7-801652

Dip Cell
Magneto-Chemie B.V.
Calandstraat 109
3125 B.A. Schiedam
Netherlands
Telephone: 31-10-262-0788
31-10-262-0201

Figure 11: Requirements for installation and operation of hypochlorite generators

Hypochlorite generator

- information on operation and maintenance from the manufacturer
- space
- a room exclusively for installation and operation of the equipment
- cement floor at least 2 x 2 meters
- ventilation – windows opposite each other for circulation and for release of hydrogen gas
- locking door

Electrical source 110-220 volts, 20 amps from battery or solar cell

Water source

- piped preferable; well is acceptable
- close to equipment
- clear (filter if turbid)

Salt source Store in room in covered plastic container, away from walls, windows and floor

Operators At least two, trained to operate and maintain equipment, bottle disinfectant, keep records, follow distribution procedures

Materials

- three 100 (or 200) liter barrels with lids. Cut 15 cm circular hole in one lid. Place plastic spigots 5 cm from bottom in 2 places.
- wooden benches to hold barrels
- chairs
- table for labeling bottles
- plastic bottles (250 ml recommended)
- preprinted labels or silk-screened bottles
- storage space for bottles, supplies
- sodium hydroxide (alkalizing agent to extend shelf life of sodium hypochlorite solution)
- measuring device that tests concentration of sodium

Figure 12 lists steps for producing hypochlorite solution on a routine basis. Before routine production can begin, however, a critical step is trial production. Trial production includes producing a batch of solution, assessing the chlorine concentration of the solution produced, and making adjustments in the manufacturing procedure as needed. This process must continue until batches of solution with the desired concentration of chlorine are produced reliably. Trial production may take one or several days, and requires the assistance of an experienced person.

The steps of trial production are:

- Follow the procedure for production of hypochlorite solution. (Refer to Figure 12, steps 1 through 10.)
- After the machine has operated the prescribed number of hours, determine concentration of chlorine produced (see Annex C).
- If the concentration is less than 0.5%, this result is likely to be explained by one of three factors that determine hypochlorite concentration: salt concentration, time of machine operation, and current flowing into the solution. Make adjustments to at least one of these factors to obtain the desired concentration of 0.5% - 1.0%.

  - Increase the time of operation of the machine in increments of 1 hour until desired concentration is reached
  - Increase the concentration of salt by 10% (e.g., if 3 kg is used initially, then use an additional 0.3 kg).
  - Check the amperage produced by the machine (most machines have digital or graphic indicators of amperage). If amperage is less than the level recommended in the operation manual for the machine, contact the manufacturer for recommended adjustments.

- When optimal time of machine operation and salt concentration is determined, this procedure should be recorded and used for each production cycle.

- Test concentration of hypochlorite after each round of production so adjustments can be made as necessary. (See Annex C.)

Figure 12: Procedure for Production of Hypochlorite Solution (manufacturer will provide detailed information)

STEPS

1. Mix completely 3 kg salt in 100 liters water in a barrel (or 6 kg in 200 liters)
2. Cover with lid with hole
3. Place cell in solution
4. Connect cable of cell to rectifier
5. Connect rectifier to power source (wall outlet or battery)
6. Turn on rectifier – set for 12 hours
7. Make sure amperage does not exceed 20 – check hourly. If amps increase, turn down amperage on rectifier
8. When finished, immediately remove cell from solution
9. Remove lid with hole and replace with lid with no hole
10. Place cell in container with fresh water after use
11. Test concentration of finished product (see Annex)
12. Maintain register of each production: date, time on, time off, kg salt, liters of water, final concentration, number of bottles filled, operator name

Maintenance

Clean cell in 5% solution of acetic acid (vinegar) at least once a week by submerging cell in vinegar for 1 hour

Safety precautions

Fuse (circuit breaker)
Goggles, gloves, and apron for operators
No smoking around equipment
Barrels and spigots should be polyethylene as metal parts will corrode rapidly

To enhance shelf life of bleach

Add NaOH to finished solution, aiming for pH of 11 to 12
If no pH meter available, add 60 gm NaOH/100 liters of disinfectant

Packaging bleach

Plastic 250 ml bottles, opaque, with 2.5 to 10 ml cap.
Add label with dosing instructions in pictures
Store bottles in cool place away from sunlight, out of reach of children

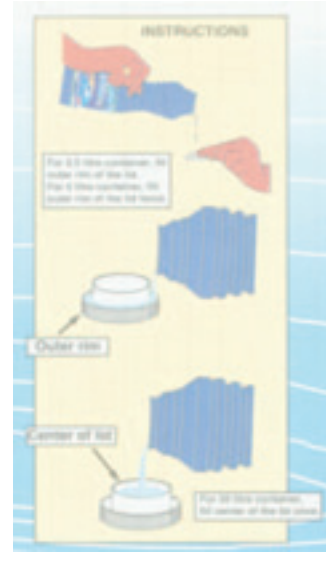
Determine local shelf life and discard bleach not sold 3 months before expiration

After successful trial production is accomplished, test the disinfectant in local water to determine the necessary dose. The dose will depend on the turbidity of the water.

The procedure is as follows:

- Fill vessel with local water (it is best to use the type of vessel recommended by project)
- Add ½ to 1 capful of solution to the water
- Agitate the container and let it sit for 30 minutes
- Test treated water for free chlorine concentration
- If concentration is between 0.5 and 2 mg/liter, dosage is adequate
- If concentration is less than 0.5 mg/liter, add disinfectant solution. Double the previous dose (e.g., if it was ½ capful, add another ½ capful). Keep adding these same increments of solution until target concentration of chlorine is reached.
- If concentration is greater than 2.0 mg/L, then start process over, beginning with ½ the initial test dose in a vessel of fresh, untreated water.
- Continue reducing dose until target concentration is reached.

State the correct dose in educational materials including on the label for the bottle. The best dose is one that can be measured with the cap of the disinfectant bottle (so that everyone has the same measuring device), is simple, and can be used in as many locally available containers of different sizes as possible.



In Zambia, for example, the disinfectant bottle had a cap with a central cup and a surrounding rim. The instructions said to measure the correct amount of disinfectant to treat a 2.5 liter water vessel by filling the outside rim of the cap once. To treat 5 liters, fill the outside rim 2 times; for 20 liters, fill the central cup.

In Madagascar, the instructions were to use ½ capful to treat 10 liters of water and to use one whole capful

for 20 liters. One problem faced there was that disinfectant was shipped to a cyclone-affected disaster area where the only available water source was turbid river water. The dose recommended for the relatively clear water in the capital city was not adequate for the turbid river water at the disaster site. The dose had to be adjusted for the local water and educational material altered to reflect this change.

Train staff at each production site. Training should include operation and maintenance of the equipment that produces disinfectant, safety precautions, measurement of hypochlorite concentration, product safety, record keeping and reporting. (See Annex C.)

9.4 Set up distribution system for products

In section 7.0, the project planned for behavior change, using strategies such as community mobilization, promotion, and education. Materials included items to be displayed at points of sale and materials to explain use of the products to families at house-to-house visits and community meetings.

In section 8.0, the project planned pricing of the products and a system for cost recovery.

Next, to set up the distribution system, as described in section 6.0, identify and contact specific retailers, government health centers or other health facilities, and other organizations that will sell the products (e.g., neighborhood health committees). Plan the network of distribution (how products will be transported to sellers, how health centers and other sellers will be re-supplied) and flow of money. For example, list the exact procedures for sellers to turn in revenues and receive a commission for vessels or disinfectant sold.

Finally, the project will need to train health center staff, neighborhood health committees and agents, commercial retailers, service club participants and NGO representatives who will be involved in the sale of water storage vessels and disinfectant solution. (See sections 10.4 and 10.9 on planning and implementing training for staff.)

9.5 List the activities and the desired outputs (quantities)

List the activities including a statement of the quantities that the project plans to achieve. These should be the main activities and level of effort required to achieve of the objectives specified in step 2.0. For example, see Figure 13.

Figure 13: Production and Distribution Activities to Lead to Achievement of the Objectives

To achieve the following objectives:

1. Increasing access to the intervention (products)

   1.1 Sell 20,000 bottles of disinfectant in first 3 months
   1.2 Sell 1,000 water storage vessels in first 3 months

The project will implement the following activities:

1. Place disinfectant and vessels in 60 retail shops and demonstrate consistent supply
2. Place disinfectant or vessels in 10 health facilities
3. Train 30 community-based distributors (such as community volunteers)
4. Produce 1500 liters of solution per month
5. Produce 100% of batches of solution with free chlorine > 0.4%
6. Review sales records.

10.0 PREPARE TO IMPLEMENT THE BEHAVIOR CHANGE STRATEGY

Tasks:

- → Develop brand name and logo
- → Develop key messages
- → Make detailed plans to implement methods for behavior change
- → Plan training of staff to implement behavior change methods
- → Develop communication materials and training materials
- → List activities and desired outputs (quantities)
- → Arrange use of channels selected
- → Pretest messages and materials
- → Produce and distribute materials
- → Train persons who will implement behavior change methods
- → Plan additional behavior change interventions, if possible

Use information from formative research (see 7.1) to develop plans and materials to carry out the behavior change strategy. Effective messages, materials and other behavior change interventions will increase demand, purchase, and use of appropriate water storage vessels and disinfectant. Developing effective materials requires pretesting them with the target audience to find out whether they create the desired effect and revising them accordingly.

Developing an effective behavior change strategy and its components, such as brand name, logo, messages, materials, etc., requires special skills. It is recommended that the project works with specialists to undertake this development. Individuals who have the skills and experience to contribute in this area may be found in HIV/AIDS health education within the MOH, in private firms or advertising companies within the country that have produced effective marketing campaigns, or in NGOs with substantial behavior change activities. **In Kenya**, for example, CARE hired a marketer who had worked in the private sector. He appreciated the opportunity to apply his skills to a socially useful product.

10.1 Develop brand name and logo

Development of the brand name and logo to position the Safe Water System positively for the target population is a very important step. Having a brand name and logo can be very beneficial because it gives people an easy way to identify the products. The best brand names are simple, catchy, and evoke healthy images in the minds of the target population. When the brand name and logo are completed, they should be incorporated in the various promotional and educational materials.

10.2 Develop key messages

Use appropriate language, terms and local dialect to ensure that messages are relevant to the audience and can be understood by them. If a new term is needed, it may be necessary to introduce the new term and teach what it means in educational messages. Prepare educational and promotional messages in pictures and words. The pictures should be understandable without the words, so that illiterate people in the target population can also understand the message.

Formative research provides information on:

- local language and terms – to decide on wording of messages
- current knowledge about diarrhea
- positive perceptions about water disinfection and storage
- negative perceptions and barriers to address in messages

The project must decide which positive perceptions to reinforce and which benefits to emphasize in promotion, according to local circumstances. Some messages may need to address negative perceptions (e.g., about chlorine) or barriers to use of the Safe Water System. Negative messages or warnings tend not to work as well as positive messages. Messages must give information the audience wants and needs but does not know. Promotion can be effective by associating use of the Safe Water System with a status and lifestyle that people aspire to have.

Develop messages that fulfill specific educational and promotional objectives and that are:

- easy to understand – simple, using appropriate language and local terms
- easy to remember – simple, conveying only 1 or 2 ideas
- positive — conveying positive benefits of products in a way that encourages use
- specific and action-oriented, not general
- accurate, feasible and relevant
- sensitive to existing cultural beliefs
- attractive and interesting
- conveyed in pictures that can be understood without words (particularly important for messages about how to use products)

The actual messages will depend on findings of the formative research and the behavior change objectives. The box below lists some common messages.

Figure 14: Key Messages or Topics for Education and Promotion

Diarrhea

How water is contaminated

- Animal and human feces on the open ground get washed into water sources (surface water, shallow wells)by rain
- Sewage is dumped in surface water sources
- Crossed connections are accidentally made between sewer and water lines
- Cracks or holes in water pipes allow surface contaminants (animal and human feces) to get into water lines (particularly when there are power outages which shut off pumps and create negative pressure which sucks surface contaminants into the water lines)
- People with fecally-contaminated hands touch water stored in wide-mouthed containers such as buckets

How drinking contaminated water causes diarrhea

- Microbes that cause diarrhea are present in feces. These are ingested when a person drinks contaminated water.
- Microbes are too small to see. Clear water can be very contaminated.

The problem of diarrheal disease in our community

- Use local data that is meaningful, for example, the number of episodes of diarrhea in children under age 5 per month in the community, the percentage of children who die of diarrheal diseases annually

Young children are at particular risk of diarrhea, which can be very severe in infants and toddlers.

You can prevent diarrhea by using the Safe Water System.

Protect your family from diarrhea by using the Safe Water System.

Acquiring vessels and disinfectant

Where to go to get disinfectant and a vessel

Get a safe water storage vessel

What disinfectant is; it is safe

Buy disinfectant and always use it

Prices of the vessel and disinfectant

How long disinfectant lasts in the bottle; when to discard

How to obtain more disinfectant

Figure 14: Key Messages or Topics for Education and Promotion (continued)

Treating water

How the intervention works
Disinfectant kills microbes in water within 30 minutes
Storage container keeps new microbes out of water
Cloth filter removes dirt from water so disinfectant is more effective
Allowing water to settle and separating the clear water makes disinfectant stronger.
The correct amount of disinfectant to use in recommended containers.
How to measure and add the correct amount of disinfectant to water
Wait 30 minutes to allow the disinfectant to work and then drink
Always treat water before drinking it, or using it to wash or prepare food

Storing water

Use the vessel correctly to store water and protect it from contamination
Do not put your hands or let anyone else put their hands or utensils into water
Clean the vessel at least once a week

Uses of treated water

Drinking
Washing hands
Washing produce
Cleaning cooking and eating utensils

Storage of disinfectant bottle

Out of reach of children
Indoors, in a dark cool place

Benefits of water treatment and safe storage

Your family, particularly children, will stay healthier and will have less diarrhea if you use disinfectant and a safe water storage vessel.
Shows that you are a better mom
Shows that you are a smart mom
Shows that you are a trend setter

10.3 Make detailed plans for implementing the methods for behavior change

Describe the methods selected for behavior change and make detailed plans for each. Plans should include channels and the numbers and types of staff needed to implement the methods. Plan where, when, how often staff will implement the methods, and produce a list or schedule.

For example:

- In both the Central and Northern districts, project will conduct informational meeting for teachers and distribute materials to them by (date). Teachers will do educational activities in the schools at least once weekly.

- Project will distribute promotion and education materials to outlets by (date) in the Central district and (date) in the Northern district. Shopkeepers will do education and promotion on an ongoing basis.

- In the Central district only, house-to-house visitors will be selected, trained in motivational interviewing (specify date, location and trainer), and will make house-to-house visits in their assigned areas according to a schedule developed at their training (to visit each house twice monthly).

- In both districts, posters will be hung in market places and in government offices by (date).

- In the Northern district, a local drama group will be contacted and their help enlisted by (date); local drama group will perform once weekly at market days plus at community mobilization meetings in the towns of Adaba and Cristo on (dates).

- Project will distribute educational and promotional materials to 8 health centers in the Central district by (date) and 4 health centers in the Norther district by (date).

- The project will conduct 4 training sessions for health center staff in the Central district and 2 sessions in the Northern district (specify schedule). Health center staff will teach

mothers about the Safe Water System at well-baby clinics each week. Health center staff will teach mothers of children who come with diarrhea about the Safe Water System.

10.4 Plan training of staff to implement behavior change methods

Key steps in organizing training in any project are:

- Decide who needs training
- Develop a training curriculum and materials, if not already available
- Identify suitable trainers
- Develop a plan to implement training, and consider whether this training can be integrated into other training activities

List the types of staff that will be involved in the project and list the tasks that they should perform. Assess their need for training. Everyone will need to be informed of the tasks that they are expected to do. Some will need further training to provide new skills. Staff will require training for their role in distribution of products as well as their tasks related to behavior change methods. Training may include oral instruction, written instruction, review of reference materials, discussions, demonstrations, practice exercises, and practice on the job.

For effective interpersonal communications, the project must train staff about the Safe Water System and its use, and how to use printed materials. Effectiveness of communications can be greatly increased if staff are trained how to communicate effectively and ensure that messages are understood. For example, a group of community volunteers received training in a behavior change technique known as motivational interviewing (see Annex F for a

description of the training). Prior to training, 1% of the target population used disinfectant in their water compared to 2% of a neighboring community. Three months after the community volunteers received training, 78% of the target population had detectable chlorine residuals in their stored water, compared to 4% in the neighboring community.[Quick, unpublished data]

10.5 Develop communication materials and training materials

Develop text, artwork and layout for the materials needed. This may include point-of-purchase signs, stickers and cards to identify outlets and sales persons; brochures with instructions on product use and benefits; posters to promote the products and benefits.

Develop video. Video development includes writing a script, filming, editing a film, and adding narration and graphics.

Develop specifications for and list messages that may be included in wall paintings or murals. Then commission community artists to do the paintings.

Write newspaper stories or advertisements.

Design small group activities such as presentations and demonstrations for community meetings, club meetings, etc. This includes writing scripts and instructions, and designing visual aids.

Produce radio spots, including writing scripts, taping a speaker, adding music, and editing.

Figure 15: Characteristics of good educational and promotional materials[29]

A good logo

- Simple, not cluttered
- Explicit and not abstract, the audience should understand it immediately
- Related to the key benefits of the Safe Water System, a symbol of the idea
- Positive, uplifting, conveys the idea of results
- Easily reproducible
- Works in different sizes and settings
- Dramatizes the overall tone of the behavior change strategy

A useful flyer, visual aid or brochure

- Carries the information most likely to be forgotten
- Uses visuals to tell the story, not just words
- Shows people performing key behaviors
- Uses images attractive to the audience
- Concise
- Maintains same tone as overall behavior change strategy
- Organized so that it favors a logical action sequence
- Designed for easy use as a visual aid
- Matches graphic and language skills of specific audience

An effective public poster

- Dramatizes a single idea
- Attracts attention from at least ten meters away
- Uses visuals to carry the message
- Memorable
- Models the behavior whenever possible
- Shows how the product benefits people
- Consistent with tone of overall change strategy

An effective radio spot

- Presents one idea
- Begins with an attention getter
- Is direct and explicit
- Repeats the key idea at least two or three times
- Asks listeners to take action
- Makes the audience feel part of the situation
- Maintains the same tone as the overall change strategy

Training materials may be needed in addition to the educational and promotional materials for the community described above. Training materials should prepare staff to do their specific tasks in the Safe Water System project. For example, shopkeepers may need:

- a description of how they should promote the Safe Water System to customers, including main points to describe
- frequently asked questions and how to answer them
- instructions for keeping records of sales
- instructions for reordering stock of disinfectant and/or vessels.

Training materials may also describe how shopkeepers should display posters and other point-of-purchase materials and suggest how to use the pamphlet when talking with customers.

Training materials are most effective when they are simple and focus just on behaviors that the person is supposed to do.

Some participants in the project will not need written training materials but will be trained by another person. In this case, prepare a trainer's outline of points to address and exercises to do with the group, to show them how and have them practice carrying out their tasks correctly. See Annex I for an example of a plan for a training session.

10.6 List the activities related to behavior change and desired outputs (quantities)

List the activities and outputs (quantities) that the project plans to achieve. These should be main activities and level of effort required to achieve the objectives specified in step 2.0. See an example in Figure 16.

Figure 16: Sales and Behavior Change Activities to Lead to Achievement of the Objectives

(This example is for illustration only. Actual implementation plans will be much more detailed.)

To achieve the following project objectives:

1.1 Sell 20,000 bottles of disinfectant in first 3 months
1.2 Sell 1,000 water storage vessels in first 3 months

2.1 70% of target population will recognize the brand name of the Safe Water System products (vessel and disinfectant) after 6 months
2.2 30% of households will report use of approved water storage vessel and disinfectant after 6 months
2.3 25% of households will have knowledge of correct dose of disinfectant after 6 months
2.4 25% of households will have observed safe water storage practices after 6 months
2.5 10% of households will have measurable residual free chlorine levels >0.2 mg/liter after 6 months.
2.6 10% of households will have no detectable *E. coli* colonies in stored water

The project will implement the following activities:

Production and Sales

1. Produce 1500 liters of solution per month
2. Produce 100% of batches of solution with hypochlorite concentration >0.5%
3. Train 30 community-based distributors (such as community volunteers)
4. Place disinfectant and vessels in 60 retail shops and demonstrate consistent supply
5. Place disinfectant or vessels in 10 health facilities

Education and promotion

6. Design and produce 20,000 information brochures
7. Hold informational meeting in 10 communities per month
8. Train 10 community health workers to deliver education methods per day
9. Design and broadcast one advertisement on the radio 3 times per day
10. Conduct educational event in 4 schools per month
11. Produce video and show it to 3 communities per week
12. Observe health facility staff providing education to mothers once per week

Figure 16: Sales and Behavior Change Activities to Lead to Achievement of the Objectives (continued)

Community mobilization

13. Establish neighborhood committees in 3 communities in first 3 months
14. Have 3 committees work through participatory process in 3 months
15. Have 3 communities organize themselves for the project in first 3 months

Motivational interviewing

16. Train 10 trainers in first 3 months
17. Each trainer trains 5 additional trainers in 3 months
18. Each of 50 trainers trains 10 volunteers in 3 months
19. Each volunteer conducts motivational interviewing intervention in 10 community households in 3 month period

10.7 Arrange use of channels selected

Arrange use of channels as planned in step 7.5.

Seek radio time that may be donated by government stations or purchased time from commercial stations. Arrange for air time on stations that the target audience listens to and schedule broadcasts at times the target audience listens.

Arrange for use of a video projection truck. Schedule where and when the truck will visit different communities, markets, businesses, etc.

Arrange with the local newspaper to print advertisements or notices on certain dates.

Arrange for interpersonal communications through health staff, shop keepers, sales persons. This includes distributing materials to them and training them how to communicate the messages (see 10.10 below).

10.8 Pretest messages and materials

It is essential to pretest messages and materials with members of the community to be sure they convey the message clearly and have the positive effect intended. Pretest pictures as well as words to be used in promotional messages. Pretesting can avoid expensive and time-consuming mistakes.

Pretesting can be done through in-depth interviews or focus group discussions with a sample of the target audience. It is important that the interviewers listen carefully to the participants' impressions of the materials and NOT tell them what the messages are. If the participants do not understand something, the interviewer should record that and not explain until the interview or focus group is over. This method enables an unbiased assessment of how well the materials convey the intended message. Pretesting should check the following:

- **Presentation:** Do people like the words and pictures?
- **Attention:** Does the message hold the audience's attention?
- **Comprehension:** Does the audience understand the intended messages and products?
- **Personal relevance:** Does the audience perceive the messages to be made for them or made for other people?
- **Believability:** Does the audience perceive the message and its source to be credible?
- **Acceptability:** Is anything (words, pictures, implications) offensive or culturally inappropriate?

Frequently the same material is presented in two or more formats, so that people can choose the one they prefer. Arrange to actually observe people using the materials or products. For example, if a brochure teaches how to add the disinfectant to water, it is best to ask women to actually perform these tasks, using instructions in the brochure. In this way one can observe whether women can actually follow the instructions.

Based on feedback from pretesting, revise the messages and materials. Revision may involve changing text or illustrations, eliminating a particular element such as distracting sound effects in a radio spot, combining parts of two different materials, or actually beginning from scratch with a new idea made evident by the tests. Pretest again with a sample of the target audience to see that the modifications have improved the materials in terms of the audience's comprehension and other criteria listed above. If new materials are developed, they should be pretested before being produced in final form.

In Madagascar, for example, the original draft of an instructional brochure showed a close up of a hand holding a cap of disinfectant and pouring it into a bucket. Mothers were confused by the brochure and could not understand the picture. When this picture was replaced by a drawing of a woman holding and pouring the capful of solution, understanding improved. Also, in this draft brochure, the different steps of treatment were numbered. Step 3 showed the woman pouring a half capful, the recommended dosage, into her container. Several people, when referring to the brochure, poured 3 half capfuls into their containers, mistakenly interpreting the number 3 as the number of capfuls to use. This problem was corrected by using arrows to point from one step to the next, rather than numbers.

10.9 Produce and distribute materials

Estimate the number of copies of different materials needed for distribution to the target population (e.g., brochures, point-of-purchase displays, posters, videos). Print the needed quantities and distribute them to health facilities and other outlets, health staff, marketing staff, organizations such as neighborhood health committees, and warehouses that will resupply outlets. Also provide sufficient quantities for training sessions.

10.10 Train persons who will implement the behavior change methods

To prepare for implementation of the educational and promotional activities:

- Train health staff to use educational materials to teach the target population about products and behaviors.

- Train pharmacists, shopkeepers, volunteers and other persons who will sell products about the messages to tell customers, use of sales brochures and other point-of-purchase materials, procedures for managing money from sales, and procedures for restocking supplies.

- Hire and train promotional workers (e.g., communicators, video projection truck drivers) how to communicate messages, and how to answer likely questions from families.

- If plans include use of motivational interviewing, train the selected staff in those skills (see Annex F).

Training should include information, examples and practice. The trainer should:

- describe the task and give necessary information about it such as tools and supplies needed, when to perform it, and main steps.

- demonstrate himself or show the learners an example of someone doing the task correctly.
- ask the learners to practice the task (or part of the task) so that they gain experience.
- watch carefully and give additional help as needed until every learner can perform the task. People learn better and remember longer how to do a task that they actually perform, as opposed to only hearing about it or seeing someone else perform it.

10.11 Plan additional behavior change interventions, if possible

Consider planning additional methods to increase demand for products and behavior change, if possible. Below are some methods used in Safe Water System projects so far:

- use of volunteers for door-to-door sales (Zambia)
- payment of commissions/incentives for sales (Zambia)
- home visits by health workers to reinforce messages (Pakistan, Madagascar, Kenya, Zambia)
- use of Safe Water System in schools to teach school children (Equador, Bolivia)
- branded items such as drinking glasses, cups, t-shirts, stickers and pens to promote awareness of water system project-approved vessels and disinfectant solution.

11.0 PLAN MONITORING AND EVALUATION OF THE PROJECT

Tasks :

For monitoring

- → Identify activities/indicators/outcome measures to be monitored
- → Decide how the findings will be acted on
- → Identify sources for monitoring data and data collection methods
- → Schedule monitoring
- → Design and pretest simple forms and questionnaires for recording information

For evaluation

- → Review project objectives and relevant project activities in terms of expected effects
- → Identify indicators/outcome measures to evaluate
- → Determine sources of data for evaluation and data collection methods
- → Plan for data gathering including schedule and staff

Monitoring and evaluation are crucial to effective management of a Safe Water System project. There are many examples where information from monitoring or evaluation led to a significant change in a project that, one can see in retrospect, was essential to success. If a problem had not been identified, or not been identified until later, the project would have failed. **In Pakistan**, for example, ongoing monitoring of a project identified a problem with vessel breakage 6 – 12 months after distribution. On analysis the problem was due to ultraviolet light degradation of the plastic. The solution was to add UV light absorbers to the plastic of future vessels. **In Madagascar**, the project expanded from the city into a rural region affected by a cyclone. The only water source was a river with very turbid water. The dose of disinfectant recommended for clear piped water in the city was inadequate for the river water in the rural project. The solution was to double the dose.

Monitoring requires ongoing data collection **during** project implementation. Purposes of monitoring include:

- measuring progress of activities during implementation, using indicators, which usually relate to quality or quantity and a particular timeframe.
- highlighting which activities are being carried out well and which less well.
- providing information during implementation about specific problems and aspects that need modification.
- enabling managers to decide about allocation of resources and to identify training and supervision needs.

Evaluation requires data collection **before** and **after** a given period of project implementation. Purposes of evaluation include:

- assessing whether the objectives have been achieved.
- looking at overall strengths and weaknesses.
- guiding design of future phases or follow-up projects.

To plan for monitoring and evaluation, specify the information that will be needed, how it will be used for decision making and how progress and impact will be measured. Plans for monitoring and evaluation should be developed at the same time and integrated with plans for the whole project. At the beginning of the planning process, decide how monitoring and evaluation data will be acted on. Ensure that each piece of data collected has a purpose so

that monitoring and evaluation is a meaningful practice that advances the project's goals and objectives.

To plan for monitoring:

11.1 Identify the activities/indicators/outcome measures to be monitored

First review the project **objectives** (these were specified in step 2.0) and the **activities** planned (in steps 9.0, 10.0) to achieve the objectives. Monitoring should allow the project to determine what activities are occurring, not occurring, or not working out as planned, so that corrections can be made along the way. The project may monitor an activity, or some indicator of the activity. For example, one activity to monitor is:

- Place disinfectant and vessels in 60 retail shops and demonstrate consistent supply

This activity could be monitored by reviewing records of shipments of disinfectant to all 60 shops. Or an indicator could be monitored, such as presence of disinfectant on the shelves during a survey of a sample of retail shops. Monitoring will need to be more intensive in the early stages of the project. Once the project is established and running well, monitoring frequency can be reduced.

Limit the items to be monitored to a manageable number that will provide the most useful information for the pilot project, and that will not require excessive personnel time and project money.

11.2 Decide how the findings will be acted on

It is important to assure that only useful data is collected so effort is not expended on activities that do not contribute to the project. The best way to do this is to think through how each piece of monitoring data will be acted upon. For example,

- If production of disinfectant solution is insufficient to meet demand, then the project can purchase new hypochlorite generating machines, or if a company is making the solution, that company can produce more.
- If the population is not purchasing the disinfectant solution because the price is too high, the project will have to reconsider how much to charge for disinfectant.
- If the solution is not being purchased because of taste, then more education and behavior change approaches will be needed.
- If mothers with a lower educational or income level are not purchasing disinfectant, the project can undertake an educational/behavior change campaign targeting this group.
- If vessels are not being purchased because of the price, then the price will have to be changed, or a locally-produced, cheaper vessel can be recommended.

11.3 Identify sources for monitoring data and data collection methods

To monitor some indicators, new data collection systems may need to be established, whereas, for others, existing data sources will be sufficient. For example, systems for recording sales of vessels and disinfectant at shops or other outlets may need to be established. Alternatively, it may be simple to track invoices which are already collected by businesses for all of their sales. Specify where monitoring will be done, that is, in the whole project area or in a sample of outlets. Keep surveys limited in scope as they are labor intensive and relatively expensive. Surveying a small sample of shops, or doing a focus group, may be sufficient as a simple monitoring check of whether certain activities are getting done, or whether products are available in the target area.

Decide what methods of data collection will be used to measure the selected indicators. Possible methods include:

- Routine reports, such as
  - Records from chlorine production site about volume produced and distributed (see Annex C)
  - Reports from sales outlets of bottles sold
  - Overall sales by community and region

- Supervisory visits to health facilities that are promoting and selling the products

- Survey of outlets in target area (can include interview with staff, examination of records of sales, observation of sales behaviors, inventory of stock)

On the next page is an example of planning for monitoring. The project objectives and activities are listed, along with the data source and method of data collection for monitoring each activity.

Figure 17: Example: Plan for Monitoring

Objectives:

1.1 Sell 20,000 bottles of disinfectant in first 3 months
1.2 Sell 1,000 water storage vessels in first 3 months

Activities to monitor	*Data Source*	*Method of data collection*
Production and sales		
1. Produce 1500 liters of solution per month 2. Produce 100% of batches of solution with free chlorine > 0.5%	Disinfectant production records including concentration of batches and volumes bottled	Review of production records; Visit to validate concentration testing
3. Train 30 community-based distributors (such as community volunteers)	Records of training sessions conductedand attendees Observation of training session	Visit to trainers/administrative office to review training records Observation of training session to confirm agenda
4. Place disinfectant and vessels in 60 retail shops and demonstrate consistent supply 5. Place disinfectant or vessels in 10 health facilities	Survey of outlets and health facilities in target area	Bi-weekly visits to outlets and health facilities to inventory stock on shelves
6. Sell at least 5000 bottles per month 7. Sell at least 300 vessels per month	Sales reports	Review sales reports

Objectives:

2.1 70% of target population will recognize the brand name of the Safe Water System products (vessel and disinfectant) after 6 months
2.2 30% of households will report use of approved water storage vessel and disinfectant after 6 months
2.3 25% of households will have knowledge of correct dose of disinfectant after 6 months
2.4 25% of households will have observed safe water storage practices after 6 months
2.5 10% of households will have measurable residual free chlorine levels >0.2 mg/liter after 6 months
2.6 10% of households will have no detectable E. coli colonies in stored water

Activities to monitor	*Data Source*	*Method of Data Collection*
Education and promotion		
1. Design and produce 20,000 information brochures	Invoices from printing company	Review invoices
2. Train 10 community health workers to deliver education messages in each of 3 communities	Training records	Observation of training sessions Review of records

Activities to monitor	*Data Source*	*Method of Data Collection*
3. Hold informational meeting in 10 communities per month	Meeting minutes	Review of records
4. Design and broadcast one advertisement on the radio 3 times per day	Review of advertisements drafted/ produced Review broadcast schedule Broadcasts	Meeting with designer of advertisements and written broadcast schedule Listen for scheduled broadcasts
5. Conduct educational event in 4 schools per month	Training plans and schedule	Review plans and records of events conducted
6. Produce video and show it to 3 communities per week	Drafts of video Report of communities visited with video	Review draft and final video Video projection truck reports of communities visited
7. Observe health facility staff providing education to mothers once per week	Survey of health facilities in target area	Bi-weekly visits to outlets and health facilities to observe staff
Community mobilization 8. Establish neighborhood committees in 3 communities in first 3 months 9. Have 3 committees work through participatory process in 3 months 10. Have 3 communities organize themselves for the project in first 3 months	Meeting minutes	Review minutes Observe meetings
Motivational interviewing 11. Train 10 trainers in first 3 months 12. Each trainer trains 5 additional trainers in 3 months 13. Each of 50 trainers trains 10 volunteers in 3 months	Training reports	Review reports *Observe training*
14. Each volunteer conducts motivational interviewing intervention in 10 community households in 3 month period	Regular meetings with volunteers	Reports from volunteers Accompany volunteers on some visits

11.4 Schedule monitoring

Decide on the timing of monitoring activities and draw up a schedule. Some activities or indicators may require weekly or monthly monitoring, whereas others may only need to be measured once or twice during a 6 – 12 month pilot project. Some are important to check early in the project, so that problems can be quickly identified and solved. For example, if there are problems producing enough disinfectant to supply outlets, this problem must be quickly solved. If it is found that vessels are available but people are not buying them, this problem should be addressed quickly. Plan to begin data collection while the pilot project activities are implemented.

Identify staff who will conduct monitoring and who will analyze and interpret the data and schedule their time.

11.5 Design and pre-test simple forms and questionnaires for recording information

For example, design forms to collect information about sales of vessels and disinfectant at outlets. When designing data collection, be sure to include all the information needed to monitor the selected indicators, but do not include extra information that is "nice to know" but will not be used for decision making.

To plan for evaluation:

11.6 Review project objectives and relevant project activities in terms of expected effects

Review the reasons for evaluating the project and review the project objectives. Then describe the project:

- target population
- project activities
- responsibilities of project staff
- resources available to project (persons, transportation, data managers/analyzers, money)

Match project objectives with project activities to be sure enough activities will be done to meet the objectives in the proposed time frame. This will prevent undertaking evaluation prematurely, when there is little or no chance of measuring an impact. For example, to measure the health impact of the project, 20 percent of the population will need to be using the intervention. Until the project has reached this level of participation, a health impact evaluation will be premature.

11.7 Identify indicators/outcome measures to evaluate

Specify the indicators/outcome measures based on what is important to know to evaluate achievement of project objectives, strengths and weaknesses of the pilot, and to plan for future activities and expansion. Limit the items to be evaluated to a manageable number that will provide the most useful information and that will enable you to stay within budget and personnel limitations of the project.

Evaluation of the behavior of the target population and use of the products is essential. If use of the products is less than expected, or declining, the project must figure out the reasons and make adjustments. Behavior change strategies must be designed, implemented and modified as needed because these are the key to an effective project. Repeated project evaluations over time will permit personnel to determine whether behavior change is increasing or decreasing in the population. For the project to succeed new behaviors must be sustained.

11.8 Determine sources of data for evaluation and data collection methods

Possible sources include:

- interviews with members of target populations
- disease registries in health facilities serving target populations
- accumulation of monitoring results

Possible methods include:

- community surveys (baseline and follow-up), which can include interviewing family members in their homes, observing certain practices, and/or testing samples of water stored in the home for chlorine residuals or microbiologic quality
- surveys of health facilities and sales outlets, which can include interviewing staff, observing sales and education behaviors, and checking stock
- exit interviews with families attending health facilities or families purchasing Safe Water System products
- focus group interview of sample of target population (to assess people's perceptions of product acceptability, taste, cost and to probe for potential barriers to utilization, such as cultural factors, education, other priorities)
- review of monitoring results
- special studies and surveys that can assist in understanding specific operational issues, for example, case control studies of patients visiting health center with diarrhea and their well neighbors
- active diarrhea surveillance by home visits (health impact)

If there is a local laboratory that assesses microbiologic quality of water, the project may choose to assess water quality. However, these tests can be expensive. Measurement of free chlorine residuals is a reasonable indicator of microbiologic quality, since in the presence of adequate free chlorine residuals, it is much less likely that *E. coli* are present in the water.

The table on the next page shows a plan for evaluation. For each objective, it shows indicators to evaluate, data sources and data collection methods.

Figure 18: Example: Plan for Evaluation

Objective	Indicator	Data Source	Method of Data Collection
1. Increasing access to the intervention (hardware)	Number of bottles sold	Sales records	Review sales records
1.1 Sell 20,000 bottles of disinfectant in first 3 months	Number of vessels sold		
1.2 Sell 1,000 water storage vessels in first 3 months			
2. Changing water treatment and storage behaviors			
2.1 70% of target population will recognize the brand name of the Safe Water System products (vessel and disinfectant) after 6 months	% recognition of brand name	Interviews with target population	Baseline and follow-up surveys of random sample of target population
2.2 30% of households will report use of approved water storage vessel and disinfectant after 6 months	% of households reporting use		
2.3 25% of households will have knowledge of correct dose of disinfectant after 6 months	% of households able to demonstrate correct dose		

2.4	25% of households will have observed safe water storage practices after 6 months	% of households with stored water observed in recommended container	Home visits to observe water storage practices	Baseline and follow-up surveys of random sample of target population
2.5	10% of households will have measurable residual free chlorine levels >0.2 mg/liter after 6 months.	% of households with free chlorine residual >0.2 mg/liter	Water stored in households	Home visits to random sample of population to test stored water at baseline and then after 6 months of implementation
2.6	10% of household will have no detectabe *E. coli* colonies in stored water	% of households with no detectable *E. coli* colonies in stored water		
3.	***Improving health***			
3.1	Reduce diarrhea rates in target population by 20%.	% decreased risk of diarrhea in intervention households compared to control households	Interviews with patients or caregivers, and well controls	Active diarrhea surveillance: periodic (weekly, biweekly) home visits to obtain information about diarrhea episodes. Need comparison group -- could be non-users of intervention or selected control group. Obtain baseline diarrhea data, and then data following implementation of intervention
4.	***Achieving satisfaction***			
4.1	80% of households in target population will report satisfaction with products	% of households indicating satisfaction with products	Interviews with households in target population	Survey of random sample of target population Focus group interviews

11.9 Plan for data gathering including schedule and staff

- Select a data gathering method.

- Consider the purpose of the evaluation, the anticipated start of project activities, and time required for intended outcomes to occur. Then specify when to collect baseline data (prior to project implementation) and when to collect evaluation data (after an appropriate interval).

- When estimating time and other resources required for the data collection, also consider:
  - the number of project participants (e.g., homes or outlets to be surveyed), distances between these
  - the willingness of participants to provide data, the difficulty and time required for data collection at each house (e.g., testing water samples, interviewing family members, observation of water handling practices)

- Design and pretest simple forms and questionnaires for data collection.

- Determine who will collect, analyze, and interpret evaluation data.

- Also determine who will be responsible for writing report. Without a written report, the evaluation will not be in a useful form. The report is essential for progress reports to donor agencies and can provide justification for future funding.

- Set timeline for data collection, analysis, interpretation, and report writing.

12.0 IMPLEMENT THE PROJECT

Tasks:

- → Produce and distribute vessels, disinfectant and educational/promotional materials
- → Launch the pilot project (special event)
- → Supervise and support activities to implement the behavior change strategy and sell vessels and disinfectant through distribution systems as planned; monitor the activities
- → Continue supplying bottles of disinfectant
- → Evaluate the pilot project
- → Implement the project on a larger scale

The project should first be implemented as a pilot. This is strongly recommended in order to test methods and determine what is effective, before implementing on a large scale. A pilot project discovers mistakes or weaknesses, and permits adjustments and improvements, without jeopardizing the larger activity. Also, a successful pilot can be used to justify increased funding from donor agencies.

The length of the pilot depends on what you need to learn from it. A pilot to determine the acceptability to the target audience and the effectiveness of the Safe Water System can be fairly short, such as 12 weeks. A pilot of a social marketing approach to distribution, education and promotion will take longer, to give time for the messages and distribution to diffuse in the community. **In Zambia**, for example, a pilot project lasted one year. It was successful and was instrumental in helping the Ministry of Health control a cholera outbreak, which convinced USAID to increase funding to expand the project to other regions of the country in the second year.

12.1 Produce and distribute vessels, disinfectant, and educational/promotional materials

- Procure or produce vessels. (See section 5.0.)
- Procure or produce disinfectant. (See section 5.0.)
  - Bottle disinfectant (with appropriate label)
  - Assure quality/concentration of disinfectant when produced and when distributed (see Annex C)
  - Distribute disinfectant to outlets (clinics, stores, and other outlets). Provide health facilities and other outlets such as clinics, pharmacies, NGO clinics, and volunteer sales people, with an initial supply of vessels and disinfectant. Monitor to ensure that deliveries are made to outlets in a timely way and that families who hear of the products and come to purchase them will not be disappointed.
- Print and distribute educational/promotional materials

  Print sufficient quantities and materials for all anticipated needs during the pilot. It is usually more cost effective to print a large quantity than to reprint smaller quantities each time supplies run out. Distribute materials so that they are in outlets and in the hands of staff who will use them prior to the launch.

12.2 Launch the pilot project (special event)

The launch event is a special promotional activity to introduce the products and outlets in the pilot area and generate excitement and awareness in the target population. **In Bolivia**, for example, the launch included a parade of traditional dancers through the streets of La Paz followed by a ceremony on stage that included popular musicians and political figures. **In Madagascar**, the launch included a performance by the leading popular singer and other educational activities.

Timing of the launch is very important. In some settings, it is most effective to first implement some educational activities to convey some messages about diarrhea as a problem and the need for safe water. These activities should make the audience aware of the link between diarrhea and unsafe water and stimulate their interest. **In Pakistan**, for example, the project spent a couple of weeks doing community-based education about contamination in the drinking water and the diseases it caused, using videotapes, slide shows, posters, and group meetings. Then the project brought in the water vessels, demonstrated and distributed them. The initial 2 weeks of focus on the problem effectively increased enthusiasm for the subsequent intervention.

A launch event might be timed to correspond with a cholera season or other seasonal increase of diarrhea, a time when people are especially motivated to avoid disease transmission.

However, a launch event does not have to be expensive. **In Kenya**, the launch was a meeting with community leaders to hand out and discuss information about the Safe Water System. The community leaders were then asked to take back the information to their villages. No press was present, but the effort reached all villages in the project area.

12.3 Supervise and support activities to implement the behavior change strategy and sell vessels and disinfectant through distribution systems as planned; monitor the activities

Health staff, staff at pharmacies and shops, and volunteers sell the products as planned. They will require an uninterrupted supply of the vessels, disinfectant, and educational and promotional materials.

Promote and sell the products through different distribution systems and media channels as planned.

- Use print materials – Health facilities display posters and staff use brochures when teaching family members about making water safe. Labels are put on disinfectant bottles. Posters are hung in places where groups will see them, such as in the market place, post office, shops.

- Disseminate messages to groups — Radio spots are broadcast, demonstrations are conducted at community meetings, audio-visual trucks visit communities to show a video on the Safe Water System, and drama groups stage promotional events.

- Implement interpersonal communication — Health staff teach clients about diarrhea and the Safe Water System including answering questions and ensuring clients understand how to use the products. Pharmacists and shopkeepers promote and teach clients about the Safe Water System products as they sell the products to them. Neighborhood health committee representatives trained in motivational interviewing talk with community members about the Safe Water System and sell the products to them.

It is important to monitor these activities from the beginning to be sure that the activities are getting underway as planned, that the products are available for families to buy, that the target population understands the messages, and that there are no significant barriers to acceptance. If results are unexpected, conduct analyses to determine what went wrong. Solve problems that have delayed activities such as distribution of products or promotion of the Safe Water System and make adjustments as needed. Sometimes rumors are spread about a product, for example that it causes sterility. If this happens, it is necessary to seek out the source of the rumor to dispel concerns, and to reinforce educational and promotional efforts in populations affected by the rumor. Another potential problem is misuse of the products, for example using the water vessel to dispense alcoholic beverages. While such occurrences are impossible to prevent, it is important to disseminate a clear message that the purpose of the products is to make water safe.

Over time, assess the audience's response to the messages. If necessary, adjust messages and the way they are delivered. Even if the messages are still appropriate, their format and presentation should change over time so that people do not become bored and ignore them. Over time, promotion can emphasize different aspects of the product and the image associated with it. Early in the campaign, messages may emphasize purchasing a Safe Water System storage vessel and a bottle of disinfectant solution. Later messages may emphasize the ongoing purchase and proper use of the disinfectant along with improved sanitary practices.

Monitoring and Supervision

Monitoring and supervision are important to ensure that the activities are carried out as planned. In one project, after extensive media coverage, shipment of the disinfectant became unreliable and people did not have access to the product. Use of, and demand for, the disinfectant dropped to zero.

Some factors that often result in poor motivation and lead to project failures include:

- lack of clarity about responsibilities
- inadequate transport
- lack of support from supervisors and colleagues
- inadequate incentives, pay and resources
- heavy workload or conflicting tasks

Staff at health centers, pharmacies and shops, and volunteers who will sell the products need support and supervision. These individuals were given training and materials to help them teach about and sell the products. In addition, a visit to their site to answer their questions and give them encouragement, particularly early in the pilot project, can help to increase their effectiveness and motivation.

Strategies for improving supervision and staff motivation include:

- Giving staff clear and detailed job descriptions so that they know what is expected of them
- Establishing clear roles and allocating responsibility for supervision, especially if activities are being integrated into existing health programmes and activities and personnel already have a range of tasks to carry out
- Holding regular meetings to ensure that staff at all levels are aware of plans, progress and changes as a result of monitoring, and can exchange information about their experiences.
- Investigating and addressing the specific causes of poor motivation
- Ensuring that staff are paid a salary in accordance with the job and have the resources to carry out their jobs
- Ensuring that volunteers receive sufficient incentives to play their expected roles
- Providing staff with incentives for good work, such as bonus payments, recognition through prizes or awards, in-service training, or promotion
- Including funds for supervision in project budgets

12.4 Continue supplying bottles of disinfectant

Monitor to ensure that production of disinfectant is keeping up with the need to resupply outlets. If demand exceeds the supply, consider whether an additional machine is needed in order to increase the production, or whether the existing machines could be run more hours each day to increase output. Determine that there are not large stocks sitting in some outlets while other outlets run out. If some outlets have stock outages, help staff at those outlets to anticipate their needs and order products to restock their shelves in a timely way.

12.5 Evaluate the pilot project

- Meet with community leaders to inform them about the need for evaluation and to get their approval and cooperation
- Initiate field work; obtain consent from every participating household
- Collect and store evaluation data as planned
- Analyze and interpret evaluation data
- Review findings with project staff
- Make adjustments in project activities based on findings
- Write the evaluation report
  - Organize report around objectives that were evaluated
  - Write a summary, purpose of evaluation, methods, results, conclusions, recommendations

12.6 Implement the project on a larger scale

Each successful Safe Water System pilot project has been subsequently implemented on a larger scale. This requires additional funding and partners. Successful projects have been able to find substantial additional funding. It is important to document success through project evaluations and reports so that this information can be presented to donor agencies and other potential partners. Each effort to expand a project will be unique, but will probably include the following steps:

- Make adjustments in the project design for the next phase (going to bigger scale). Slow incremental growth is recommended so that supply and demand can be generated evenly in new areas.

- Make needed adjustments in the products, methods of distribution, communication methods or messages needed to implement on a larger scale, and any adjustments based on evaluation of the pilot.

- Obtain funding for increased product volume, distribution, behavior change strategy.

- Arrange for transportation and storage for increased distribution of products in larger area.

- Establish additional points of sale for vessels and disinfectant, including providing promotional and educational materials, and training staff.

- Implement distribution, sales, and the behavior change strategy on a larger scale (e.g., promotion, education, motivational interviewing, community mobilization).

- Monitor and evaluate.

When expanding, consider additional target populations, such as schools, health clinics, mothers' clubs, restaurants, or public places where people must wait (e.g., city offices).

Also consider different applications of the Safe Water System. Examples of additional applications that have been tried in pilot projects include:

- street vendors of beverages (Guatemala and Bolivia)[8]
- preparation of bulk ORS solution in cholera wards, hospitals, or clinics (Guinea-Bissau, Bolivia)[9]
- emergency response to natural disasters and epidemics (Bolivia, Zambia, Madagascar)[12]
- preparation of infant formula by HIV-positive mothers (Cote d'Ivoire).

Safe Water System projects have been expanded to a national, or near-national level in Zambia, Madagascar, and Ecuador. A similar project was expanded to several regions of Peru. Bolivia expanded to 7 regions of the country, but then reduced the project due to lack of funding and management problems. These projects can be contacted for more specific information.

Bolivia:	Yale@ceibo.entelnet.bo
Ecuador:	Changops@telconet.net or msdinasa@punto.net.ec
Kenya:	makutsa@net2000ke.com koons@ksm.care.or.ke
Madagascar:	Mahavita@dts.mg cms_psi.mad@simicro.mg
Peru:	rrojas@cepis.ops-oms.org

ALTERNATIVE WATER TREATMENT TECHNOLOGIES

A number of water treatment methods that employ simple, low cost technology are available. These methods include straining; aeration; storage and settlement; disinfection by boiling, chemicals, solar radiation; and filtration; coagulation and flocculation; and desalination. The following classification is based on Skinner and Shaw.[29] The different methods are presented alphabetically.

Aeration can be accomplished by vigorous shaking in a vessel part full of water or allowing water to trickle down through one or more perforated trays containing small stones. Aeration increases the air content of the water, removes volatile substances such as hydrogen sulfide, which affect odor and taste, and oxidizes iron or manganese so that they form precipitates which can be removed by settlement or filtration.

Coagulation and flocculation. If water contains fine suspended solids, coagulation and flocculation can be used for removal of much of the material. In coagulation, a substance is added to the water to change the behavior of the suspended particles. It causes the particles, which previously tended to repel each other, to be attracted towards each other, or towards the added material. Coagulation takes place during a rapid mixing or stirring process that immediately follows the addition of the coagulant.

The flocculation process, which follows coagulation, usually consists of slow gentle stirring. During flocculation, as the particles come into contact with each other, they cling together to form larger particles which can be removed by settlement or filtration. Alum (aluminum sulfate) is a coagulant used both at the household level and in water treatment plants.[31, 32] Natural coagulants include powdered seeds of the *Moringa olifeira* tree and types of clay such as bentonite.

Desalination. Excessive chemical salts in water make it unpalatable. Desalination by distillation produces water without chemical salts and various methods can be used at household level, for example to treat seawater. Desalination is also effective in removing other chemicals like fluoride, arsenic and iron.

Disinfection is a way of ensuring that drinking water is free from pathogens. The effectiveness of chemical and solar disinfection, and to

a lesser extent boiling, is reduced by the presence of organic matter and suspended solids.

Disinfection by boiling. A typical recommendation for disinfecting water by boiling is to bring the water to a rolling boil for 10-12 minutes. In fact, one minute at 100ºC. will kill most pathogens including cholera and many are killed at 70ºC. The main disadvantages of boiling water are that it uses up fuel and it is time-consuming.

Chemical disinfection. Chlorination is the most widely used method for disinfecting drinking water. The source of chlorine can be sodium hypochlorite (such as household bleach or electrolytically generated from a solution of salt and water), chlorinated lime, or high test hypochlorite (chlorine tablets). Iodine is another excellent chemical disinfectant that is sometimes used. Iodine should not be used for extended periods (longer than a few weeks). Both chlorine and iodine must be added in sufficient quantities to destroy all pathogens but not so much that taste is adversely affected. Deciding on the right amount can be difficult because substances in the water will react with the disinfectant, and the strength of the disinfectant may decline with time depending on how it is stored.

Solar disinfection uses solar radiation to inactivate and destroy pathogens present in water. Treatment consists of filling transparent containers with water and exposing them to full sunlight for about five hours (or two consecutive days under 100 percent cloudy sky). Disinfection occurs by a combination of radiation and thermal treatment (the temperature of the water does not need to rise much above 50ºC). Solar disinfection requires relatively clear water (turbidity less than 30NTU). More information on solar disinfection is available on the website www.sodis.ch.

Filtration includes mechanical straining, absorption and adsorption, and, particularly in slow sand filters, biochemical processes. Depending on the size, type and depth of filter media, and the flow rate and physical characteristics of the raw water, filters can remove suspended solids, pathogens, and certain chemicals, tastes and odors. Straining and settlement are treatment methods that usefully precede filtration to reduce the amount of suspended solids that enter the filtration stage. This increases the period for which a filter can operate before it needs cleaning or replacing. Coagulation and flocculation are also useful treatments to precede settlement and improve still further the removal of solids before filtration.

Storage and settlement. Storing water in safe conditions for one day can result in the die-off of more than 50 percent of most bacteria. Longer periods of storage will lead to further reductions. During storage the suspended solids and some of the pathogens will settle to the bottom of the container. Water removed from the top of the container will be relatively clear (unless the solids are very small such as clay particles) and contain fewer pathogens. The three-pot treatment system where raw water is added to the first pot, decanted into the second pot after 24 hours and into the third pot after a further 24 hours, exploits the benefits of storage and settlement.

Straining. Pouring water through a clean cotton cloth will remove a certain amount of the suspended solids or turbidity. Special monofilament filter cloths have been developed for use in areas where Guinea-worm disease is prevalent. The cloths filter out the copepods which are intermediate hosts for the Guinea-worm larvae

The following tables (Figures 19 and 20) describe the systems currently promoted for household treatment in developing countries, the advantages and constraints of each system, and costs. Figure 19 also indicates whether published reports of lab tests or field trials of household applications are published in the epidemiologic or environmental literature. Promotion and education are essential elements for the successful implementation of any of these systems. The costs given in Figure 20 do not include the costs of promotion and education leading to behavior change because the major determinant of these costs is likely to be the context or setting in which the treatment systems are being promoted. Promoting household treatment in a setting where there are trained extension agents and community health promoters is very different from working in communities and neighborhoods where there is no institutional capacity.

Figure 19: Household Treatment Systems – Advantages and Constraints

System	Process	What is Removed	Pub-lished lab tests	Published field tests in developing countries	Advantages	Constraints
Aeration	Shaking part-full container or some form of cascade that exposes water to air	Some taste and odor removal, oxidizes iron and manganese facilitating removal by filtration	No	No	Low-cost component of iron and manganese removal	Limited removal, normally used in combination with other treatment methods
Boiling	Bring water to rolling boil for 10-12 minutes	Kills nearly all waterborne pathogens	Yes	Yes	Materials available in most households	Time to gather firewood. Cost of fuel. Increased demand for firewood contributes to deforestation
Ceramic filters	Water passes (by gravity or siphon) from outside to inside of unglazed, ceramic cylinder (often called a candle). Good quality ceramic has a pore size of 0.2 microns. Some candles are impregnated with silver to kill pathogens. In some systems, candle filter is preceded by a polypropylene rope filter to remove suspended particles or packed with activated carbon to remove organic chemicals and tastes.	Suspended solids and pathogenic organisms. In theory viruses can pass through 0.2 micron pore but they are normally attached to other material and are prevented from passing.	No	No	Simple and robust.	Blind quickly if water contains suspended solids. Suspended solids are removed by scrubbing candle and scrubbing wears away ceramic material. Candles are relatively expensive.

Figure 19: Household Treatment Systems – Advantages and Constraints (continued)

Chlorine tablets	Disinfection with calcium hypochlorite or trichloroisocyanuric acid tablets	Inactivates or destroys nearly all waterborne pathogens, oxidizes organic substances	Yes	Yes	Relatively easy to distribute and use, particularly in emergencies. Residual effect.	Not locally available in many developing countries, have to be imported. Expensive for long term use. Dose depends on organic material, etc in water. Available chlorine in tablet can decline with age. Adequate contact time required.
Rapid sand filters	Use coarser sand and higher flow rate than slow sand filters to remove impurities by sedimentation, adsorption, straining, chemical and microbiological processes.	Suspended solids especially after coagulation and flocculation.	No	No	Relatively small and compact.	Not effective at removing pathogens. Needs system for backwashing.
Safe water system (sodium hypochlorite + safe water container + social marketing + education)	Disinfection with locally available chlorine source (sodium hypochlorite solution generated from salt and water or purchased as bleach), container with faucet & narrow neck	Inactivates or destroys nearly all waterborne pathogens, oxidizes organic substances	Yes	Yes	Complementary package of disinfection, safe water container and hygiene promotion.	Local supply of hypochlorite must be continously available, strength of hypochlorite solution and raw water quality must be relatively constant, otherwise dosing must change. Adequate contact time required.
Slow sand filters	Use a relatively fine sand and a low filtration rate to remove impurities by sedimentation, adsorption, straining, chemical and microbiological processes.	Substantially reduces pathogens (microbiological is main mechanism for removal)	No	No	Pathogen reduction but not complete removal. Locally available materials.	Only suitable for raw water with a turbidity of less than 20 NTU. Requires careful maintenance.

Figure 19: Household Treatment Systems – Advantages and Constraints (continued)

SODIS (solar disinfection + social marketing + education)	Disinfection by UV radiation & heat through exposure to full sunlight for 5 hours in transparent plastic bottle	Inactivates or destroys most waterborne pathogens	Yes	Yes	Uses plastic bottles which are easy to handle, convenient for storage and transportation, and reduce risk of recontamination. Sustainable system that does require consumables except for bottles.	Requires favorable climatic conditions. Only suitable for water with turbidity of less than 30 NTU.
"Sorption" or "catalytic" filters	Water passes through a finely ground filter medium composed of zeolite or similar. Impurities chemically bond with filter medium. Pore size in medium is about 2 micron.	Taste, odor, chlorine, and suspended solids, pathogens, volatile organic compounds, and heavy metals.	No	No	Very simple to use – small filters are attached to the cap of a water bottle. User simply fills the bottle with raw water and sucks on a spout in the cap, drawing the water through the filter. Removes nearly all impurities.	Filters are easily blinded by suspended solids. Small filters set in water bottle cap have a limited life being capable of filtering a maximum of 750 liters of water before media is used up. Filters specially formulated for arsenic removal have an even shorter life: filtering about 100 liters. Sorption filters are relatively expensive.
Storage & settlement	Raw water is added to the 1st pot, poured or preferably siphoned into 2nd pot after 24 hours, and into 3rd after further 24 hours	About 50 percent of most bacteria die-off, Schistosomiasis cercariae die-off, significant removal of turbidity	No	No	Pots available in most households	Only partial removal of pathogenic organisms
Straining	Pour water through monofilament cloth	Copepods (cyclops) containing Guinea-worm larvae, some turbidity	Yes	Yes	Simple method for prevention of Guinea-worm. In areas where copepods harbor *V. cholerae*, can reduce, but not eliminate transmission.	Cloth must always be used with same surface uppermost. Limited removal of other pathogens.

Figure 20. Household Treatment Systems – Costs

System	***Imported items*** (shipping costs and customs duties add to cost)	***Initial per capita cost* of hardware*** (5 person household)	***Annual operating cost per capita*** (5 person household & 10 liters of treated water per day)
Aeration	None	None	None
Boiling	None	None	Time to gather firewood. Cost of fuel. Deforestation.
Ceramic filter	Filter candles	$5 ($20-25 per system)	$1 (replace $5 filter annually)
Chlorine tablets	Tablets	None	$6
Rapid sand filter	None	Bucket or other container for sand	Time to gather and clean sand
Safe Water System	Cells for generating hypochlorite	$1.60 (2 plastic 20 liter water containers per household, $4.00 per container)	$0.60
Slow sand filter	None	Bucket or other container for sand	Time to gather and clean sand
SODIS	None	Cost of black paint for used plastic bottles	None
Sorption filter	Filter media	$7.50 (one filter per person)	$37.50 (replace filter five times per year)
Storage and settlement	None	Cost of three pots	Cost of three pots (zero after initial investment for every year that pots last)
Straining	Monofilament cloth	Depends on location	Depends on location

*All cost are estimates based on data in 1999.

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ANNEXES

ANNEX A: COLLECTING BACKGROUND DATA: SAMPLE QUESTIONNAIRE ON KNOWLEDGE AND PRACTICES

Date of interview _____/_____/200_
Index subject study no. _____
Household no. _____
Interviewer's name _____

Demographic data

1. Name of principal respondent _____
2. Relationship of respondent to the head of household
   a = Husband *b = Wife* *c = Son*
   d = Daughter *e = Other (specify)* _____
3. Name of the village _____

I WOULD LIKE TO ASK YOU ABOUT THE SOURCES OF INCOME FOR YOUR HOUSEHOLD

4. What are the main sources of income for the household?
   a. *Professional technical or managerial job*
   b. *Large scale agriculture*
   c. *Small scale agriculture*
   d. *Sales or services*
   e. *Skilled manual labor*
   f. *Unskilled manual labor*
   g. *Other* _____

5. What is the type of the house ***(Look at the house and circle the appropriate choice below)***
   a. *The walls are made of mud and the roof is grass-thatched.*
   b. *The walls made of mud and the roof is of iron sheets.*
   c. *The walls are made of bricks and the roof is grass-thatched.*
   d. *The walls are made of bricks and the roof is made of iron sheets.*
   e. *The walls are made of bricks and the roof is made of tiles.*

6. Which of the following things do you have in your house?

a. Beds	*Yes*	*No*	*Don't know*	
[If yes] how many?		_____		
b. Bicycle	*Yes*	*No*	*Don't know*	
c. Car	*Yes*	*No*	*Don't know*	
d. Truck	*Yes*	*No*	*Don't know*	
e. Radio	*Yes*	*No*	*Don't know*	
f. TV	*Yes*	*No*	*Don't know*	
g. Refrigerator	*Yes*	*No*	*Don't know*	
h. Electricity	*Yes*	*No*	*Don't know*	
i. Stove	*Yes*	*No*	*Don't know*	
[if yes] Is it	*electric*		*kerosene*	*gas*

7. Do you keep any animals or birds in your household?
   (If yes) record the type and number of animals/birds kept in the table below. (If no go to question 8)

Type of animal/bird	*1 = Yes 2 = No*	*Number of animals/birds kept*
Cows	*1 2*	
Goats	*1 2*	
Sheep	*1 2*	
Pigs	*1 2*	
Chicken / Ducks	*1 2*	
Other	*1 2*	

I WOULD LIKE TO ASK YOU ABOUT THE SOURCE AND HANDLING OF HOUSEHOLD WATER

8. From where do you usually collect the water you use in the house? ***Do not read the options to the respondent. Mark all the sources that apply***
    a. *Pond or dam*
    b. *Lake*
    c. *Stream or river*
    d. *Well*
    e. *Borehole*
    f. *Spring*
    g. *Rainwater*
    h. *Water-tap*
    i. *Other*_____

9. With what container do you collect the water you use in the household? ***(Ask to see the vessel that is usually used to collect water)***
    a. *No container*
    b. *Bucket*
    c. *Jerrycan*
    d. *Barrel / drum*
    e. *Clay pot*
    f. *Sauce –pan*
    g. *Directly from the tap*
    h. *Other (specify)*_____

10. Do you think this water is safe to drink without any treatment?
    1 = Yes 2 = No 3 = I do not know

11. What type of container do you use to store water for drinking in the house? ***(Look at the vessel usually used to store drinking water) (Do not read, circle all that apply)***
    a. *No container*
    b. *Bucket*
    c. *Jerrycan*
    d. *Barrel/drum*
    e. *Clay-pot*
    f. *Saucepan*
    e. *Jug*
    f. *Kettle*
    g. *Bottles*
    h. *Other (Specify)*

12. What type of water storage vessel does the household use?
See if it is
    a. *Wide mouthed*
    b. *Narrow mouthed*
    c. *Other. (Describe)_____*

13. **Is the water in the storage vessel covered?**
1 = Yes 2 = No

14. Do you process this water in any way to make it safer to drink?
1 = Yes 2 = No 3 = Don't know

15. If yes what do you do to the water to make it safer to drink? ***(Circle all that apply)***
    a. *Boil*
    b. *Add bleach*
    c. *Sieve it through cloth*
    d. *Other (Specify)_____*

16. What do you use to get/pour drinking water out of the storage container ***(Look and circle all that applies)***
    a. *Nothing*
    b. *Cup*
    c. *Ladle*
    d. *Pitcher*
    e. *Bowl*
    f. *Bucket*
    g. *Pour water directly from container*
    h. *Other (Specify)_____*

I WOULD LIKE TO ASK YOU SOME QUESTIONS ABOUT THE TOILET HABITS OF THE PEOPLE IN YOUR HOUSEHOLD

17. What toilet facility do you use? ***(Do not read the options. Circle all that apply.)***
    a. *In the bushes or on the ground?*
    b. *In a latrine?*
    c. *Other (specify)_____*

18. Can I see the type of soap that you use? *(**Look at the soap and comment whether)***
1 = Soap available 2 = Soap not available

Observations to be made by the interviewer

Ask to look at the toilet facility and record

19. What toilet facility does this household use?
    a. *No facilities*
    b. *Pit latrine*
    c. *Other_____*

20. *Is there water for hand washing near or at the toilet?*
    1 = Yes 2 = No

Inspect the compound and observe for

21. Are there any visible excreta in the yard? (If no go to 22)
- *a. Human feces* — *1 = Yes 2 = No*
- *b. Animal feces* — *1 = Yes 2 = No*
- *c. Unknown excreta* — *1 = Yes 2 = No*

22. If yes how many stools are observed?
- *a. Small amount (1-2 feces)*
- *b. Moderate amount (3-4 feces)*
- *c. Large amount (>5 feces)*

23. ***Record the names and age of all people who currently live in the household.***

No	Names	ID No.	Age	Sex *1 = M* *2 = F*	Relationship to head of household *a = Husband* *b = Child* *c = Grandchild* *d = Other relative* *e = Not related*
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e
				1 2	a b c d e

Check form at the end of the visit

- Water vessel inspected [__]
- Water from the household storage vessel sampled [__]
- Water source inspected [__]
- Water from the source sampled [__]
- Toilet facility inspected [__]
- The compound inspected [__]

Say goodbye to the family after going through the check form above

ANNEX B: DEVELOPING A PROPOSAL FOR A SAFE WATER SYSTEM PROJECT

Many donors have a particular form or list of items to be included in a project proposal. It is important to follow prescribed guidelines to provide information that the donor will use to decide about funding a project.

Before preparing a proposal, ask donors for their guidelines for proposals. Also contact others who have written successful proposals for that donor. They may have helpful suggestions on what to include and how to present it. The Safe Water System is still a relatively novel idea, so the idea must be sold to the donor.

Below are some elements often required in proposals:

CORE ELEMENTS

A. Title of project

B. Summary:

Project location(s)
Project staff including names and positions of country staff and external staff
Contact persons -- name, phone number, fax number, Email address
Target population – estimated total population
Duration of the project (years)
Budget – estimated total cost and amount being sought from this donor

C. Introduction:

Background on the country, region and site of the project, including demographics, climate, economic situation, political situation, and major constraints to development efforts
Overview of the project -- Who, what, when, where, why and how
Resources – available human, material and financial resources and how they can be utilized in this project
How this project relates to ongoing projects or activities (if any) related to water safety or projects in the area also funded by this donor

D. Problem statement:

Describe the problem and its causes, morbidity, mortality and other short-term and long-term effects in the community

Describe what the communities, the government, NGOs and other agencies are doing or plan to do about it
Present any needs assessments undertaken or any relevant statistics or research findings
Describe the purpose and the rationale for this initiative

E. Project description:

Goals and objectives of the project
Indicators: process indicators and impact indicators (if any)
Main activities
Expected outputs
Describe the project activities, their timing, duration, and expected outputs
Describe how they relate to the objectives and goals

F. Operational plan:

Describe the intervention strategies
Discuss technical needs assessment, and areas of sustainable collaboration
Describe how the government (MOH) and communities will actively participate in this project
Describe interagency cooperation
Discuss possibilities to leverage donor funds
Discuss how the project will strengthen the capacity of local organizations and communities

G. Project management:

Describe staffing patterns: delineate the number and type of staff required, and describe how they are to be organized to carry out project activities and program management with optimal efficiency
Outline clearly lines of communication and channels for a smooth and efficient management: technical assistance, project activities reports, problem solving, mediating conflicts. This will allow all the various actors to understand the set-up from the beginning and prevent unnecessary burden of miscommunications and frustrations.
Describe project main physical requirements: buildings, vehicles, equipment, project materials and explain briefly their purpose
Indicate the nature and quantity of any in-kind contributions by local communities, organizations, host government and other agencies (if any)

H. Monitoring and evaluation:

Describe briefly the information system, how it fits with the MOH health information system or other government or commercial information system
Describe necessary baseline studies (if any), how they will be done, when and by whom
Discuss timing for evaluation
Describe the reporting system: timing and feedback
Describe role of different partners in monitoring and reporting: local communities, MOH, NGO staff, external staff
Explain how feedback from various partners will be incorporated into decision making on the project

I. Budget

Cash budget: Staffing costs
Material and equipment
Vehicle operations and maintenance
Office operations
Training
Evaluation
Travel and lodging
Technical assistance
Indirect costs

In-Kind budget: Material and equipment
Personnel
Other (specify)

Total costs

SUPPLEMENTARY ELEMENTS (OPTIONAL)

J. Innovative aspects of the proposal
K. Capacity building to be achieved
L. Sustainability
M. Leveraging/multiplier potential for additional funding beyond this donor.

ATTACHMENTS

Maps (country and program area)
Workplan: Detailed project timeline for each month of the project period

ANNEX C: HOW TO TEST CONCENTRATION OF FRESHLY-PRODUCED SODIUM HYPOCHLORITE FOR QUALITY ASSURANCE

Materials needed:

- 1 ml pipettes
- pipetter (for drawing up solution into the pipette)
- 2 100-ml graduated cylinders
- distilled water
- colorimetric chlorine comparator (Hach kits, test strips, other colorimeters)

Testing procedure:

- Fill both graduated cylinders with 99 ml of distilled water.
- Draw up 1ml of freshly-prepared sodium hypochlorite and put it in first graduated cylinder, mix well.
- Draw up 1ml of solution from first graduated cylinder and put it in second graduated cylinder, and mix well.
- Measure the solution in the second graduated cylinder in the chlorine comparator—the result will be measured in mg/liter.
- With this method, the units in mg/liter correspond exactly to the concentration of the disinfectant produced. (For example, if the solution from the second graduated cylinder is 0.5 mg/liter, then the sodium hypochlorite solution is 0.5%.)

Basis of this calculation:

First graduated cylinder:
X mg hypochlorite solution/100ml (99ml H_2O + 1ml of hypochlorite solution) = X mg/100ml

Second graduated cylinder:
Y mg x 1ml of solution from 1st cylinder/100ml (99ml H_2O + 1 ml 1st cylinder solution) = Y mg/100ml

Example:

If the sodium hypochlorite solution is 0.5%, this equals 0.5gm/100ml, which equals 500mg/100ml. In 1ml, there are 5mg.

Therefore, in the first cylinder, you have:
5mg/100ml (99ml H_2O + 1ml hypochlorite solution)
1ml of this solution has 0.05mg of solution.

In the second cylinder, you have:
0.05 mg/100ml (99ml H_2O + 1 ml solution from first cylinder)

The concentration of this solution in mg/liter (which is what is measured in the chlorine comparators) is 0.5 mg/liter. If you get this measurement in the chlorine comparator after doing this procedure, the sodium hypochlorite solution is 0.5 gm/100ml or 0.5%.

Alternative Testing Procedure for Sodium Hypochlorite Concentration (if graduated cylinders are not available)

Materials needed:

- 1ml pipette
- 1 20 liter container
- distilled water
- chlorine comparator

Testing procedure:

- Fill 20 liter container (attempt to fill exactly; variation by a few ml will not appreciably affect results).
- Add 2ml of sodium hypochlorite solution and mix well.
- Measure this solution with chlorine comparator.
- With this method, the units in mg/liter correspond to the concentration of the disinfectant produced. (For example, if the solution is 0.5 mg/liter, then the sodium hypochlorite solution is 0.5%.)

Example:

If the concentration of the sodium hypochlorite solution is 0.5%, or 0.5gm/100ml, or 500mg/100ml, in 1ml of solution there are 5 mg.

In 2ml of solution, there are 10mg.

10mg/20 liters = 0.5mg/liter. If you get this measurement in the chlorine comparator after doing this procedure, the sodium hypochlorite solution is 0.5 gm/100ml or 0.5%.

For quality assurance of bleach production, a form should be used to monitor each production run of sodium hypochlorite. The following form is a sample:

Hypochlorite Production Record

Date	Operator	Time machine turned on	Time machine turned off	Salt (kg)	Water (liters)	Sodium hypochlorite concentration	pH	No. of bottles filled	Comments

ANNEX D: WORKSHEET FOR ASSESSING POSSIBLE HOUSEHOLD WATER STORAGE VESSELS

CHARACTERISTICS				
Volume: standard, 10-30 L, marked				
Design				
Material				
Inlet with screw-on lid;no access to dip with hands or cup				
Faucet or narrow mouth to pour water				
Access to inside for cleaning				
Device for measuring disinfectant				
Instructions for use, disinfection and cleaning affixed				
Certification of MOH				
Cost				
Other comments				
Performance in field trials				
Overall assessment				

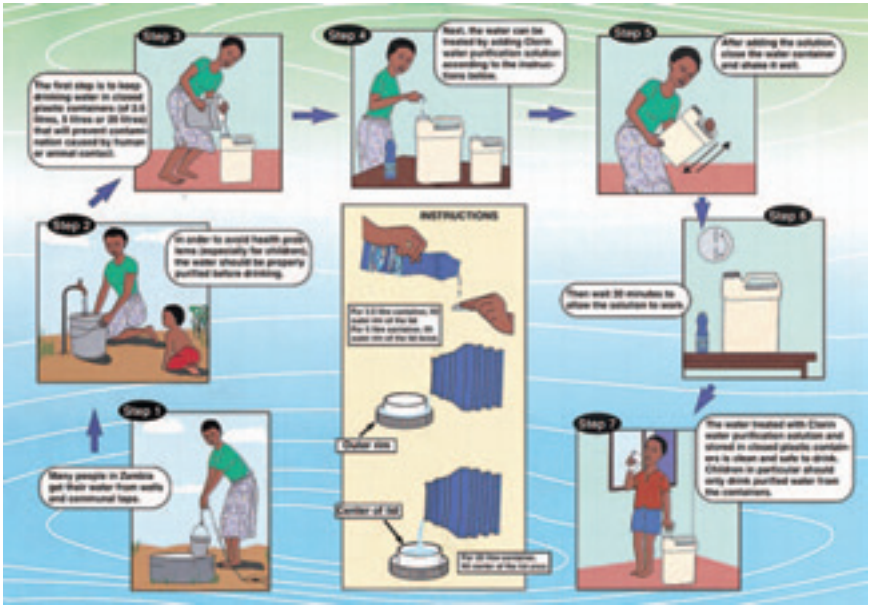
WORKSHEET FOR ASSESSING POSSIBLE DISTRIBUTION METHODS

Possible Distribution Methods	Project cost	Demand creation	Product recognition	Effectiveness of distribution	Accessibility of product for consumers	Product price	Control over product price	Potential for sustainability

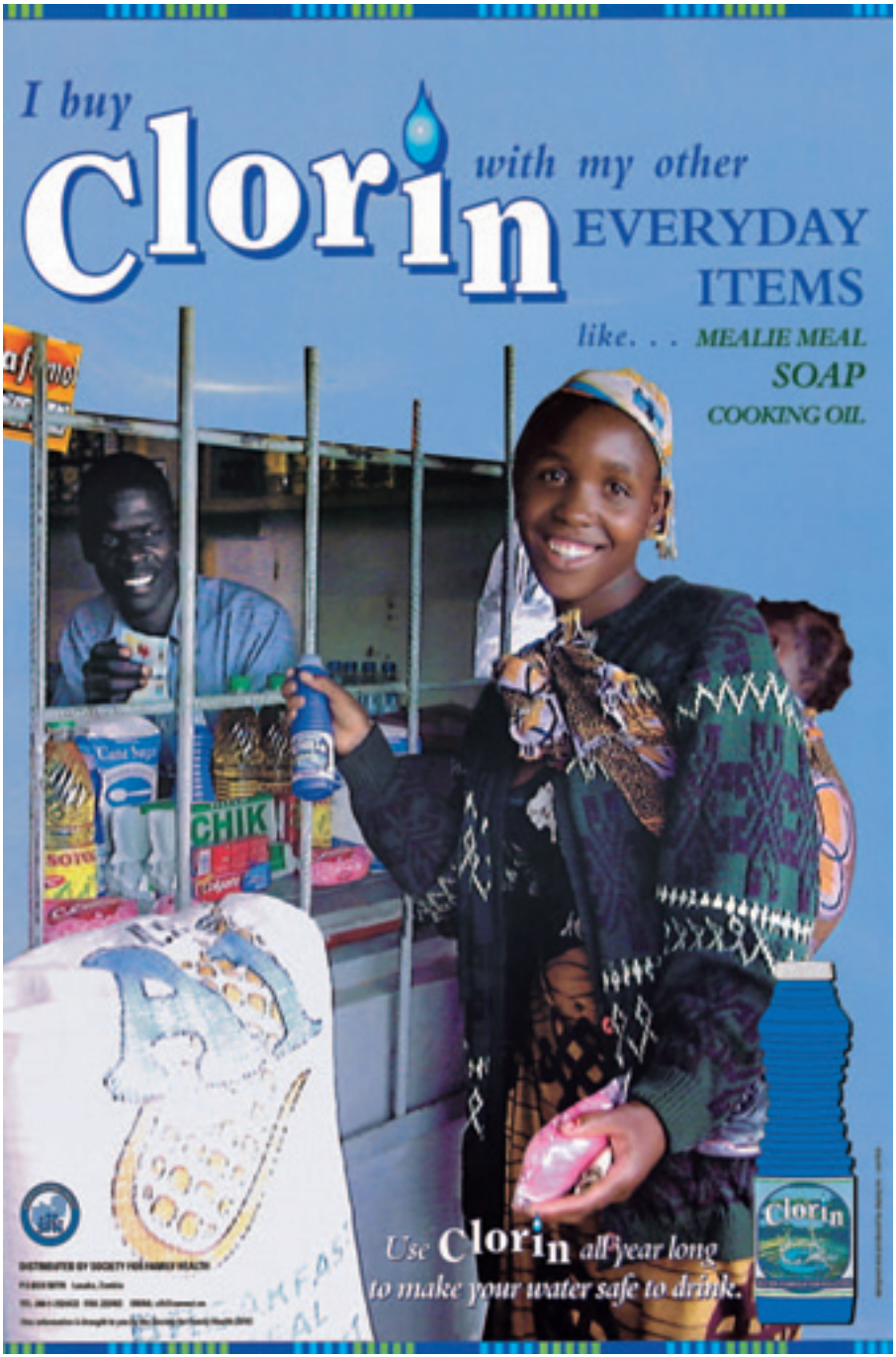
ANNEX E: EXAMPLES OF EDUCATIONAL AND PROMOTIONAL MATERIALS

Brochure from Madagascar

Brochure from Ecuador



Poster from Zambia



Poster from Zambia

Poster from Zambia

ANNEX F: TRAINING IN MOTIVATIONAL INTERVIEWING

Motivational interviewing is described in section 7.0. In Zambia, volunteer community health promoters who were members of the local Neighborhood Health Committees were trained to use a communication approach based on the method known as motivational interviewing when interacting with community residents to promote the Safe Water System. Below is some further explanation of the method and training volunteers to implement it, based on experience in Zambia.

In sessions to train community volunteers to use motivational interviewing, the trainer describes the theoretical model of the stages of readiness to change and the methods of working with people at the different stages. Throughout the training, volunteers are encouraged to provide examples of their experiences as health promoters working in the community. The trainer then weaves these examples into the discussion, exercises, and practice to illustrate the theory and application of motivational interviewing.

The trainer describes the essential elements of effective brief interventions and discusses examples provided by the volunteers. The Miller and Rollnick books[25, 33] on motivational interviewing use the acronym FRAMES to describe these elements (Feedback, Responsibility, Advice, Menu, Empathy, and Self Efficacy):

- **Feedback** involves non-judgemental sharing of local data on diarrhea rates, incidence of cholera, and water quality within the residents' own community. If needed, education on the causes of diarrhea and cholera can be delivered, within a motivational interviewing framework.
- **Responsibility** for change is emphasized to reside solely within the community resident.
- **Advice** is given but permission is requested beforehand. It is made clear that the views offered are solely the personal ones of the volunteer. The resident is free to weigh how the offered suggestions fit within his or her own values and ideas, and to accept or reject the advice.
- A **menu** of options for dealing with the problem is also beneficial.
- An **empathic** style is critical throughout the entire interchange.
- **Self efficacy,** or self confidence in achieving change, is supported whenever possible. If someone does not believe change is feasible, her or she is not likely to even begin to try. It is very important to support any thought, desire, or attempt at behavior change by expressing belief that change is achievable for that person.

The trainer describes the tools of motivational interviewing which the volunteers practice in training:

- use of open-ended questions
- affirmations
- reflective listening, and
- summarizing.

A good portion of the training focuses on developing the tools of summarizing and reflective listening. Reflective listening is the most difficult skill. Volunteers need a lot of practice to develop this skill and some volunteers develop the skill better than others. (A useful strategy in the field is to use a buddy system whereby volunteers with stronger skills are paired up with ones with weaker skills.)

The trainer also introduces principles of motivational interviewing:

- expressing empathy
- developing discrepancy
- avoiding argumentation
- rolling with resistance
- supporting self efficacy.

Since the principles are closely related to the elements and tools, they serve as a reminder as well as to unify the ideas.

Another important concept is eliciting change statements from residents. The trainer teaches this along with summarizing so the volunteers learn what to reinforce from what is said during an interaction. Most volunteers can understand this concept, though implementing it in the field is more difficult.

Throughout the training, the trainer emphasizes the style and spirit of motivational interviewing which involves an empathic, collaborative approach and avoids direct persuasion. If the timing and progress are right, the volunteer can offer an invitation for the individual to consider the benefits of using the Safe Water System. Volunteers learn that by working through a resident's ambivalence, using motivational interviewing tools and style, and supporting and developing a person's ideas about change, it is quite possible that a resident will make a commitment to adopt the Safe Water System. Subsequent interventions with the resident can then focus on maintaining the behavior change.

At the end of the training, the expectation is that the volunteers have understood the main ideas and have begun to master implementation

of some of them, so that they can be more effective than they would be if delivering health education in the traditional didactic, authoritarian way. However, they still need further field supervision and guidance by the trainer.

In two Zambia studies, the rates of use of the Safe Water System were significantly higher in communities using a motivational interviewing approach when compared to communities using standard health education[13] or to those using social marketing and health education.[27] These higher rates have been sustained over time.

More work is needed to develop training specifically for motivational interviewing used in public health interventions in developing countries. Further adaptation of motivational interviewing, and other brief negotiation methods based on motivational interviewing, is expected. Training in motivational interviewing approaches must be provided by individuals previously trained and experienced in the method.

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ANNEX G: FORMATIVE RESEARCH

Formative research is the basis for an effective strategy for behavior change. Collecting background data for a safe water system project is described in section 1.0. Additional formative research is described in section 7.1.

This annex summarizes some major points about formative research and provides some example focus group discussion guides:

- Sample focus group discussion questions about water treatment and storage (used by CARE Kenya Nyanza Healthy Water Project)
- Sample focus group discussion guide for brand name, logo, and slogan development (used by CARE Kenya Nyanza Healthy Water Project)

ABOUT FORMATIVE RESEARCH

Plan of Formative Research

- Identify risk practices
- Select practices for intervention
- Select target populations (e.g., mothers of young children, school age students, opinion leaders)
- Determine most effective and relevant messages for target populations (e.g., for mothers—"good mothers provide safe water for kids"; for students—"help kill microbes that cause illness.")
- Determine channels of communication (e.g., radio messages, street theatre, discussions in schools, health centers, markets)
- Design and field test communication and other behavior change strategies and materials

Formative Research Methods

Site study

Topic: characterize each sector of town/region
Information sources: meet with leaders, women's groups, health personnel

Focus groups

Topics: water sources, causes of diarrhea, diarrhea treatment and prevention, health priorities of community, hygienic

practices/excreta disposal, child feeding, access to health education, animals in compound

Information sources: Women's groups, opinion leaders, educators, health personnel (traditional vs. modern), community organization

Evaluation of health status

Information sources: Epidemiologic data – local government, health centers/posts, special studies of causes of diarrhea, case control/cohort studies

Structured observation

Topics: water sources, water treatment practices, water storage practices, human waste disposal

Information sources: Households

Structured interviews

Topics: water handling, hygienic practices, methods of communication

Information sources: Health workers, mothers

Knowledge, attitudes, practices, beliefs (KAPB) study

Quantitative study of KAPB re: water handling, diarrhea prevention, communication sources

Information sources: Households

HINTS:

Cross check data for consistency.

Need political commitment at all levels for project to work.

Formative research team should include outsiders trained in public health, social sciences, and insiders who know community.

Sample Focus Group Discussion Questions (Used by CARE Kenya Nyanza Healthy Water Project)

1. Introductions and statement of purpose of the meeting
   Name, occupation, education level, marital status, family size

2. What are your main service needs in your village?
   What are the major health problems in your village?

3. What do you understand by safe drinking water?
   What do you think makes water unsafe for drinking? (at source and at home)
   What can you do to make the water safe?

Once boiling is mentioned

4. How many of you boil drinking water?
   What fuel do you use?
   How long do you take to collect the fuel?
   How much does the fuel cost you if bought?
   How long do you take to light the fire?
   How long does the water take to boil?
   How long does the water take to cool?
   On average how much water do you boil per day?
   What do you like about boiling?
   What do you dislike about boiling?

If chemicals are mentioned

5. How did you hear about these chemicals?
   Which chemicals are these?
   How are they used?
   Have you ever tried them?
   What do you like about chemical treatment of drinking water?
   What do you dislike about chemical treatment of drinking water?

6. What are the qualities of a safe water storage vessel?

Show clay pot (20 liters estimated volume)

7. How many of you use clay pots to store drinking water?
   Can water in clay pots be contaminated?
   How?
   How do you clean the clay pots?
   After how long?
   How much does it cost?
   How long does it last?
   What do you like about storing drinking water in a clay pot?
   What do you dislike about storing drinking water in a clay pot?

Show common plastic container

8. How many of you use this to store drinking water?
   Can water in this container be contaminated?
   How?
   How do you clean this container?
   How much does it cost?
   How long does it last?
   What do you like about storing water in this container?
   What do you dislike about storing water in this container?

Show specialized container

9. What do you think about this container?
   What special features does it have? (Different from the other two)
   Can water in this container be contaminated?
   How?
   How would you clean this container?
   How much do you think it might cost?
   How can you make water cool in such a container?
   What do you like / dislike about storing water in this container?
   Are you willing to buy such a container if it is in the market?
   What is the maximum amount of money you can pay for the container if you were to buy it?

Comparison of the three containers

10. Out of these 3 containers, which one do you prefer for water storage and why?

Decision-making

11. Who decides on which water storage container to buy for the household?
    Why is he/she the one who makes the decision?
    Who decides on the general household expenditure?

EXPECTED DURATION OF INTERVIEW: 1 HOUR 30 MINUTES

Sample Focus Group Discussion Guide for Brand Name, Logo, and Slogan Development (Used by CARE Kenya Nyanza Healthy Water Project)

1. Introduction of respondents and moderator
   Purpose of discussion.

2. If a safe chemical for water treatment was available to you and supposing you were to buy, where would you expect to buy it?
   Why?
   How much would you pay for it at the most if you were to buy the chemical to last you one month?
   Where do you expect the chemical to have been produced? (Local, Nairobi or Imported)

3. **Brand Name**
   Read out suggested names.
   What do you think about that name?
   What do you associate the name with?
   Does it arouse negative feelings or positive feelings?
   Why?
   Pronounce it.
   Which one do you prefer for a safe water treatment chemical? (No.1, 2, & 3)
   Why?

4. **Logo**
   Show different logo drawings
   What do you think is the meaning of this symbol?
   What do you associate with it?
   Does it arouse negative feelings or positive feelings to you?
   Why?
   Which one do you prefer for a safe water storage chemical? (No. 1, 2, & 3)
   Why?

5. **Slogan**
   Read different slogans
   What do you understand by the following statement?
   Does it remind you of any good or bad thing?
   Which is that?
   Which one do you recommend for a safe water treatment chemical? (No. 1, 2, & 3)
   Why?

6. **Colour**
   Which colour do you associate with clean drinking water?

   Show different colours
   Which of these colours do you associate with clean water?
   Which one would you prefer for a safe water treatment chemical?

7. **Unsealed & sealed bottles**
   Which of these two capping systems do you prefer for a safe water treatment chemical?
   Why?

ANNEX H: POTENTIAL CHANNELS OF COMMUNICATION

Interpersonal Channels

Interpersonal channels include community meetings, door to door visits, health worker/client interactions, interactions between shopkeepers or other sales agents and their customers, teacher/student interactions and any other direct communication through project staff or peers.

The advantages of interpersonal channels compared with other channels include:

- ease of approach for smaller projects
- potential to use locally appropriate terms
- allows selective targeting of specific groups
- high impact in communities
- effectiveness in rural areas where there is greater community cohesiveness and potential for sharing information by word of mouth
- message delivery is interactive with the potential for discussion and clarification of messages
- potential for incorporating novel approaches like motivational interviewing
- increased efficiency when well-traveled, well-connected persons in the society are the communicators

Disadvantages of interpersonal channels compared with other channels include:

- low coverage and low rate of message repetition per person
- relatively high costs per person reached
- if special staff added for a promotional campaign, coverage of a target population requires large numbers of staff for a short term campaign or long term staff inputs for a longer campaign; high salary, training and transport costs
- staff drop out
- less effective in urban areas and among other less cohesive communities.

Local Media

Local media can include drama, songs sung by traditional musicians, puppet shows, storytelling, or public announcements by religious leaders or other local leaders at community gatherings. Local media can be useful for raising awareness, generating interest and discussion, and may be effective in improving acceptance.

Advantages of local media include:

- communities can easily identify with the source of the information
- messages can be delivered using the most locally appropriate language and terminology
- messages delivered in an entertaining way may be better remembered

Potential disadvantages of local media channels are:

- relatively low audience exposure to messages or repetition of messages, because dramas or performances may only happen occasionally
- messages may be missed if people focus on the entertainment or if the messages are difficult to understand

Mass Media

Mass media include radio, television, video, films and cassettes. These channels can increase awareness and interest, and convey messages in a dramatic and meaningful way. Access to mass media is increasing rapidly in developing countries and radio ownership is high, particularly in urban centers.

Advantages of mass media include:

- wide coverage
- low cost per person reached
- messages can be focused on a target audience by attaching them to mass media programs that reach the target audience. Soap operas on radio and television are especially good channels for conveying messages because they are ongoing and provide the opportunity to convey more complicated messages and repeat them frequently.
- are effective to motivate individuals to purchase and use products by associating them with a desired lifestyle

Disadvantages of mass media include:

- Not everyone has access to mass media (less access in rural areas, poorer people).
- Preparing radio and television spots can be expensive, though donors or government sponsored stations may give free airtime.
- Message delivery is not interactive.

- Areas and people reached by broadcasts may not correspond with areas targeted for the project.

Printed Materials

Printed materials include posters, labels on vessels or disinfectant containers, sales brochures, leaflets, newspapers and newsletters. They encourage people to take action, convey information quickly and reach many people.

Advantages of printed materials include:

- Labels, brochures, leaflets are a useful channel for providing instructions. Even if people cannot read, they generally have access to someone who can explain instructions to them. Labels have the advantage of always being available when a product is used.
- Newsletters can be useful to update health workers or sales outlets about information such as changes in product availability, progress of the project, and answers to frequently-asked questions.

Disadvantages of printed materials include:

- Printed materials may not reach people who need them. Posters must be placed where many people will see them. Leaflets must be distributed carefully to reach many people. Printed materials must be re-supplied to clinics, sales outlets, and other distributors such as neighborhood health committees.
- Some cultures are not used to receiving information in written form. Some languages and dialects do not have a written form. Some people are not literate.
- Some terms may not be understood. Pictures may be misinterpreted. (These disadvantages can be overcome with pre-testing and by combining print materials with face to face interactions in which terms, pictures and messages can be explained.)
- Unless printed materials are well designed and tested, they may not convey the intended messages to the audience.

ANNEX I: EXAMPLE TRAINING CURRICULUM FROM ZAMBIA

CLORIN HOME WATER CHLORINATION GUIDELINES FOR TRAINING CURRICULUM

FOR CLINIC STAFF, NEIGHBORHOOD SALES AGENTS, RETAILERS, DRAMA GROUPS

HALF DAY TRAINING

8AM: Opening and Introduction (30-45 minutes)

- Welcome participants to the Clorin Home Water Chlorination Workshop
- Explain that the workshop will continue until about noon with a break for tea
- Introduce yourself and explain that we will begin with introductions. Ask participants to give their name, where they are from, and what they expect to learn from this workshop. Write responses on the flipchart about what they expect to learn so that you can come back to it at the end.
- Start with yourself. Introduce yourself and explain whom you work for.

Explain to participants what is SFH.

- SFH is a Zambian non-government organization dedicated to improving the health of Zambians by marketing essential health products to the public and by educating Zambians about important health concerns. SFH works in the areas of AIDS prevention, family planning, and child health. For AIDS prevention, we sell Maximum condoms and Lovers Plus condoms. For family planning we sell Safeplan oral contraceptive pills and Prolact vaginal foaming tablets. For child health we sell POWERCHEM mosquito nets and retreatment kits for malaria prevention, and Clorin home water chlorination solution for water borne disease prevention. If they have questions about products other than Clorin, they can ask at the end of the training.

Next explain about the Clorin Home Water Chlorination Solution project.

- The objective of the Clorin home water chlorination project is to reduce the cases of diarrhea and cholera in Zambia. Clorin is a chlorine solution that is used to disinfect home drinking water. It

kills most bacteria in water that cause disease, including cholera.

- The product has been developed largely through the support of the Centers for Disease Control in the United States. The Clorin project started in Zambia in September 1998 in 5 pilot sites in Lusaka and Kitwe. It was expanded to cover Lusaka, Kitwe, and Ndola in 1999, and now in 2000 it is expanding nationwide.

- To date, more than 350,000 bottles of Clorin have been sold. There has been tremendous demand for Clorin, especially in the rainy season when cases of diarrhea increase, and when there are outbreaks of cholera. Clorin has the support of the Central Board of Health, and is often mentioned as a way to prevent cholera. In fact, because of this, Clorin has been widely associated with cholera prevention. SFH in our communications efforts would like to emphasize that Clorin should be used to disinfect your water all year round, not just in the cholera season. This is because diarrhea is a serious problem among children in Zambia, and diarrheal diseases occur throughout the year. Far more children die of diarrhea each year than cholera, which makes it even more important that people treat their water to prevent diarrhea, especially among children.

Next explain the objectives of today's Clorin training program. During the course of today's training, we will cover the following topics (write on a flipchart):

- Review the important facts about diarrhea and cholera – transmission, symptoms, and consequences.
- Understand what Clorin is and how to use Clorin.
- Learn the essential messages to discuss with people in the communities about Clorin.
- Practice communication skills/selling techniques.

Ask the class if they have any questions.

8:30AM: DIARRHEA AND CHOLERA – THE PROBLEM (30 MIN)

Diarrhea Transmission

Objective: Review transmission and signs and symptoms of diarrhea and cholera.

Tell the group that you are going to read a story about diarrhea, and then discuss it afterwards:

STORY: The clinic director from _____ (name a local clinic) has just admitted a seriously ill child to the clinic. Mrs. _____ has just brought her 3 year old daughter Grace to the clinic at 10pm because she had had diarrhea for the previous 4 days, and was very weak. The doctor examined Grace and found that she was very dehydrated, and had a severe case of diarrhea. He gave her some medicine, and admitted her for further observation. Two days later, Grace was feeling better and playing. Mr and Mrs. _____ were very relieved, and thanked the clinic doctor. The doctor gave Mr. And Mrs. _____ some advice on how Grace and the whole family could prevent themselves from getting diarrhea and other water borne diseases.

After reading the story, discuss these questions and write all answers on the flipchart:

1. How do you think Grace got diarrhea?
   Answers to look for:
   - *Diarrhea can be caused by drinking contaminated water, eating contaminated food, or from contaminated hands going into the mouth, or indirectly from not washing hands before eating, after going to the toilet.*
   - *Cholera is a bacteria that is most often transmitted by contaminated water.*

2. What signs and symptoms can a person get from diarrhea and cholera?
   Diarrhea – can result in weakness, dehydration
   Cholera – severe diarrhea, dehydration

3. What could have happened if the parents had delayed more in taking Grace to the clinic?
   She might have died

4. If the child has a mild case of diarrhea, what is the proper treatment?
   Oral rehydration solution. If the child doesn't recover in 2 days, take the child to the clinic. If people say Clorin is the proper treatment, explain to them that Clorin is for treatment of water to prevent diarrhoea and not a treatment for diarrhoea.
   If the child has severe diarrhea, take the child immediately to the clinic. Give lots of fluids (treated water)

5. How do you think the parents could have prevented Grace from getting diarrhea?
   Make sure that the home drinking water is treated with Clorin to disinfect it.
   Use a closed container with a lid to store drinking water.
   Make sure that Grace washes her hands before eating and after going to the toilet.
   Prevent food from getting contaminated by the cook washing her/his hands before preparing food, and by covering leftover food.

6. What is the best way to prevent Cholera?
   Cholera is most commonly transmitted by contaminated water, so disinfecting your water is the best way to prevent cholera.
   Disinfect your water with Clorin, or boil your water.
   Use a closed container with a lid to store drinking water.
   Good sanitation – use toilets/latrines, keep environment clean.
   When people die of cholera, it is because of the severe dehydration from the diarrhea that is caused by the cholera bacteria. A person with severe diarrhea should be taken to the clinic immediately, and also given plenty of fluids (disinfected water).

7. If Grace got diarrhea from drinking contaminated water, what are the ways that the water could have gotten contaminated?
   From the pipe, in the well (at the source)
   By a dirty water container
   By a person scooping water out with an unclean cup or putting an unclean hand in the water

At the end of the discussion, you should summarize what the participants have said, and add any information that was not mentioned. Ask questions of the group that will get them to say the correct answers.

9AM CLORIN – THE SOLUTION (1 HR)

The Clorin Home Water Chlorination Product

Objective: Participants understand the benefits of Clorin and how to use Clorin.

Explain to the group that this component of the training is to help them understand what is Clorin. Hold up the product. Explain that Clorin is a chlorine solution. Chlorine is a chemical that will kill most bacteria in

water that cause disease and diarrhea, including cholera. Treating drinking water with Clorin is one of the best ways to prevent diarrhea and cholera.

The Clorin is sold for 500 kwacha per bottle. One bottle on average is enough for a family of 6 people for one month. The clinics and retail outlets buy Clorin for K350 kwacha. The K150 difference is for sales commission for the clinic sales agents, and trade margin for the retail outlets (use flip chart to explain if necessary). These prices are subsidized which means that SFH does not make a profit on them. The program is funded by donors, and Clorin is sold at a low price so that we can reduce the diarrhea and cholera cases in Zambia and improve people's health.

Next explain that before you demonstrate how to dose Clorin, you will tell them about how to properly store drinking water. As discussed earlier, water can be contaminated in several ways. One of the most common ways that water can be contaminated is by storing water in an open bucket where people put their hands into the bucket to scoop water out. A person's hands can easily contaminate water, even if it is already treated. So you must store your water in a closed container with a lid. Pour the water out instead of scooping it out.

Once you have filled your closed, narrow mouth container with water, you put Clorin into the container according to the directions. Only a small amount of Clorin is needed to disinfect your drinking water. Can someone tell me from the brochure, how much Clorin do I put into a 20L container?

- *Fill inside ring of the lid with Clorin and pour into container.*

That is correct. You fill the inside ring of the lid once with Clorin and then pour it into the container with the water. Then you close the container and shake it. Then you must wait for 30 minutes for the Clorin to kill all the germs before you can drink it.

Can anyone tell me how much Clorin do I put into a 2.5L container? A 5L container?

- *Fill outside rim of lid once with Clorin.*
- *Fill outside rim of lid twice with Clorin.*

In order for them to understand how to use the product better, let's conduct the following exercise:

Split the group in to 3 groups by having them count off 1-2-3.

Explain to the three groups that this is the situation: Someone from their neighborhood has just bought this Clorin. They need your help in figuring out what it is and how to use it. Give each group a Clorin bottle and one container (different size to each group) and ask them to read the instructions and put the correct amount of Clorin into the container.

After they have agreed how much to put into the container, switch the containers until they have tried all three.

Then ask one member of each group to come to the front and correctly dose one container each. Ask the rest of the group if they are dosing it correctly.

Ask the group if they have any questions.

Then explain what will happen if they put too much Clorin in the water.

If someone puts too much Clorin in the water, no harm will result to anybody. The only result of putting too much Clorin in the water is that you will smell the Clorin, or the water will taste like chlorine. So if anyone ever complains that the taste or the smell changes after they put Clorin in the water, what do you tell them?

That they have probably overdosed their water. Explain to them how to correctly dose it.

Some people ask if you can put Clorin in a well to disinfect the whole well

No, this does not work. Do not pour Clorin down a well.

10 AM REVIEW OF CONTENT (30 min)

Objective: Review of the content to this point and clarification of any content that is not clear.

Give everyone a slip of paper, or instruct them to find the blank piece of paper that is in their folder. Instruct them to write on the paper one thing they have learned and one question that they have.

Collect the papers, and read them to the class. Ask members of the class to answer the questions for the rest of the class and answer any yourself that others cannot answer.

Ask if there is anything else that is unclear, and break for tea**.**

TEA: 10am – 10:15am

10:15AM – COMMUNICATION – SELLING Clorin (1 Hr)

Objective: What and how to communicate the benefits and correct use of Clorin

Divide the group into 2-3 groups of three or four by counting off 1-2-3-4 (not more than three groups if possible). Tell them they are to develop a short skit that shows what are the most important points to tell a person when they are selling Clorin to a person. (*If the group is for retailers they should pretend they are going to sell Clorin to a customer. If the group is a drama, they are pretending they are educating the group about diarrhea, and trying to convince them to go to buy Clorin).*

Tell them that the skit should include what they think are the most important things that they should tell the customer, such as asking them if they know how you get diarrhea or cholera, and how to properly dose water to prevent diarrhea. Tell them to come up with the other important points that they need to tell the customer. The person playing the community member or customer is skeptical. This person must think of all the reasons possible, why they would not want to use Clorin (i.e. price, never treated water, my water is clean etc)

After the groups have finished, discuss the main points that they want to talk to the customer about. Ask them to tell you the points, and you write them on the flipchart.

The main points should be as follows – if any are missing after they finish telling you what they have thought of, then you should ask them questions so that they say what is missing:

1) Did they ask (not tell): How do you get diarrhea/cholera? *(Discussion of how diarrhea/cholera can be transmitted through contaminated water and get rid of any misconceptions)*

2) Did they ask (not tell): Do you know how you can prevent diarrhea/cholera? *(Discussion of disinfecting water with Clorin, storing water in a closed container, washing hands before eating, cooking, and after using toilet, covering food etc)*

3) Explain the product – what is Clorin, what does it do, and how do you use it properly *(i.e. Clorin is a solution that kills all germs in water that can cause diarrhea and cholera. Inner ring once for 20L container etc, shake and let rest for 30 minutes before drinking)*

4) Explain how to store the water safely (*i.e. use a closed, narrow mouth container with a lid. Pour water out instead of scooping to avoid re-contamination)*

5) Explain that water treated with Clorin is safe for adults and children. The taste and smell of the water will not change if Clorin is used correctly.

6) Explain that you can find Clorin in pharmacies, clinics, drug stores, and supermarkets for only K500.

7) Address any barriers to purchase or use
   - Too expensive
     (it's cheaper in the long run than taking your child to the clinic for treatment. It can save your life by preventing cholera. It will save you time that you have to take off of work by taking your child to the clinic. It costs less than one glass of beer)
   - My water is safe because it looks clear and comes from the tap (*Even tap water can be contaminated. The germs are too small to see, so even if the water looks clear, it can be contaminated. The city does not treat the water all the time, and it can get re-contaminated in the pipes anyway)*
   - I have never treated my water. Why should I start now?
     (Has your child ever had diarrhea? It was probably from drinking contaminated water. Your water can have germs at any time. You should always treat your water.)
   - I only need to treat my water in the rainy season.
     (Your water can have germs that can cause diarrhea at any time of the year. Treat your water with Clorin all year round)

After the discussion, ask one group to perform their skit. Tell the rest of the class to watch for any of the main messages that were left out.

After the skit, ask the class to point out any messages that were left out.

11:15AM (If Neighborhood Health Committees or Clinics) GO OVER BOOK KEEPING FORMS (30 min)

11:45AM REVIEW OF EXPECTATIONS AND CONCLUSIONS (30 min)

Objective: Make sure the expectations and objectives of the course have been met.

Let's review the essential messages about Clorin. What are some of the essential messages that you would want to tell a customer or community member about Clorin?

- Clorin will help prevent diarrhea and cholera in your family.
- Clorin will kill bacteria (germs) in your water that causes diarrhea, including cholera.
- Clorin should be dosed according to the instructions. Inner ring for 20L container, etc.
- Store your water in a closed container with a lid to avoid re-contamination.
- Even tap water or water that looks clear can have germs. All drinking water must be treated with Clorin.
- Diarrhea can be a problem all year round. Treat your water all year round, not just in the rainy season.
- Clorin can be found in clinics, pharmacies, drug stores, and supermarkets for just K500.
- Clorin is a prevention against diarrhea, NOT a treatment for diarrhea. Diarrhea is treated with oral rehydration solution.

Refer to the original expectations and objectives.
Check them off to make sure they have been met.

Ask participants if there is anything that is unclear.

Ask the participants what they thought of the training and if they have suggestions for improvement or things they would like to know that were not covered.

Congratulate the participants and tell them that they should go out and actively try to educate people in their communities about diarrhea and cholera, and teach them to use Clorin to treat their water all year round.

Thank the participants. Give out certificates.