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BEST PRACTICES IN SOCIAL MARKETING SAFE WATER SOLUTION FOR HOUSEHOLD WATER TREATMENT:

LESSONS LEARNED FROM POPULATION SERVICES INTERNATIONAL FIELD PROGRAMS



March 2007

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Social Marketing Plus for Diarrheal Disease Control: Point-of-use Water Disinfection and Zinc Treatment (POUZN) is a five-year task order, under USAID's Private Sector Program (PSP) indefinite quantity contract. POUZN works globally to introduce and scale-up **low-cost point-of-use (POU) water treatment products and zinc**, a new effective treatment for diarrhea, for the reduction of child morbidity and mortality from diarrhea.

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DISCLAIMER

The authors' views expressed in this publication do not necessarily reflect the views of the United States Agency for International Development (USAID) or the United States Government

ABSTRACT

Since 1998, Population Services International, with the funding and support of the U.S. Agency for International Development and other donors, has been involved in the implementation of safe water programs in 20 developing countries, promoting the Safe Water System (SWS), a household water treatment and safe storage strategy originally designed by the U.S. Centers for Disease Control and Prevention in response to cholera outbreaks in Latin America. SWS includes three elements: (1) water treatment at point-of-use with a dilute sodium hypochlorite (chlorine) “safe water” solution; (2) storage of water in a safe container, and (3) education to improve hygiene and water use practices.

This paper synthesizes lessons learned, best practices, successes, and challenges of social marketing safe water solution, and discusses how these lessons may be applied to planning safe water treatment programs around the globe.

Key words: household water treatment, household water quality, diarrhea prevention, safe drinking water, point-of-use water treatment

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ACRONYMS

ARV	Anti-retroviral (therapy) for HIV/AIDS
BCC	Behavior change communication
CBD	Community-based distribution
CDC	U.S. Centers for Disease Control and Prevention
COGS	Cost of goods sold
GAP	Global AIDS Program
HIV/AIDS	Human immunodeficiency virus/acquired immunodeficiency syndrome
HWTS	Household water treatment and safe storage
KfW	Kreditanstalt für Wiederaufbau (German government–owned development bank)
KSH	Kenya shilling
MDG	United Nations Millennium Development Goals
MOH	Ministry of Health
MOW	Ministry of Water
NGO	Nongovernmental organization
NTU	Nephelometric turbidity units
OFDA	Office of Foreign Disaster Assistance (USAID)
PAHO	Pan American Health Organization
PEPFAR	United States President’s Emergency Plan for AIDS Relief
PLWHA	Persons living with HIV/AIDS
PMTCT	Prevention of mother-to-child transmission
POU	Point-of-use
POUZN	Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment Project
PSI	Population Services International
PUR®	Procter & Gamble product for clarifying and disinfecting turbid water
SWS	Safe Water System
UNICEF	United Nations Children’s Fund
USAID	United States Agency for International Development
WHO	World Health Organization

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PSI field staff interviewed: Carmen Chan (India), Nils Gade (Tanzania and Zambia), Brad Lucas (Zambia and Tanzania), David McAfee (Madagascar), Guy Stallworthy (Myanmar), Chelsea Treadwell (Malawi), and David Walker (Kenya).

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EXECUTIVE SUMMARY

The health consequences of inadequate water supply, sanitation, and hygiene are an estimated 4 billion cases of diarrhea, epidemics of waterborne infectious diseases such as cholera, and 1.8 million deaths each year, mostly among young children in developing countries, highlighting the need for effective public health strategies to prevent diarrhea.

As part of its global leadership mandate, the U.S. Agency for International Development (USAID)'s Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) Project, implemented by Abt Associates and Population Services International (PSI), led this effort to gather lessons learned from PSI's eight years of field experience implementing safe water programs in 20 countries.

In the 1990s, the U.S. Centers for Disease Control and Prevention (CDC), based on a series of field trials and published documentation, developed a household water treatment and safe storage strategy, the Safe Water System (SWS), that includes three elements: (1) water treatment at point-of-use (POU) with a dilute sodium hypochlorite (chlorine) solution; (2) storage of water in a safe container, and (3) education to improve hygiene and water use practices. This household water treatment program is rapid to implement, low-cost, and can be carried out on a national or regional scale. Household water treatment programs are also complementary to infrastructure development projects that improve the supply of water but cannot guarantee safe water quality at the household level.

PSI, one of the largest social marketing organizations in the world, was involved with the design and testing of the first SWS trials and has since implemented safe water programs in 20 developing countries. This paper synthesizes lessons learned, best practices, successes, and challenges of safe water solution social marketing programs and discusses how these lessons may be applied to planning safe water treatment programs around the globe. Summarized below are the main lessons from PSI's experience social marketing the safe water system:

Project Design: Three factors are critical to initiating a safe water system project: (1) identifying appropriate target group(s) with high incidence of waterborne diseases, yet sufficient resources to regularly purchase the product; (2) establishing a stable funding base to ensure program sustainability; and (3) recruiting and assembling the human resource expertise needed to develop and support a safe water program.

- Lesson 1.1: The target group must meet the dual criteria of health needs and private sector viability
- Lesson 1.2: A long-term funding strategy should be developed
- Lesson 1.3: A range of technical expertise is needed

Production of Safe Water Product Components: Key factors to ensure a high-quality product include locating, arranging for, and monitoring local production by companies with the required specialized technical knowledge; establishing stringent, ongoing quality control at program outset; setting appropriate expiration dates for the product; and correctly determining the chlorine dosage. Standardizing the product packaging into a 150 mL plastic bottle with a 3 mL cap, with the sodium hypochlorite concentration modified to meet the dosage needs in each country, has led to a more easily produced, transported, usable, and affordable product.

- Lesson 2.1: Arranging local production is not easy but is ultimately critical to sustainability and cost-effectiveness
- Lesson 2.2: Ongoing quality monitoring is essential
- Lesson 2.3: Product shelf life is important to market acceptance
- Lesson 2.4: Correct chlorine dosage is the key to product viability
- Lesson 2.5: Standardization of plastic containers simplifies program implementation and reduces program costs
- Lesson 2.6: Packaging must be appropriate for rural transportation and distribution

The Regulatory Environment: The approval of all relevant government ministries is an essential step in securing product registration, ensuring the product's long-term sustainability in-country, and maintaining collaboration with other government programs. Program staff must be prepared to respond to technical questions about the product in a timely and technically sound manner.

- Lesson 3.1: Involve all relevant government agencies early in the process
- Lesson 3.2: Respond immediately to government concerns
- Lesson 3.3: Prepare program staff to respond to technical questions about the product

Marketing and Communications: Marketing and communications efforts are critical for helping people understand the relationship between untreated water and diarrhea, the importance of treating household water, and the need for sustained, consistent product use. The associated behavior change challenge is significant, requiring time, a sustained investment, and a range of approaches. Identifying the appropriate target group(s) and channels of communication in peri-urban and rural areas is critical to this effort. Safe water program campaigns need to be aspirational in nature and complement other diarrheal disease prevention and treatment campaigns.

- Lesson 4.1: Shifting the focus of product launch to rural communities with unsafe water and sanitation has been very effective in enhancing product prestige

- Lesson 4.2: Communications must address specific safe water program behavioral constructs
- Lesson 4.3: The branded marketing campaign should be positive and aspirational
- Lesson 4.4: Safe water campaign messages need to be complementary to related campaigns
- Lesson 4.5: Timing of a safe water product launch affects success
- Lesson 4.6: Choosing the most appropriate communication channels is highly context-specific
- Lesson 4.7: Targeted technical information can address concerns about dangers of chlorine use
- Lesson 4.8: Behavior change for safe water use is a long process, requiring sustained funding
- Lesson 4.9: Marketing templates (such as labels) can be developed and adapted to local requirements

Sales and Distribution: The commercial sector in most developing countries provides an efficient vehicle for large-scale distribution of essential household items to the urban and peri-urban markets where women purchase most household goods. However, ensuring that the product reaches the retailer is not enough. A consistent “push” – through point-of-sale materials that call attention to the product – is needed to keep the product in the forefront of retailer displays and consumer minds. Partner non-governmental organization (NGO) volunteer or community-based distribution networks can assist with promotion and distribution and significantly improve rural penetration. Successful programs can encourage commercial firms to enter the market with their own brands.

- Lesson 5.1: While the commercial sector will distribute the safe water product, program success requires a complementary “push” from the project
- Lesson 5.2: Capitalizing on NGO networks can significantly improve rural penetration
- Lesson 5.3: Entry of a socially marketed safe water product can encourage commercial sector participation

Creating Partnerships: The cultivation of partnerships has not only strengthened political support for safe water programs but has also increased product sales among target populations.

- Lesson 6.1: Partnerships are vital to the successful adoption of the safe water program at all levels
- Lesson 6.2: Donor advocacy and support can make a considerable contribution to the success of safe water programs

- Lesson 6.3: With appropriate coordination and training, NGO programs can offer a wealth of opportunities for reaching rural and high-risk populations
- Lesson 6.4: Trusted spokespersons and product champions are fundamental to product adoption

Product Costs, Pricing, and Cost Recovery: It is a careful balancing act to set an affordable consumer price that recovers production costs, minimizes subsidies, and yet provides key target populations access to the product.

- Lesson 7.1: Product cost may be recovered through sales
- Lesson 7.2: In most countries, product subsidies are not necessary

Integrating Safe Water into HIV/AIDS Programming: The provision of safe drinking water is critical in support for persons living with HIV/AIDS (PLWHA) since they are particularly susceptible to opportunistic infections and diarrhea. Partnering with NGOs that provide care to PLWHA has been a successful model for reaching this target group.

- Lesson 8.1: Partnering with local NGOs that provide care for persons living with HIV/AIDS has been a successful model for reaching PLWHA
- Lesson 8.2: Interest in reaching PLWHA can provide the stimulus for a national safe water campaign

Household-level point-of-use water treatment has been shown to significantly reduce diarrheal diseases in vulnerable populations and should become an essential intervention within child survival, HIV/AIDS, and water supply programs. While challenges remain, such as ensuring consistent product use and program financial sustainability, the key elements in implementing household water treatment programs using safe water solution are now quite well understood. These and other evidence-based POU water treatment programs should be scaled up and expanded throughout the developing world, filling a critical public health gap in drinking water quality.

INTRODUCTION

In September 2000, the United Nations General Assembly adopted Millennium Development Goals (MDG) to promote “human development as the key to sustaining social and economic progress.” One MDG target is to “halve, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation.” Even if that goal is met, more than 600 million people will still lack access to safe water in 2015. Moreover, although the MDG target specifically calls for the provision of “safe” drinking water, the yardstick for assessing progress toward that target is provision of water from “improved” sources, such as boreholes or household connections. Because post-source contamination is so prevalent, it is difficult to assess whether water is actually safe at the household level even for people who currently obtain drinking water from improved sources.

The health consequences of inadequate water supply, sanitation, and hygiene are an estimated 4 billion cases of diarrhea, epidemics of waterborne infectious diseases such as cholera, and 1.8 million deaths each year, mostly among young children in developing countries, highlighting the need for effective public health strategies that can keep water safe and prevent diarrhea.

HOUSEHOLD WATER TREATMENT AND POINT-OF-USE CHLORINATION

Since 1996, a large body of published work has examined the health impact of interventions to improve water quality at the point-of-use (POU) through household water treatment and safe storage (HWTS). The results of these studies, including several randomized controlled intervention trials, have highlighted the public health implications of post-source contamination of drinking water during collection, transport, and storage and the health value of effective HWTS. A recent meta-analysis found that hygiene education and water quality interventions were effective in reducing diarrheal disease by 42 and 39 percent, respectively.¹

In 2003, as the evidence base for the health benefits of various HWTS methods accumulated, academic and government institutions, nongovernmental organizations (NGOs), and private sector organizations that support or engage directly in research and implementation of novel HWTS approaches formed the International Network to Promote Household Water Treatment and Safe Storage, with a secretariat hosted by the World Health Organization (WHO) in Geneva, Switzerland. Its stated goal is “to contribute to a significant reduction in waterborne disease, especially among vulnerable populations, by promoting household water treatment and safe storage as a key component of water, sanitation and hygiene programmes.”

¹ Fewtrell L., Colford, J.M. Water, Sanitation, and Hygiene: Interventions and Diarrhoea, a Systematic Review and Meta-Analysis. Washington, DC: World Bank HNP Discussion Paper, July 2004.

The Network serves as a forum for professional collaboration and is an excellent resource for those interested in starting water treatment programs.²

The five common household water treatment options are chlorination, filtration (biosand and ceramic), solar disinfection, combined filtration/chlorination, and combined flocculation/chlorination.

Chlorination was first used for disinfection of public water supplies in the early 1900s, contributing to dramatic reductions in waterborne disease in cities in the developed world. Although small trials of point-of-use chlorination had been implemented, larger-scale trials began in the 1990s as part of the Pan American Health Organization and CDC's response to epidemic cholera in Latin America.

The Safe Water System (SWS) developed by the CDC includes three elements:

1. A water treatment *product* consisting of a dilute sodium hypochlorite (chlorine) solution, referred to throughout this document as the safe water solution or “the product;”
2. *Storage* of water in a safe container; and
3. *Education* to improve hygiene and water use practices.

In randomized controlled trials, use of the SWS has resulted in diarrheal disease risk reduction from 26 to 84 percent, with an approximate average reduction of 50 percent.³

PSI AND THE SAFE WATER SYSTEM PROGRAM

With offices in more than 60 countries, PSI is one of the world's largest social marketing NGOs. PSI designs a brand name and logo for health products and services, sells them at affordable prices, distributes them through wholesale and retail commercial and public sector networks, and generates demand for the products through behavior change campaigns (BCC) that make use of radio and television spots, mobile video units, point-of-sale materials, theatrical performances, and interpersonal communication. PSI's primary areas of focus are HIV/AIDS, malaria, family planning, and maternal and child health.

In 1996 and 1997, PSI was involved in the design and testing of the first safe water project with the CDC. The CDC developed and tested a prototype SWS pilot in Bolivia, and PSI fielded the first commercial application. Controlled trials confirmed that use of the SWS reduces the incidence of diarrhea under field conditions. In Bolivia, a five-month field test led to 44 percent fewer diarrhea episodes in intervention versus control households.⁴ PSI, with continuing

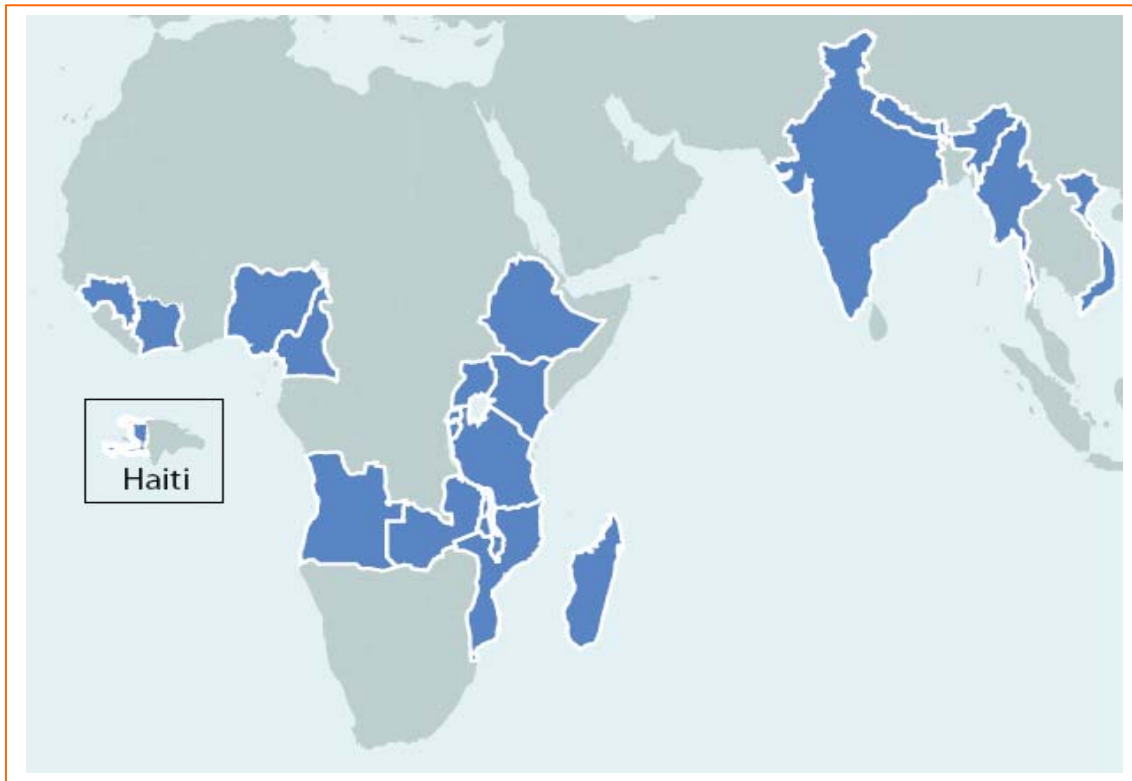
² The Network can be accessed at www.who.int/household_water/

³ Wright J., Gundry S., Conroy R. Household Drinking Water in Developing Countries: A Systematic Review of Microbiological Contamination between Source and Point-of-Use. *Tropical Medicine and International Health*, January 2004; 9(1):106-117.

⁴ Quick R. et al. Diarrhea Prevention in Bolivia through Point-of-Use Disinfection and Safe Storage: A Promising New Strategy. Atlanta: U.S. Centers for Disease Control and Prevention, 1999.

technical support from the CDC, has since applied the lessons learned from the Bolivia pilot program to expand the social marketing of the SWS throughout the developing world.⁵ (Figure 1, below, presents a map of current PSI safe water program countries.)

FIGURE 1: CURRENT PSI SAFE WATER PROGRAMS



PSI launched its first two large-scale safe water programs in Zambia and Madagascar in the midst of public health emergencies – a cholera epidemic in Zambia and a cholera epidemic followed by three consecutive cyclone emergencies in Madagascar. Both efforts have successfully developed into ongoing programs promoting a dilute chlorine solution for everyday use. In Zambia, sales steadily increased from 732 bottles of safe water solution per month in October 1998 to 155,000 bottles per month in June 2006.

To date, PSI has launched safe water programs in 20 countries, as detailed in the following table.

⁵ Initial PSI programs included the marketing of both the safe water solution and an accompanying water storage container. Due to high production and transport costs associated with marketing storage containers, this practice was discontinued. Promotion of appropriate storage and targeted behavior change communication campaigns remain essential elements of the program.

TABLE I: PSI SAFE WATER PROGRAM COUNTRIES IN ORDER OF LAUNCH DATE

Country	Date Launched	Funding sources	2005 Sales (bottles)	Cumulative Sales (bottles)
Zambia	November 1998	PEPFAR, CDC, USAID	1,835,088	9,531,959
Madagascar	March 2000	CDC, USAID	705,554	3,164,557
Tanzania	July 2002	PSI	140,466	811,297
Rwanda	August 2002	PSI, Government of Rwanda, USAID	66,293	323,394
Malawi	December 2002	PSI, USAID,	666,298	2,222,302
Kenya	May 2003	PSI, USAID	832,106	2,088,670
Afghanistan	June 2003	USAID, CDC	367,501	535,580
Burkina Faso	February 2004	PSI	1,505	21,850
India	April 2004	USAID	95,498	211,987
Myanmar	July 2004	UNICEF, WHO, PSI	92,193	169,852
Uzbekistan	July 2004	PSI	9,890	16,320
Mozambique	November 2004	PSI, USAID, Government of the Netherlands	207,517	374,820
Nigeria	November 2004	PSI, USAID	495,554	959,793
Uganda	August 2005	CDC, PEPFAR, PSI	95,543	383,129
Nepal	October 2005	PSI	152,661	249,881
Vietnam	November 2005	PSI	26,712	93,772
Ethiopia	December 2005	USAID	N/A	429,163
Burundi	March 2006	USAID	N/A	34,244
Guinea	July 2006	KfW	N/A	N/A
Cameroon	November 2006	CDC	N/A	N/A

Source: PSI. PEPFAR=President's Emergency Plan for AIDS Relief; KfW=Kreditanstalt für Wiederaufbau

Seventeen of the programs are ongoing. Two, Uzbekistan and Burkina Faso, have been discontinued due to lack of funding; Afghanistan has been transferred to another project.

As part of its global leadership mandate, USAID's Social Marketing Plus for Diarrheal Disease Control: Point-of-Use Water Disinfection and Zinc Treatment (POUZN) Project, implemented by Abt Associates and PSI, led this effort to gather lessons learned from PSI's eight years of field experience implementing safe water programs in 20 countries. This paper synthesizes lessons learned, best practices, successes, and challenges of safe water programs worldwide and discusses how these lessons may be applied to planning POU safe water treatment programs around the globe.

METHODOLOGY

This paper is based on a review of secondary research and other technical reports produced by PSI and CDC and summarizes interviews with PSI and CDC staff. Appendix A includes the interview guide while Appendix C includes a full list of references and individuals interviewed.

Based on the information gathered, the paper presents lessons learned in the following categories:

- Project Design
- Product Development
- Policy/Regulatory Environment
- Marketing and Behavior Change Campaigns
- Sales and Distribution
- Partnerships and Linkages
- Product Costs, Pricing, and Cost Recovery
- HIV/AIDS and the Safe Water Programs

A final section presents a summary of recommendations and conclusions.

SECTION I: PROJECT DESIGN

Three factors are critical to initiating a safe water solution social marketing project: (1) identifying the target group(s); (2) establishing a stable funding base with which to launch and support the project; and (3) recruiting and assembling the human resources needed to develop and support the project's launch.

LESSON 1.1: THE TARGET GROUP MUST MEET THE DUAL CRITERIA OF HEALTH NEEDS AND PRIVATE SECTOR VIABILITY

While the primary target group for use of chlorinated water is children under five years of age, one question addressed by social marketing programs at their outset is how to define the focus of program activities. Program planners must consider a range of criteria including: Does the area in question have a high incidence of diarrheal disease? What are the donors' priorities? Are target families part of the cash economy? Do they have sufficient income and available cash to regularly purchase the product? Is there an established distribution chain?

LESSON 1.2: A LONG-TERM FUNDING STRATEGY SHOULD BE DEVELOPED

Even though the safe water program has benefited from existing PSI programs in many countries, to significantly reduce overhead costs, a safe water project still needs consistent funding to launch the product, develop a marketing campaign, and implement a sustained BCC program.

PSI countries have used a wide variety of resources to launch and support safe water projects. The most stable safe water projects enjoy long-term, consistent funding. In both Zambia and Madagascar, USAID funding for safe water projects has been provided through long-term social marketing awards, with water as one project component. These projects have been able to grow steadily, undergo evaluation, and improve over time.

Based on the successes in Zambia and Madagascar, numerous PSI country programs have used PSI's internal corporate funds to launch a safe water product with the expectation that, once the program established a track record, a donor would provide continued funding. This strategy has had mixed success. In Kenya, a PSI-funded launch resulted in a cost-recoverable product that is achieving increased market penetration and is now supported by several donors. In Malawi, however, a PSI-funded launch faced difficulties in sustaining itself. While the initial product subsidy was relatively low, increasing sales and local currency devaluation led to rising costs and

"Funds were definitely limited. While there are other challenges that affected product acceptability, additional advertising and promotion funding would have mitigated their effect somewhat. We did not have sufficient weight on mass media and therefore did not build brand credibility as quickly as we could have had we had additional funds." *PSI/Kenya*

inconsistent production. Nevertheless, the product has remained on the market for four years. Malawi obtained substantial long-term funding from USAID in 2006, which will allow for new advertising, and increased community outreach to strengthen the program. Uzbekistan and Burkina Faso are the only two PSI safe water programs that have been discontinued. In both cases, seed funding provided by PSI to initiate the programs did not attract additional donor support. In Uzbekistan, funding constraints were compounded by the difficulty of creating demand for a POU product in a country where the government previously provided piped, treated, chlorinated water. As a result, PSI programs have become more strategic and more cautious about launching water treatment products with short-term funding.

For all PSI programs, the goal has been to create a sufficiently viable market for the socially marketed health products such that donor funding is no longer needed to subsidize product costs and, in some cases, marketing costs over the long term. Achievement of such a goal, however, takes time and is greatly expedited by stable funding, well-considered product subsidy levels, and attention to each country's water and epidemiological situation. At start-up in Zambia, the average cost for the production, marketing, and distribution of a single bottle of Clorin was \$1.88. This decreased by 82 percent to \$0.33 in 2003, when over 1.7 million bottles were sold.⁶ The Zambia example is representative of most of the more mature PSI safe water programs, which have shown a decrease over the years in cost per bottle, demonstrating that strategic investments can lead to cost-effective diarrheal disease reduction programs. PSI support for new safe water programs is now typically contingent upon the availability of sufficient, multiple-year external funding to launch a high-quality program with strong communication and promotion components.

LESSON 1.3: A RANGE OF TECHNICAL EXPERTISE IS NEEDED

The launch of a safe water program requires technical expertise in several areas; some of that expertise may be transferred directly from other programs in-country, and some may demand the development of new skills. The ability to draw on the technical and marketing assistance of PSI/Washington, the CDC in Atlanta, and other PSI water programs, as well as on local staff capacity has been critical to the successful implementation of new programs.

On the technical side, the CDC has provided short-term technical assistance for product development, quality control, and dosage testing of local water. Technical information, available at www.cdc.gov/safewater, detailing the technical steps for starting a safe water project, have provided new participant countries with information on the launch process. On the marketing side, resource sharing between and among PSI programs has been critical to exchanging ideas about how to make and market the product.

Local staff knowledge and experience is also very important. For example, Ethiopia's Water Coordinator used to be a manager on the Coca-Cola assembly line. His skills in production and marketing have proven invaluable to the success of the country's safe water program. In Nepal,

⁶ Banarjee A., McFarland D.A., Singh R., Quick R. Cost and Financial Sustainability of a Household-Based Water Treatment and Storage Intervention in Zambia. *Water and Health* (in press).

the PSI team that launched the safe water product had extensive business contacts in India and Nepal, allowing easy access to Nepal's plastic mold makers and the manufacturing sector, thereby simplifying project initiation.

In many countries, conflicting demands on staff time can slow the launch of a new product. A team dedicated to the sole task of initiating a safe water program is often the key to the successful development and launch of the product as well as to overall successful safe water program implementation. In parallel, resources in the form of short-term technical assistance, local production capacity, and experienced program staff play a critical role in program implementation.

SECTION 2: PRODUCTION OF PRODUCT COMPONENTS

The safe water product consists of four parts: (1) the bottle; (2) the cap; (3) the chlorine solution; and (4) the label. Through development of the product in various developing country contexts, PSI has revised its initial approaches to product launch in order to overcome a variety of complications and ensure the production of a high-quality, reliable, local product.

Production of the safe water solution marked the first time that PSI manufactured a health product. Many of the early safe water programs (such as in Zambia and Madagascar) were originally “garage” operations, with PSI producing bottles of solution in its office compound. Given that PSI had never manufactured anything, this role led to complications, delays, and occasionally errors in the production. As a result, all programs initiated after 2002 adopted a local manufacturing model that involves either local or regional companies. Even with manufacturing outsourced, PSI still had to take several resource- and time-intensive steps in order to develop its safe water programs, including: product development, sourcing of raw material suppliers, product registration, product testing, and quality control systems.

“SWS turned us into a manufacturer, which was a whole new ballgame for PSI and we confronted a new set of challenges that we had never confronted before.” *PSI/Madagascar*

“The one stellar lesson here was that it is far better to find a manufacturer and get them going with a developed protocol and a contract.” *PSI/Zambia*

LESSON 2.1: ARRANGING LOCAL PRODUCTION IS NOT EASY BUT IS ULTIMATELY CRITICAL TO SUSTAINABILITY AND COST-EFFECTIVENESS

In the process of establishing safe water programs throughout the developing world, PSI found the task of arranging local production to be difficult and time-consuming in the early stages of program implementation but, in the end, essential for program sustainability.

The essential elements to be taken into account for local production include:

- The need for specialized technical knowledge when selecting an appropriate local manufacturing company;
- Production capacity limitations; and
- Ongoing need for internal and external quality control.

The process of identifying and locating in-country companies capable of producing the necessary product components - the plastic bottle, cap, and chlorine solution - requires specialized technical knowledge. Initially, PSI simply identified potential manufacturers by determining which companies produced bleach in-country and then approaching them. However, not all countries produce bleach, and, in many cases, bleach producers marketing a product for cleaning purposes are not interested in producing a product with a specific chlorine solution concentration which requires more stringent quality control. As a result, PSI learned that it often needs to cast a wider net for companies that bottle water, process chemicals, manufacture pharmaceuticals, and/or produce cleaning products in order to find manufacturers qualified to make high-quality products for safe water systems.

Knowledge of the technical specifications of what is required from each company is critical. Necessary characteristics include:

- **Bottle:** A plastics company with blow-molding capabilities
- **Solution:** A source of distilled or de-ionized water and chlorine for making the solution. These may end up being sourced from two different companies to get the required quality.
- **Process:** Manual filling capacity

Even with a comprehensive grasp of the technical specifications, program staff can still have difficulty in determining a company's true capacity from the information provided by the manufacturer. It is critical to make site visits to prospective manufacturers before awarding a production contract to assess the quality of the company and its technical capacity. In Cameroon, site visits revealed that most of the initial tender respondents lacked production capacity. In Nigeria, PSI was referred to several companies that did not exist. In Tanzania, a re-bid contract was awarded to a new company with the lowest bid, but it soon became clear that the new company lacked the capacity to make the product. PSI then had to wait until the company defaulted before re-awarding the contract to the original company, which had earned a reputation for high-quality manufacturing.



Safe water solution manufacturing set-up in Malawi

Chlorine solution can be generated in four ways, listed here from most to least desirable in terms of ease of maintaining quality control: injection of chlorine gas solution into a stream of clean water, dilution of concentrated liquid solution with clean water, dilution of concentrated powder with clean water, and small-batch production by

using an electrolytic generator, water, and salt. All have their benefits, drawbacks, and appropriate applications.

Many countries lack the technical capacity to inject chlorine gas solution into a stream of clean water, although program countries with advanced manufacturing sectors – Kenya, India, Nigeria, and Tanzania – use this method. Any company with 1,000-liter tanks and the capacity to import chlorine in liquid or powder form can use the second method, generating the solution by dilution of concentrated liquid or powder. Programs bordering countries with a large manufacturing sector tend to import the concentrated liquid chlorine solution (made by the chlorine gas injection method) from their neighbors (Mozambique and Malawi from South Africa, Nepal from India). More remote countries tend to dilute the more concentrated, lighter, and more easily transported powder (Madagascar and Burundi). Countries with little importation capacity, such as Afghanistan and Myanmar, use the electrolytic generators, which make small batches of low-concentration solution.

In Madagascar, the manufacture of the product initially took place at a plastics company. The company imported electrolytic generators from the United States and installed them in one area of the plant, relying on staff to fill bottles manually. The generators, however, could produce only 200 liters of solution in 24 hours and could not keep pace with demand during the cholera epidemic. PSI re-bid the production contract, and selected a company with the capacity to fill bottles and make de-ionized water; as a result, the production method shifted to dilution of concentrated powder, allowing for greater production capacity.

The benefits of local production include:

- Greater likelihood for ongoing project sustainability;
- Consistent supply;
- Job creation (in both production and distribution chains) and support of the local economy;
- Political capital; and
- Lower risk of stock-outs due to import delays.

However, it is important to consider changing production practices as demand increases. In many countries, large high-quality companies are not interested in product manufacture during a product's early years because of lack of return on investment on small volumes. In Zambia, PSI was unable to identify a local producer at product inception in 1999 and was forced to make the solution itself. In 2005, with sales approaching 2 million bottles a year, PSI found that the production process had become onerous and initiated a search for a company to assume production. Five large high-quality companies submitted full formal bids, and PSI awarded the contract to a pharmaceutical production facility at a lower cost per bottle than that of PSI-managed production.

LESSON 2.2: ONGOING QUALITY MONITORING IS ESSENTIAL

The chlorine solution in the water treatment product needs to be within the specified range to both disinfect the water and be safe to consume. In Malawi, a country with low production

capacity, a small chemical company initially produced the chlorine solution at the specified concentration, but it failed to establish ongoing quality control procedures. Random testing after two years of production found significant variation in chlorine concentration between batches. Upon visiting the factory, PSI realized that production standards had slipped and that technicians were no longer testing each batch of incoming concentrated chlorine solution or the diluted product. To rectify the situation, PSI/Malawi took the following steps:

- Insisted that the factory owner place a manager on the floor to supervise staff throughout the production cycle;
- Developed a quality control form for submission to PSI for approval before authorization of payment for each batch; and
- Invested in a test kit to be used by PSI/Malawi staff to verify the correct concentration of each batch.

With the implementation of these measures, the company corrected the concentration, and PSI/Malawi continued to contract with the manufacturer to produce the solution.

The Malawi experience highlights the need to ensure stringent, ongoing quality control from a project's outset. Currently, quality control procedures and requirements are established by PSI using CDC guidelines prior to the start of production in each country, and each production company, an independent laboratory, and, in some cases, PSI undertake regular product testing. The production/quality requirements should be included in the contractual agreement between program management and the manufacturer.

LESSON 2.3: PRODUCT SHELF LIFE IS IMPORTANT TO MARKET ACCEPTANCE

Early country programs set very conservative expiry dates for the chlorine solution. (See box). Eventually, laboratory results confirmed 12 months as an appropriate expiry date under the temperature and storage conditions in countries where PSI markets the product. As a result, new programs can now launch their products with a 12-month expiry date, which has made the product much more attractive to distributors and retailers and reduced the high rate of product returns and financial losses.

"Every (initial) country developed a careful approach, starting with a three-month shelf life, and then six months, and then nine months. During the time there was a three or six months' shelf life, we had huge returns on the trade. *PSI/Tanzania*

LESSON 2.4: CORRECT CHLORINE DOSAGE IS THE KEY TO PRODUCT VIABILITY

Correct dosage of the product needs to fall within the WHO guidelines for chlorine residual for disinfection while also being acceptable to consumers who may object to the chlorine taste and smell. The variables that determine the sodium hypochlorite dosage are the concentration

of the sodium hypochlorite solution (in percent), the size of the cap (in milliliters), the size of the storage container (in liters); and the quality of source water to be treated. Currently the chlorine solution is packaged in a bottle with directions instructing users to add one full bottle cap of the solution to clear water (or two caps to turbid water) in a standard (generally 20 liter) storage container, agitate, and wait 30 minutes before drinking.

Initial dosing options were linked to the size of plastic bottles and caps already available in a country. The result was widely varying products. As a result, CDC developed a consistent methodology to determine correct dosage for safe water products that is now applied in all countries starting new programs or changing product design. The methodology involves:

- Determining the water sources used by the local population for drinking;
- Collecting samples of water from these sources;
- Adding specified doses of chlorine; and
- Measuring the chlorine residual over time to ensure that water remains safe for drinking for 24 hours after the addition of chlorine.



A rural woman collecting water from an all-too-common water source

When dosage testing was completed with the standard methodology described above, the results were remarkably consistent within and between countries. They indicated that over 90 percent of unchlorinated water from improved sources or from unimproved sources with turbidity of less than 10 NTU⁷ needed 1.875 mg/L of sodium hypochlorite, while over 90 percent of unimproved sources with turbidity greater than 10 NTU needed a double dose. These results enabled the development of a standard product that is dosed in accordance with a cap size, expressed in milliliters, and has a specified chlorine concentration depending on the size of the typical storage container. CDC has compiled these dosage testing results for PSI products in 13 countries and is submitting an article summarizing them to the peer-reviewed literature. These results have also been presented to U.S. government agencies for possible application in domestic emergencies including hurricanes and earthquakes.

Some examples of the use of dosage-testing results in PSI programs include:

- An illustrative dosage- testing report from a laboratory in another country was given to technicians at a local laboratory in Vietnam, which enabled them to successfully duplicate the required analyses.
- In Myanmar, results from the dosage testing were outside the reference range. Further

⁷ Turbidity is measured in units called nephelometric turbidity units (NTUs). An increase in turbidity in drinking water is associated with increased potential for gastrointestinal illness.

investigation revealed that the equipment used to measure small volumes of fluid was labeled incorrectly. The laboratory upgraded their equipment to resolve the problem.

- In Nepal, chlorine dosages were reduced in response to users' concerns about taste acceptability. Dosage testing allowed PSI to determine the lowest residual that still maintained efficacy for disinfection.
- Malawi increased the chlorine dosage because the poorly fired ceramic pots used as storage receptacles were porous and leached chlorine.
- In several countries, implementing local in-country dosage testing facilitated government approval of the product.



Local PSI staff assisting with dosage testing.

LESSON 2.5: STANDARDIZATION OF PLASTIC CONTAINERS SIMPLIFIES PROGRAM IMPLEMENTATION AND REDUCES PROGRAM COSTS

Initially, each country selected a bottle and cap size based on what packaging was already locally available, and then calculated the correct concentration of the solution based on the local container size and source water quality. The differences in packaging size and product concentration across countries complicated product development as PSI's overall safe water program matured. For example, a larger cap size requires a lower-concentration solution to achieve correct dosage in the local container. The required concentration affects the choice of chlorine solution manufacturing process. A lower concentration product has fewer doses per bottle, or the bottle size has to be increased in order to treat the same volume of water. The transportation costs for a lower concentration solution are increased relative to a more concentrated solution because there is a higher proportion of water being shipped.

"Our first Safewat product was a 250-milliliter bottle of 1 percent solution. We later switched to a 100-milliliter bottle of 2.5 percent solution. The new product is more cost-effective in terms of health impact achieved; the smaller bottle reduced the cost of the plastic bottles, the bottle molds, cost of transportation, and cost of storage at retail point." *PSI/India*

Given the desire to simplify product initiation in each country and in view of the consistent dosage results obtained by CDC from multiple countries, PSI, based both on technical and marketing inputs, has developed a standard product.

The new standard product consists of a 1.25% sodium hypochlorite solution packaged in a 150 mL bottle with a 3 mL cap. One bottle is sufficient to treat 50 20-liter containers (1,000 liters) of clear water with a dosing regimen of one cap per 20 liters (dosage of 1.875 mg Cl/L). The bottle lasts for approximately 50 days for a family of five to six persons, assuming daily household consumption of 20 liters of high-quality water for drinking, cooking, and some washing. The standard product is easy to use and transport, and the bottle is designed with space for a label.



WaterGuard poster advertisement in Kenya.

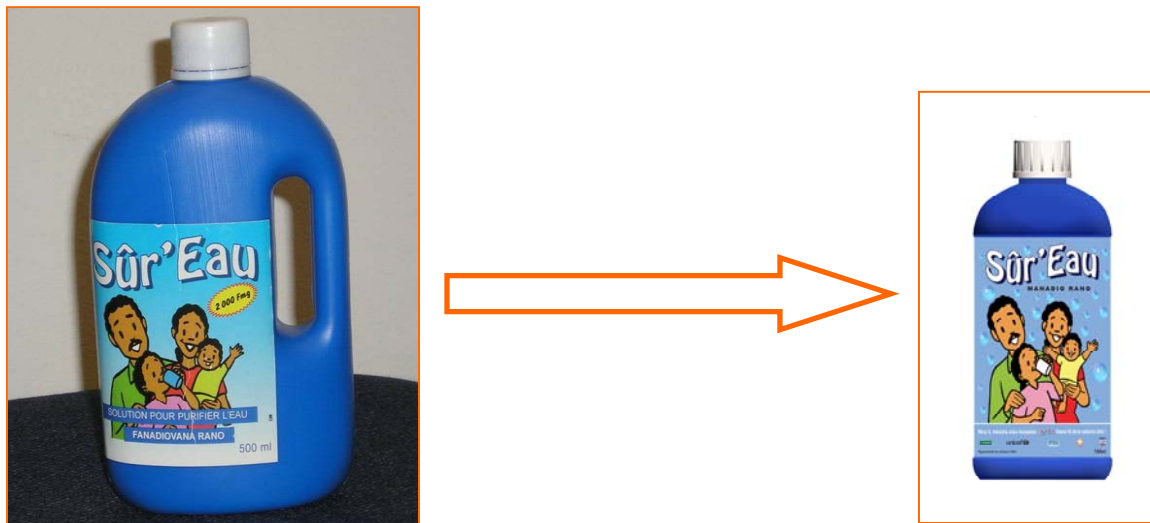
In Africa, to support the standard product, PSI invested in a specialized 3 mL-volume cap mold with a security ring. The caps are manufactured by BlowPlast, in Nairobi, Kenya, and imported to PSI programs around the continent. In addition, PSI programs import bottle molds made by AMM Engineering to produce the standard bottles at local plastics companies.

Eleven of the 17 currently operating PSI program countries are using the standard bottle. CDC still recommends dosage testing in each new country to confirm the specified concentration and related cap size; if a higher or lower dosage is needed, the sodium hypochlorite concentration is modified without any change to bottle and cap size. For example, to account for the chlorine leaching in ceramic pots used in Malawi, PSI increased the concentration

of the solution in the standardized product to 1.6 percent (one cap for clear water requires a dosage of 2.4 mg/L).

Two additional programs – Nigeria and Madagascar – use a bottle design similar to the design of the standard bottle but rely on locally available caps with a slightly different cap volume (2.5 and 4 mL, respectively) and a different sodium hypochlorite concentration to adjust the dosage. The Nigeria program chose its design in response to the capacity to manufacture the caps locally, eliminating the need to import them.

Standardization of the product has significantly reduced product costs, simplified project initiation, and facilitated the importation of product from neighboring countries during emergencies. Madagascar reduced product cost (per liter of water treated) by 55 percent by moving from a 500 mL bottle with an 8 mL cap and 0.4 percent solution to a 150 mL bottle with a 2.5 mL cap and 1.6 percent solution for the same price. In Kenya, the shift from a large to a small bottle allowed PSI to reduce the purchase price to the customer – from 35 KSH to 20 KSH per bottle, thus decreasing the cost per liter treated and increasing access to the product among people with limited disposable income.



Madagascar's original 500 mL bottle (left) and their new 150 mL bottle, containing the more concentrated chlorine solution.

LESSON 2.6: PACKAGING MUST BE APPROPRIATE FOR RURAL TRANSPORTATION AND DISTRIBUTION

The safe water product is targeted to people without access to chlorinated water, many of whom live in rural areas. Both the small box used for packaging bottles in Nepal, and the plastic-wrapped breakout packages of 12 bottles⁸ in Kenya allow easy transport of the product into remote areas. In contrast, the large box of 100 bottles used in Burundi is heavy and difficult to transport. Loose bottles are hard to transport as well.



The easy-to-carry PSI/Kenya bottles versus the large PSI/Burundi boxes

Although development of the standard cap has remedied many of the leakage issues, preventing leaks is still critical for a successful safe water program. One leaky bottle can ruin an entire box of product. Leakage can be prevented by ensuring that the cap fits the bottle correctly (as in the standard bottle) and is screwed on tightly at the time of packaging, and that the product is packaged with cardboard on the top and bottom of the product such that any impact does not break the caps. PSI regularly subjects the final package to physical pressure and trauma to test whether it will break in the transportation chain.



The Nepal branded box



PSI/Kenya packaging to prevent breakage (eight groups of 12 packaged in boxes, later shrink-wrapped)

⁸ Bottles are an important part of the distribution scheme. While there is potential for environmental impact if bottles are discarded indiscriminately, most containers of this nature are re-used.

SECTION 3: THE REGULATORY ENVIRONMENT

Experience has shown that understanding and engaging key players in the regulatory environment is critical to successfully launching the product, promoting it, and conveying key messages.

LESSON 3.1: INVOLVE ALL RELEVANT GOVERNMENT AGENCIES EARLY IN THE PROCESS

The approval of government ministries is an essential step in securing product registration, ensuring products' long-term sustainability in-country, and maintaining collaboration with government programs. Early on, and well before the product launch date, the implementing organization should undertake an assessment of the regulatory environment and meet with the appropriate ministries that govern product registration and approval.

With traditional PSI products such as bed nets or condoms, it is the Ministry of Health (MOH), perhaps in conjunction with a national coordinating committee of multisectoral partners, that typically controls the regulatory environment. Thus, MOH approval for such imported products is generally all that is required to begin product marketing. For a water treatment project, however, the regulatory environment can be more fragmented; at a minimum, the ministry dealing with drinking water supply and municipal water suppliers should be involved in the discussion along with the MOH. Registration of the product can also require the approval of production methods and the inspection of local companies by the Ministry of Industry, a Bureau of Standards, or a national drug authority.

Kenya's Bureau of Standards required its own evaluation of the sodium hypochlorite production company and made a site visit to the company before agreeing to product registration. In Nepal, a PSI staff member expedited the process as a result of her many years of working for the government. Uzbekistan's Minister of Health had attended a CDC-sponsored epidemiological training course in the United States and felt competent to approve a CDC-endorsed product.

Tanzania is the only country in which a government withdrew its approval for the product. In June 2002, the country launched the product, and sales increased by mid-December to 25,000 per month. However, in February 2003, the Ministry of Water (MOW) shut down the project, claiming that it was not the MOH's right to approve a water project. Even though both PSI and CDC/Atlanta had consulted the MOW before product launch, the Ministry still decided to suspend the project, saying that the product was lethal if not used properly. Moreover, the MOH then sent a letter to all staff instructing them not to use or promote the product. After making several product changes (including some Swahili word changes, a dosing change, the

addition of the MOW's name to the bottle, and the introduction of advertisements stressing the importance of the 30-minute wait time), PSI was allowed to relaunch the product. Not surprisingly, PSI found it hard to market the product when rumors about its toxicity became pervasive.

In 2004, PSI restocked the product after obtaining the approval of Tanzania's Bureau of Standards. That approval, plus intensive community education completed by October 2004 throughout Tanzania with each district medical officer and regional medical officer, helped the product recover its previous sales levels of about 20,000 to 25,000 bottles per month. The long recovery time involved in regaining consumer trust underscores the importance of obtaining early product approval from all relevant ministries, keeping those ministries informed about the implementation of the safe water program, and promoting project successes.

LESSON 3.2: RESPOND IMMEDIATELY TO GOVERNMENT CONCERNS

Timely and technically sound responses to concerns are critical as illustrated by an event in Kenya. In May 2005, PSI/Kenya received a letter from a mid-level Kenya Ministry of Water and Irrigation employee that included the following statements:

Recent tests . . . confirmed the very high residual levels of chlorine up to 2.5 mg/l in the sample of [WaterGuard treated] water. This residual chlorine levels [sic] could become lethal dose if consistently put to use particularly by children.

Note also that this Ministry disclaims any responsibility should any of this PSI products [sic] cause illness or even death.

Please take necessary actions accordingly and urgently inform the undersigned of what interventions are put in place to rectify the situation immediately.

PSI/Kenya immediately responded to the Ministry official, meeting with the Ministry the day after receiving the letter to obtain more information, and contacting the CDC and WHO to request a technical response to their concerns.

Upon receiving further information from the Ministry, including a demand to recall all WaterGuard products immediately, the PSI Country Representative worked with PSI/Washington and CDC to develop a response strategy, including telephone calls and meetings between the Country Representative and the official. PSI then presented the Ministry with technical information compiled by the CDC and WHO, including:

- A letter explaining the WaterGuard dosing regime and free chlorine residual standards;
- A report detailing the results of CDC water testing with WaterGuard using Kenyan water; and

- A WHO letter to the CDC, specifically requested for the response, stating that the safe water solution “*methods meet WHO recommendations as described in the Guidelines both in terms of efficacy and safety.*”

By coordinating a timely, respectful, technically accurate, and politically sensitive response, the PSI Country Director was able to negotiate a retraction of the initial letter and the demand for the product’s withdrawal from the market.

LESSON 3.3: PREPARE PROGRAM STAFF TO RESPOND TO TECHNICAL QUESTIONS ABOUT THE PRODUCT

It is important that the safe water program staff be able to correctly respond to technical questions about the product and know where to obtain written documentation if needed. In addition, staff must exercise good judgment in determining the appropriate level of response. It is not prudent to respond to a non-technical inquiry in the form of a journal article; on the other hand, a scientist or public health official may not appreciate a succinct, non-technical summary.

In Nigeria, government officials, potential project partners, and users consistently raised questions regarding product use and safety. To ensure the preparedness of the staff to respond to such questions, the Project Coordinator regularly quizzed staff members to ensure that they could answer questions appropriately. Program staff members’ ability to answer technical questions and their forthrightness in acknowledging the need to research an answer to a question and respond as soon as possible builds credibility, reassures officials and donors, and prevents consumer resistance to the product.

SECTION 4: MARKETING AND COMMUNICATIONS

Marketing and communications efforts are critical for helping people understand the relationship between untreated water and diarrhea, the importance of consistently treating household water, and the efficacy of water treatment products. The associated behavior change challenge is significant. PSI's experience indicates that successful behavior change requires time, a sustained investment, and a range of approaches.

The efficacy of marketing and communication efforts hinges on understanding barriers to product use, reliance on media channels that effectively reach the target population, positioning the product as “aspirational” (making people associate product use with a better lifestyle), and, in the case of the safe water product, addressing myths regarding water safety and the use of chlorine. Efforts to address these concerns increase the target population's opportunity, ability, and motivation to change behavior over the long term.

Identifying the appropriate target audience is critical to the success of a program. In general, mothers are responsible for water use in the home, and fathers are responsible for financial decisions; therefore, educational and promotional efforts associated with the safe water solution need to reach both mothers and fathers, although in some cultures other key people, including mothers-in-law or religious leaders, are also targeted with messages to influence adoption of these behaviors in the household and community.

LESSON 4.1: SHIFTING THE FOCUS OF PRODUCT LAUNCH TO RURAL COMMUNITIES WITH UNSAFE WATER AND SANITATION HAS BEEN VERY EFFECTIVE IN ENHANCING PRODUCT PRESTIGE

Many of the country programs found that, in the case of the safe water product, a traditional product/program launch – in a formal setting with highly placed government officials and television coverage – was not particularly useful if the objective was to reach out to low-income groups, especially mothers in peri-urban and rural communities, and to encourage their use of the safe water solution. Many programs (as in Mozambique and Zambia) therefore chose to shift the focus of the launch activities to rural areas, identifying communities with the worst water and sanitation statistics and developing a program of events that would take place in those areas. As a result, launch events brought senior government officials out to communities (thereby enhancing product prestige in the eyes of community members) and fostered involvement and ownership of the product launch activities at all levels of public and civil society. In Mozambique, four unique launch events took place as the program rolled out regionally. For each event, government, donor, and partner officials spoke while local community members participated in contests and song-and-dance shows. Segments of the

launches were aired on television, and follow-up radio question-and-answer contests allowed populations from other areas to learn about the new product.

LESSON 4.2: COMMUNICATIONS MUST ADDRESS SPECIFIC SAFE WATER PROGRAM BEHAVIORAL CONSTRUCTS

To many users, the concept of water treatment with chlorine to prevent diarrhea is new. Therefore, an evolutionary process is required if households are to adopt new behaviors leading to consistent treatment of the drinking water supply. The behavioral constructs used by PSI for safe water programs include:

- Understanding disease severity by recognizing that diarrhea is a serious and, for children, a deadly disease that is not “natural”;
- Understanding disease transmission by (1) recognizing that contaminated water brings disease and that even water from an improved source can be contaminated, (2) understanding that water that looks clean may be contaminated, and (3) knowing that diarrhea is a leading cause of death in children;
- Recognizing that the safe water solution is a safe and effective product, which, if used consistently, can prevent diarrhea;
- Promoting self-efficacy, i.e., the belief of the individual that he or she has the skills and ability to treat water effectively; and
- Adopting additional healthy behaviors by consistently practicing hand-washing and safe water storage to complement product use and support diarrheal disease prevention in the home.

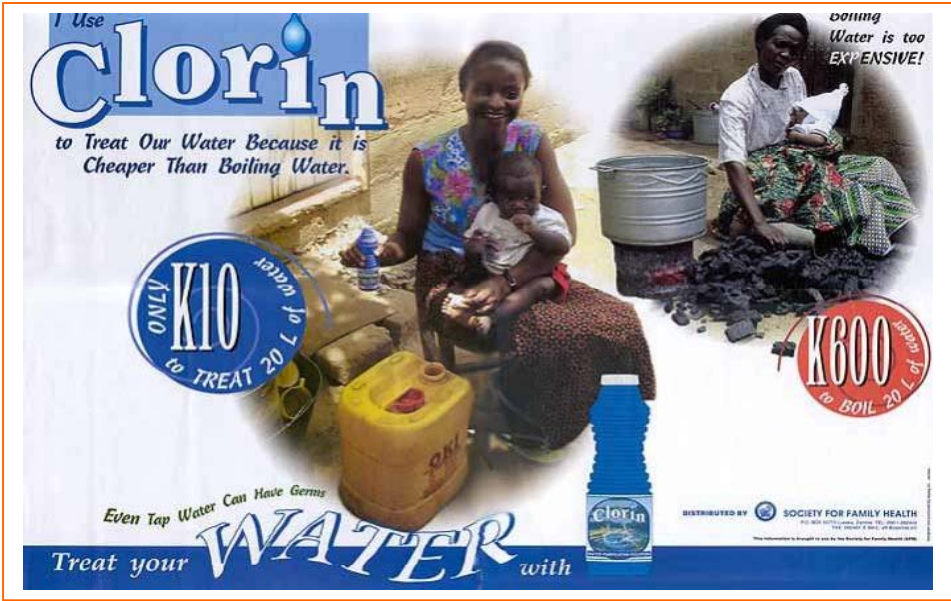
Before developing and rolling out messages, it is important to identify which, if any, of the above behavioral constructs poses a barrier to the target population’s acceptance of the product. For example, the target population in Madagascar did not understand the linkages between water, diarrhea, and health. Therefore, PSI developed a one-hour video shown in mobile video units in rural areas that describes the story of a woman who used safe water with her family, a woman who did not, and the differences in their respective families’ health.

Similarly, in India, an analysis of the project’s baseline survey results showed that most households agreed with the statement “water that looks clear is safe to drink.” To build demand for the product, Safewat, PSI/India conducted a multimedia campaign to communicate the following message: “*Water that looks clear can contain microbes that cause diarrhea. It is very difficult to tell. Be safe with Safewat. Safewat is a safe, easy and affordable method of purifying water and keeping your family safe from diarrheal diseases.*” The program’s follow-up research disclosed that the belief that water quality could be assessed by appearance dropped by over 20 percent while product use among respondents rose by 25 percent.

Conversely, in Kenya, where the baseline understanding of the risks of contaminated water was high, the safe water program focused on POU treatment as an effective, cost-efficient, and convenient method of improving water quality. Initial survey results indicated that consumers' perception of the benefits of safe water products included effectiveness, ease of use, and affordability.

Beyond the marketing and BCC challenges mentioned above, safe water program barriers have included (1) the preference in some target populations for boiling drinking water, (2) the perception of unpleasant taste or smell of chlorine in drinking water, and (3) the perception that chlorine treatment might endanger the health of the family, especially children. Methods for overcoming these barriers have included group discussions to explain why the safe water solution is the best method for household water treatment, testing apparently clean water to show the presence of microbes, product demonstrations followed by "taste testing" to prove that correctly dosed water has neither an off taste nor an odor, relying on MOH backing and MOH spokespersons to reassure consumers of the product's safety, and comparing the cost of purchasing wood for boiling⁹ with the cost of the safe water product (as illustrated in the following poster from Zambia).

Example of branded materials targeted to low- to middle-income mothers (Clorin wrap in Zambia)



⁹ Although boiling has long been promoted as a method of choice for purifying water, there are cost and environmental implications associated with this method. Recently the efficacy of boiling has also come into question given inconsistent boiling times, subsequent unsafe storage practices, and lack of residual chlorine to kill microbes that may be introduced during cooling, storage, and serving of the boiled water.

While understanding the severity of diarrheal disease and disease transmission is a crucial element in behavior change and use of the product, conveying this basic information is often best carried out through a generic campaign implemented in the name of the MOH. Generic messages explaining disease transmission and disease severity and urging families to treat their water and wash their hands support the need for the safe water solution. Generic communications can also focus on or be structured around cholera emergency communications, providing information about cholera prevention and the availability of the product.

LESSON 4.3: THE BRANDED MARKETING CAMPAIGN SHOULD BE POSITIVE AND ASPIRATIONAL

There is a risk that branded safe water campaigns that focus too heavily on the severity of disease can lead to an association and a consumer misconception that use of the product **causes** the very disease that it is intended to prevent (e.g., use of the safe water product results in cholera).

Branded campaigns need to be aspirational; that is, consumers need to be inspired by the images and messages they see and hear and then aspire to create the same images in their homes. To create the aspiration, branded campaigns need to focus on the positive attributes of using the safe water solution. To get across the notion that the product can help protect children's health, campaigns must convey images of happy, healthy families that successfully use the product. Product taglines in many countries include short, upbeat messages such as "Use WaterGuard, the only way to know your water is clean" (Zambia), "Safe water, happy families" (Mozambique), or "For the good health of your family" (Guinea).

LESSON 4.4: SAFE WATER CAMPAIGN MESSAGES NEED TO BE COMPLEMENTARY TO RELATED CAMPAIGNS

Before developing a water treatment campaign, program staff must be familiar with other campaigns focused on diarrheal disease prevention and treatment and coordinate the safe water program effort with those campaigns. For example, in Madagascar, parents did not make a connection between their children's bouts of diarrhea and their children's thin stature. Given Madagascar's ideal of a chubby child, PSI deliberately created an advertising campaign with chubby, healthy-looking children drinking safe water solution-treated water. At the same time, though, the campaign had to exercise caution in not undermining breastfeeding campaigns. To that end, the children portrayed drinking safe water in the promotional materials were recognizably older than six months of age, which is the end of the exclusive breastfeeding period promoted by the MOH. PSI's efforts were therefore complementary to rather than a distraction from existing health promotion efforts.

LESSON 4.5: TIMING OF A SAFE WATER PRODUCT LAUNCH AFFECTS SUCCESS

The timing of a product launch can affect consumer perceptions of the product as an essential household good versus a response to an emergency. Product launches and related communications that are timed to occur just before the rainy season – and during the inevitable cholera epidemics – place the product on the market just as consumers are beginning to grow concerned about water safety and diarrheal disease.

In Madagascar and Mozambique, PSI launched the product just before the rainy season, thereby leading to heightened consumer interest and an increased willingness on the part of merchants to stock the product. However, in both countries, PSI found itself rushing the product to a series of cholera outbreak locations, concentrating on assisting the MOH in controlling the epidemics rather than promoting the product or its consistent daily use. Similar to

launching mosquito nets before the rainy (and high mosquito biting) season, the product was linked with a particular season or emergency. As a result, consumers viewed the product as intended for cholera outbreaks only. Accordingly, the program then needed time to reposition the product as an essential household good for daily use. Nonetheless, the advantages to launching a safe water product at the critical time of the year for diarrheal diseases outweigh the potential drawback that consumers will associate the product with an emergency.

Even if the product is not launched in conjunction with an upcoming rainy season, perceived risk and consistency of use may vary seasonally. A recent population survey in Kenya indicated that, while 80 percent of users reported consistent use of the product, about one-third of the 20 percent of inconsistent users turned to the product only when their water source changed and another approximately one-third reported use of the product only during the rainy season.¹⁰ Additional barriers to consistent product use include an attempt to save money during non-high-risk periods, the belief that rain water and tap water are pure and do not need treatment, and the perceived “off” taste and smell of chlorinated water. Tackling these barriers requires time and sufficient funding for communication and research efforts.

“Because there was a cholera epidemic the previous year, people were nervous about the upcoming rainy season. The product was launched right before the rainy season: people were already aware of the risk levels, which influenced the positive reaction to the product. Although there was a high-quality marketing campaign, consumer awareness of risk probably created some positive influence.” *PSI/Malawi*

“[Consistent use] is a challenge. Although it’s desirable for people to treat their water regardless of the season, in a household that is struggling to make ends meet, they are more likely to spend money to treat their water during the rainy season instead of the dry season when the risk is lower. Under such circumstances, PSI might be better to use seasonal targeting.” *PSI/Tanzania*

“In Orissa, our approach was to demonstrate a cost-effective and sustainable distribution model for Safewat, by positioning Safewat to the trade as a seasonable product with attractive volumes, so that they will automatically start stocking Safewat before the rainy season.” *PSI/India*

¹⁰ Kenya: PSI Research Division. Tracking Results Continuously (TRaC) Survey, Preliminary Analysis. October, 2005.

LESSON 4.6: CHOOSING THE MOST APPROPRIATE COMMUNICATION CHANNELS IS HIGHLY CONTEXT-SPECIFIC

In general, mass media channels – including television, radio, print materials, and billboards – are most likely to reach urban and peri-urban populations with relatively higher socioeconomic status. Interpersonal communication activities – such as roadshows, community theater, question-and-answer contests, and small group demonstrations and discussions – provide more effective opportunities for low-literacy and illiterate outlying populations to gain vital health information. While most PSI programs incorporated a mix of both mass media and interpersonal communication activities, the appropriate mix depends on funding levels and other available resources (such as partner NGO activities), the given BCC goals, and the target group (urban versus rural).

In Afghanistan, men primarily learned about safe water through mass media channels such as television and radio. Women, however, generally learned about PSI's safe water products through friends, neighbors, and other person-to-person interactions. Given that men often control a family's finances and that women usually prepare the household's water, targeting both genders was critical for program success.
PSI/Afghanistan

In more developed settings, such as Tanzania and Kenya, reliance on mass media has capitalized on the reality that a significant share of the population has access to television and radio and is more likely to understand the messages conveyed by these formats. In less-developed or more rural countries such as Madagascar, Malawi, and Mozambique, the mass media may not have the same reach, and communities may need to receive in-depth information from a trusted source (such as a community activist or health worker) in order to grasp fully the benefits of using the safe water solution. An assessment of language barriers, literacy rates, and educational status can help determine the need for the use of the mass media versus interpersonal outreach in safe water product marketing campaigns.

"The commercial market isn't wasting their money on all these TV and radio advertisements, it does make a difference."
PSI/Tanzania

Most PSI programs found that television advertisements succeeded in promoting the product. Television advertising provides a visual aid by permitting demonstrations of product use. It is also able to reach a wide audience rapidly. The public often perceives products promoted on television as valuable and worthwhile. Television as a medium brings prestige to products. The drawbacks to television advertising are its expense and its inability to reach target populations in rural areas. As a result, poorly funded programs are likely to put their resources elsewhere. Radio is another successful mass media outlet. It often reaches an audience broader than the television audience (radio penetrates into more homes in more diverse locations), particularly target audiences residing in remote areas, and is considerably cheaper than television. Radio also permits broadcast in several languages without great additional cost.

"In Uttaranchal, health providers in the Saadhan franchised network were instrumental in promoting Safewat to their clients. Retailers played an important role in maintaining product availability and visibility in the slum areas, though community depots were more effective in increasing product access among the target group. In Orissa, the retail outlets played a major role in promoting Safewat. Both the models have worked. The community depot model is successful only when we have done intensive interpersonal communication in the community while in rural markets mass media is effective in reinforcing the retailers' product promotion efforts."
PSI/India

Billboards near market areas that stock the product are also useful for increasing product awareness.

Community theater and roadshows generate a particularly enthusiastic response in audiences with little or no exposure to television or other forms of live entertainment and often draw a large and attentive crowd. Alternatively, community outreach (by public health workers, PSI staff, or NGO volunteers) has proven highly useful.¹¹ Small group discussions provide a forum that permits community members to ask questions about the product, to practice treating water in the presence of a trainer, and to taste the treated water. In sparsely populated and rural areas, PSI has found schools and health facilities to be useful vehicles for spreading information throughout communities. In Tanzania, PSI found that schools are an effective channel for targeting children, and several PSI programs have worked with schools to provide educational materials on the safe water program. All PSI safe water country programs agree that a mix of mass media campaigns and interpersonal communications is necessary.

“Household visits were part of the community-based approach in Uttaranchal. Interpersonal communication was carried out by 138 community volunteers through monthly visits to the target community to communicate messages on household drinking water treatment, use of Safewat water disinfectant, and the correct dosage to treat water. The household was revisited the next month and residual chlorine testing was done to assess whether the correct dosage of chlorination was available in the treated water.” *PSI/India*

LESSON 4.7: TARGETED TECHNICAL INFORMATION CAN ADDRESS CONCERNS ABOUT DANGERS OF CHLORINE USE

Government officials, NGOs, donors, and even users in the field often have the same concerns about the use of chlorine in drinking water:

1. Chlorine causes cancer; and
2. Bleach in the home is dangerous, there is nowhere safe in the household to store it and it will kill children if ingested.

There are three effective ways to help alleviate these valid concerns.

- A succinct explanation provided during product demonstration or in written materials:

*When you add chlorine to water, compounds called disinfection byproducts are formed. WHO regulates the amount of disinfection byproducts in water, and water treated with the safe water solution is below the WHO guideline values. Even at the WHO guideline values, there will only be 1 additional cancer case for every 100,000 people who drink 2 liters of chlorinated water per day **for 70 years**. The risks of severe diarrheal disease are much, much greater.*

- A written fact sheet:

¹¹ Thevos A., Quick R., Yanduli V. Motivational Interviewing Enhances the Adoption of Water Disinfection Practices in Zambia. *Health Promotion International*, 2000;15(3):207-214.

One-page fact sheets, written for a lay audience, are useful tools. They combine the benefit of written information without the technicality of peer-reviewed literature. Dr. Robert Quick of the CDC, who provides technical assistance to PSI programs, found that a one-page fact sheet on disinfection byproducts was effective in addressing concerns raised about cancer and chlorine (see Appendix B for a sample fact sheet).

- Peer-reviewed, technical literature:

Some professional audiences prefer to rely on peer-reviewed technical literature for their information source. Articles such as the Racciopi¹² article, which reviewed bleach ingestion poison-control center calls and concluded that “*acute accidental exposure to household bleach in use or in foreseeable misuse situations results, in the great majority of the cases, in minor, transient adverse effects on health,*” are useful for alleviating concern about bleach ingestion.¹³

LESSON 4.8: BEHAVIOR CHANGE FOR SAFE WATER USE IS A LONG PROCESS, REQUIRING SUSTAINED FUNDING

As with any effort to institute any new behavior, building a cadre of consistent product users takes considerable time. PSI safe water programs consistently mentioned funding shortfalls as the primary barrier to ensuring product acceptance and consistent use. Such shortfalls have the greatest adverse impact on communication campaigns, which must ensure appropriate implementation of BCC efforts and fund the research needed to measure impacts and refine messages. In Madagascar, repeated cholera outbreaks forced the program to channel funding to support the MOH in its efforts to halt the epidemics, thereby preventing the program from implementing needed marketing and research initiatives at its outset. The general public then associated the product with emergency use. As a result, the program required additional funding to promote consumer use of the product on a regular, preventive basis. In Tanzania, PSI had to discontinue mass media advertising due to insufficient funding; as a result, sales suffered considerably.

“More than most PSI products, this is a new technology for consumers (in some countries) and adoption is naturally slow. The closest analogies might be the female condom and net retreatment or family planning back in the 1960s and 1970s.”
PSI/Myanmar

Initial program results confirm that sufficient funding to support the safe water communication campaign does make a difference. In Kenya, PSI targeted advertising and promotional funds to the regions with the highest diarrheal prevalence. Follow-up research indicated that retail availability of the product in these areas was more than double that of the national average while household penetration in these areas was second only to that in Nairobi.

¹² Racciopi F. et al. Household Bleaches Based on Sodium Hypochlorite: Review of Acute Toxicology and Poison Control Center Experiences. *Fe Chem. Toxic*, 1994;32(9):849-861.

¹³ Instructions on all PSI bottles of the safe water solution instruct caregivers to keep the product stored in a cool, dry place, out of the reach of children.

Sufficient funding – across all program areas – is vital to the success of the safe water program. Sustained donor support for safe water programs will ensure not only that consumers have an accessible and available product but that they also develop an understanding of the implications of the disease and benefits of prevention that is sufficient to sustain their behavior change over the long term.

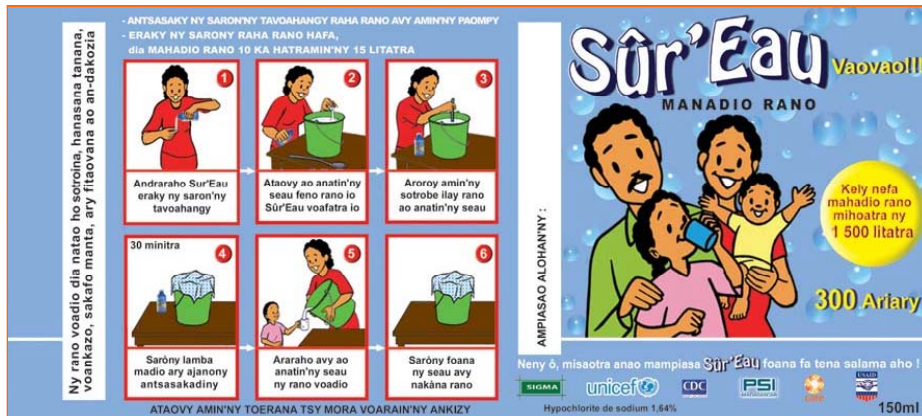
LESSON 4.9: MARKETING TEMPLATES (SUCH AS LABELS) CAN BE DEVELOPED AND ADAPTED TO LOCAL REQUIREMENTS

In the earliest safe water programs, program managers invested significant cost and time in designing labels in each country and then testing them with focus groups. Three distinct designs emerged as described below.

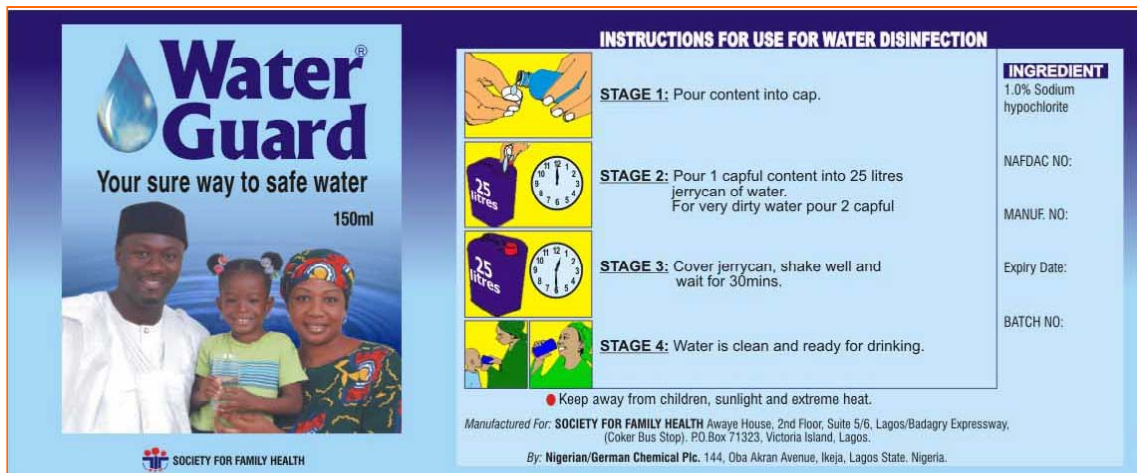
I. The Classic Design: The Kenya WaterGuard label is largely text, reflecting the higher literacy of the target population in Kenya, and the “water drop” background design is suggestive of bottled water labels. The language is K’Swahili, which is Kenya’s most widely used dialect.



2. The Pictorial Design: With large images and few words, Madagascar’s cartoon-based label is intended for a less literate population. The Madagascar label underwent focus group testing with illiterate rural women. The label design was finalized only when women could correctly identify the product’s purpose and use the product correctly without any explanation. When Madagascar moved from a 500 mL bottle to a 150 mL bottle, necessitating a label redesign, the overwhelming response from users was that the cartoon family was the indicator of the brand. Users accepted the change in bottle size but demanded retention of the cartoon family; in fact, the cartoon created a link between the old and new bottles.



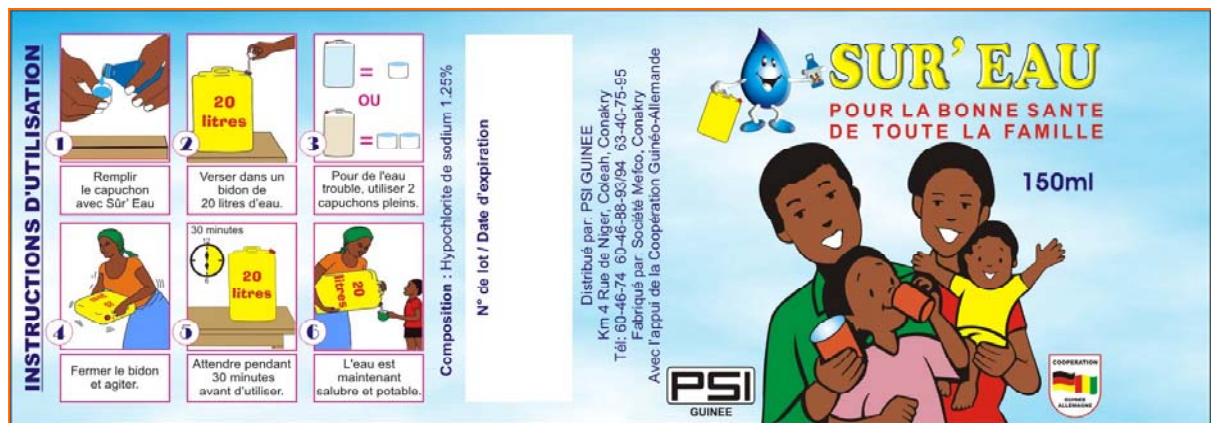
3. The Combined Design: The Nigeria label falls somewhere between Kenya’s label and Madagascar’s label. Anticipating that Nigerians might not respond well to a cartoon image, PSI hired a professional photographer and models for a photo shoot. PSI decided to depict a man in the photograph in recognition of the fact that men control household finances and to picture a headscarf-wearing woman with full coverage of her hair out of respect to both Muslim and Christian sensibilities. Both simple text and pictorial descriptions for dosing are clear and easy to follow.



Projects launched after completion of the Kenya, Madagascar, and Nigeria label designs often used the three countries' label templates in label development. Focus group sessions showed participants the labels from several countries and asked them what aspects of the labels they found appealing. Then, each project designed a label based on the focus group responses. For example, the Guinea label below uses:

- The Madagascar label's family, though with slightly darker skin to match the skin tone of the target populations;
- A "water drop" figure based on Mozambique's label;
- Use directions from Madagascar's label, modified for the jerry can storage container common in Guinea; and
- The same cartoon woman in the use directions as on Burundi's label.

This synthesis of features from existing labels led to a uniquely Guinean label but one that was developed more quickly than if the marketing team had started from scratch.



Vietnam's label is another example of a synthesis of existing label features. It is similar to Nigeria's label, with the following modifications:

- The storage container is changed to a ceramic pot to meet local customs;
- The pictures and directions are slightly larger; and
- The image of the woman is taken directly from Myanmar's label, with the clothing altered and Vietnamese children superimposed on the image.



The lessons learned from the label design experiences follow:

- The label must conform to local sensibilities.
- The use of templates can simplify and speed label design, thereby making the design process less costly. Templates provide a visual display of information and a list of mandatory technical information that must be included on the label.
- Using various country examples, countries have taken advantage of other PSI program experience in the design of their labels as well as in the development of other marketing materials, including point-of-sale materials, flyers, billboards, and radio spots, adapting them for their own use.
- Finally, it is important to note that paper labeling, initially used by most PSI water programs, has since largely given way to plastic labeling. Paper labeling is to be avoided when possible to prevent leakage from one bottle ruining an entire carton of product.

SECTION 5: SALES AND DISTRIBUTION

As with many fast-moving consumable products, the commercial sector in most developing countries provides an efficient vehicle for large-scale distribution of essential household items to the urban and peri-urban markets where people purchase most household goods. Reliance on commercial markets to place the product among other essential household products allows safe water programs to conserve project funds for targeted and/or rural distribution or for serving families beyond the reach of the commercial sector.

LESSON 5.1: WHILE THE COMMERCIAL SECTOR WILL DISTRIBUTE THE SAFE WATER PRODUCT, PROGRAM SUCCESS REQUIRES A COMPLEMENTARY “PUSH” FROM THE PROJECT

While the commercial market can play an important role in helping social marketing programs reach urban and peri-urban consumers, significant differences come into play in introducing an entirely new product onto the market as opposed to simply a new brand of condom or an upscale version of a mosquito net. First, commercial markets in developing countries are cash-poor and risk-averse. In other words, especially at the small kiosk or market stall level, business owners have little money to invest in the products they sell and therefore are unlikely to risk their own cash on a new and unproven product such as a water treatment product. Second, in most developing countries, wholesalers do not extend credit to retailers; thus, new products such as the water treatment solution are unlikely to move off a wholesaler’s shelf without significant assistance. PSI found, however, that investment in “uplifting” teams – dedicated sales teams that take product stock from wholesalers and transport it to a predetermined number of retail kiosks and outlets in each major market – help get the product out to the stalls where women shop. The PSI sales team then advises each kiosk owner of the location of the nearest wholesaler stocking the product with the hope that it will sell and the kiosk owner will be motivated to independently purchase additional inventory. In some cases, the teams have provided an initial stock of the product at no cost for a “free” trial, further encouraging the retailer to use the money from the initial sale of the product to purchase additional inventory. Safe water solution may continue to require uplifting from wholesalers to retailers, depending on sales of the product, the stall owners’ entrepreneurial spirit, and the maturity of the marketing and distribution chain.

“We assumed, given the widely recognized need for safe water, that if we employed a passive distribution strategy where the distributors were left alone to push the product, and minimal brand advertising was done, the product would sell itself. However, because the concept of chemical POU treatment was new in Kenya and we did not have the backing of the MOH, brand building was necessary to create awareness for this new technology and increase acceptance. A more active distribution strategy involving uplifters was also necessary to assist in getting the product to retail trade.” *PSI/Kenya*

Merely ensuring that the product reaches the retailer is not enough. The newer safe water solution bottles are smaller, making them easier to transport and relatively cheaper for the consumer but harder for a consumer to identify on a crowded market stall shelf. Moreover,



PSI/Kenya wall painting

retail sellers in most developing countries are generally passive, occasionally encouraging customers to purchase products that they know sell well – most notably, washing powders and soaps – but rarely pushing new products. Aside from stocking the product, retailers cannot be counted on for product promotion. As a result, the safe water solution requires large, bright, point-of-sale materials that call attention to the product. In most safe water programs, PSI developed attractive, branded sales flags, large metal or reinforced plastic sales signs, and dangling or oversized product images to ensure product visibility. At times, PSI painted brand images of the safe water solution on kiosks to indicate

that the product was available for sale. While such efforts are especially important as a product establishes market position, experience indicates that a consistent push is needed to keep the product in the forefront of retailer displays and consumer minds.

LESSON 5.2: CAPITALIZING ON NGO NETWORKS CAN SIGNIFICANTLY IMPROVE RURAL PENETRATION

One of the major challenges faced by social marketing programs is the development of an effective means of product distribution in rural areas. In some countries or regions of a country, large partner NGO volunteer or community-based distribution (CBD) networks can assist with product promotion and distribution. In some cases, PSI has created teams of mobile salespersons (on bicycles, mopeds, or foot) and charged them with responsibility for rural distribution of the safe water solution. Churches, schools, community centers, and community leaders offer additional opportunities for reaching rural and poor populations that might otherwise lack access to the product. In addition, these partners can assist in targeting free or subsidized product to populations such as the rural poor, people living with HIV/AIDS (PLWHA), or areas dealing with a cholera epidemic.

To reduce the cost of operating rural social marketing programs, PSI maximizes its reliance on existing networks whenever possible. One caveat, however, is that NGO networks are often as skeptical of a new chlorine product as any other consumer. As a practical matter, NGOs' experience with safe water activities tends to revolve around well digging, latrines, boiling of water, and other approaches to safe water and sanitation. Therefore, NGOs need time, training, and sensitization to adopt a safe water system approach. Moreover, the addition of safe water solution promotion and sales to a volunteer's existing workload can be perceived as either additional (unfunded) work for NGO staff and volunteers or as a potential deterrent to effectively carrying out volunteers' existing tasks.

Partner NGOs have been found to be most useful under two conditions: (1) when volunteers receive a small “profit” from the sales of the product, and (2) when donor funding is provided directly to the partner NGO to include safe water solution promotion and distribution as part of NGO programming. Small incentives such as pens, t-shirts, and key chains are small but effective motivators for volunteer personnel.

Whenever CBD networks and mobile sales forces can be linked to the commercial sector, a social marketing program will run more efficiently, at lower cost, and with a greater chance of sustainability. For example, in northern Mozambique, PSI works with large networks of women’s groups, farmers’ associations, and CBD volunteer networks managed by partner NGOs CARE and Save the Children (which receive funding from USAID to assist PSI in rural promotion and distribution of the safe water solution). Given that the total number of volunteers exceeds 2,000 and that many volunteers operate in groups of 20 or 30, the cost to deliver the product directly to each group would be prohibitive. Therefore, PSI agreed to open a depot in each district capital or major market area. PSI informed NGO staff and volunteer group leaders of each depot’s location, and each volunteer received seed stock (10 to 20 bottles) at a safe water program training. Volunteers used funds from the sales of seed stock to purchase more stock in the towns where they did their routine shopping. As a result, PSI did not need to continue sending trucks to each volunteer’s area. Moreover, PSI was able to reduce costs because its sales force was already selling the product to these wholesalers. Sales to the commercial sector improved as volunteers moved increasing volumes of product, enhancing its potential sustainability over the long term.

LESSON 5.3: ENTRY OF A SOCIALLY MARKETED SAFE WATER PRODUCT CAN ENCOURAGE COMMERCIAL SECTOR PARTICIPATION

Most of the countries where PSI has launched the safe water program had no existing POU water treatment product on the commercial market. Viable markets can take years to reach a level of maturity that will support a commercial safe water solution brand. As markets show signs of development (e.g., through increased commercial competition among high-quality, reasonably priced products), social marketing entities can work with commercial distributors to ensure that donor subsidies are appropriately targeted to poorer populations in areas in significant need of a water treatment product, leaving urban markets and populations to commercial for-profit enterprises.

One avenue toward product sustainability is for commercial manufacturers to enter the water treatment product market. However, as socially marketed programs have found in other product categories, commercial manufacturers need to be convinced of the commercial viability of socially marketed brands, consumer willingness to pay prices that cover costs and allow for a profit, and consumer demand sufficient to merit market entry.

In general, the countries that have been most successful in achieving commercial viability for socially marketed products in other product categories have tended to be middle-income countries with highly developed commercial markets such as those in Latin America, North

Africa, and South Asia. The safe water solution has an added burden in that it is not an easy product to import or to manufacture with consistent quality – likely an added disincentive to commercial entrants.

Not surprisingly, India seems to be developing a market for POU water treatment products, even if that market is still in a nascent stage. India has a very highly developed commercial marketplace, a large number of consumers with the ability to pay, and a strong government focus on encouraging consumers to treat household water. One Indian company has aggressively sought out sales by providing substantial trade incentives during the rainy season, holding meetings for Rotary Club members and other influential individuals, and giving television sets to the retailers as further incentive to stock and sell the product. In Kenya, the private sector now offers several products (in liquid and tablet form) for treating water in the home, including liquid solutions called AquaGuard and WaterSafe.

As safe water programs are scaled up and sustained and viable commercial markets are proven to commercial partners, the future will likely see the entry of an increasing number of commercial entities that can help sustain the programs. A strengthened regulatory framework in each country is necessary to ensure that fully commercial entrants to the POU market establish and maintain products of reliable quality with appropriate expiry terms and consistent levels of chlorine concentration.

SECTION 6: CREATING PARTNERSHIPS

The cultivation of partnerships has not only strengthened political support for the safe water programs but has also expedited product sales among target populations and increased acceptance of the new behaviors required for safe water practices. Political support, advocacy, and assistance associated with safe water promotion and distribution are essential as populations gain familiarity with a first-of-its type safe water solution and respond with behaviors requiring a departure from long-held patterns of practice.

LESSON 6.1: PARTNERSHIPS ARE VITAL TO THE SUCCESSFUL ADOPTION OF THE SAFE WATER PROGRAM AT ALL LEVELS

In every country program, the MOH is involved to some extent in PSI's safe water programs. In Kenya, PSI keeps the MOH informed of program activities, program expansion, and other developments. Many other countries consider the safe water program part of the national strategy for diarrhea control and prevention. Central government officials often take part in planning the program strategy and require provincial and district health departments to incorporate promotion of the water treatment product into their discussions with mothers who present at health facilities with children with diarrheal disease. In many – though not all – country programs, the MOW has proven itself a vital partner as well.

In a great number of country programs, international NGOs have also played an active role in the promotion and distribution of the product. NGOs such as CARE, Save the Children, the Red Cross, Médecins Sans Frontières, World Vision, Catholic Relief Services, and TechnoServe and prominent international organizations such as WHO and UNICEF have all participated in the promotion and distribution of water treatment products.

Other important partners include commercial distributors, retailers, and community-based organizations. Large commercial distributors, supermarket and retail chain stores, and national pharmacies as well as private health providers often use their own internal distribution systems to help distribute the product more efficiently to major urban centers nationwide. Local farmers' associations, women's associations, community leaders, and health workers have also played a major role in different country contexts by pushing the product from urban areas into rural areas.

LESSON 6.2: DONOR ADVOCACY AND SUPPORT CAN MAKE A CONSIDERABLE CONTRIBUTION TO THE SUCCESS OF SAFE WATER PROGRAMS

Whether or not donors have contributed funds to a project, donor advocacy has been essential to project success. Donors can encourage their implementing partners and agencies to integrate water treatment and other hygiene improvement messages into their programs by drawing up grant agreements and contracts that specify appropriate activities and corresponding line item budgets. In Mozambique, USAID provided additional funds to the NGO recipients of child survival grants to incorporate the safe water program into ongoing outreach activities in rural communities. As a result, thousands of activists began promoting and selling the water treatment product, with sales and use rising substantially in those areas.

LESSON 6.3: WITH APPROPRIATE COORDINATION AND TRAINING, NGO PROGRAMS CAN OFFER A WEALTH OF OPPORTUNITIES FOR REACHING RURAL AND HIGH-RISK POPULATIONS

As mentioned in Lesson 5.2, above, PSI has partnered successfully with a number of local and international NGOs, building on their community health education activities and leveraging their community empowerment and income generating efforts. Programs that have succeeded in partnering with local NGOs have invested significant time in training NGO staff at all levels – from NGO directors and program managers to community activists. Interpersonal



communication skills are at the core of NGO training. In fact, these partnership and interpersonal communication efforts have proven so essential to penetrating rural and hard-to-reach target groups that PSI's current safe water expansion or scale-up programs all include a significant interpersonal communication and demonstration components.

In some cases, a demonstration has been necessary to convince even program staff that the product is efficacious. As the accompanying photograph shows, the PSI/Burundi Country Representative drank treated “dirty-looking” water to convince her own staff that the safe water solution can treat such water.

LESSON 6.4: TRUSTED SPOKESPERSONS AND PRODUCT CHAMPIONS ARE FUNDAMENTAL TO PRODUCT ADOPTION

In many programs, reliance on trusted spokespersons (such as highly placed government personnel, locally known and respected individuals, and national celebrities) and product champions (such as trained health workers and community leaders) has promoted the efficacy of the safe water solution. For example, PSI/Mozambique recruited a variety of local bands, comedy groups, and regional and national government officials to support each of its regional launches. These endorsements enhanced the product's local appeal as respected and trusted individuals spoke in a local language about the product's attributes. PSI/Tanzania enlisted the participation of a well-known newscaster in a radio advertisement; the woman gave a testimonial that she used WaterGuard to protect her children and stressed that she treats all of her household consumable water. Consumers respected the newscaster and enjoyed hearing a celebrity speak about her children's welfare. In Malawi, although not specifically requested by PSI, the government endorsed the product, helping build consumer confidence in the product's efficacy, especially when the President of Malawi and national and local government officials spoke in support of the product. In Myanmar, PSI discovered that the MOH was concerned about the long-term effects of chlorine consumption. However, a well-respected WHO official assisted PSI in overcoming skepticism. This independent voice representing a reputable institution proved invaluable.



Nurses in western Kenya trained in how to use and prescribe the product.

Reliance on the power of trusted individuals to promote WaterGuard in rural areas cannot be overstated. In rural western Kenya, nurses were trained to “prescribe” WaterGuard to patients with diarrhea presenting at clinics. PSI made WaterGuard available, but patients still had to find and purchase the product at a commercial outlet. In unannounced follow-up visits to patients' homes two weeks and then one year later, 68 and 71 percent, respectively, were using the product correctly.¹⁴

¹⁴ Kenya: PSI Research Division, Marketing Plan: WaterGuard Situation Analysis, 2006..

SECTION 7: PRODUCT COSTS, PRICING, AND COST RECOVERY

Unit cost of goods sold (COGS) is the cost to PSI to purchase the components to produce one bottle of the water treatment product, including bottle, cap, label, and solution. In each program, it is a careful balancing act to set an affordable consumer price that recovers production costs, minimizes subsidies, and yet provides key target populations access to the product.

LESSON 7.1: PRODUCT COST MAY BE RECOVERED THROUGH SALES

PSI's experience indicates that most countries can produce the product for less than US\$0.25 per bottle. The large share of this cost lies in bottle production and packaging. Generally the solution itself costs less than US\$0.02 per bottle to produce.

Unit COGS vary by country from a low of about \$US0.13 per bottle in India and Kenya to a high of about \$US0.34 in Tanzania, depending on a number of factors, including ability to produce bottles in-country (versus importing bottles), in-country manufacturing competition, taxes, and oil prices. The use of the “standard” bottle mold and caps has led to a significant reduction in the cost of producing the safe water solution as well as to reductions in container production costs, distribution costs, and storage.

The consumer prices that wholesalers and retailers charge likewise vary from approximately US\$0.15 per bottle in Madagascar to US\$0.51 in Uganda. Product cost recovery varies from a low of about 45 percent in Madagascar to a high of about 164 percent in Nigeria. Fourteen of the 17 ongoing PSI safe water programs are currently recovering full production costs, and the remaining have plans in place to attain product cost recovery in the medium term.

In every program there are additional management, advertising, promotion, training, monitoring and evaluation, and product distribution costs, incurred by PSI, that are covered by donor or internal PSI funds. There has been no expectation that these costs could be covered by product sales. Therefore, cost recovery refers specifically to the product, not the overall program. Successful product cost recovery means that donor funding may then be allocated to developing the brand, communications, and marketing campaigns needed for increasing access to and understanding of the product. Experience has shown that product cost recovery can keep programs afloat between tranches of donor funding.¹⁵

In keeping with the SWS approach developed by CDC, PSI's early programs included the sale of an appropriate container, usually with a small mouth opening and a spigot for accessing the

¹⁵ Banarjee A., McFarland D.A., Singh R., Quick R. Cost and Financial Sustainability of a Household-Based Water Treatment and Storage Intervention in Zambia. *Water and Health* (in press).

water, thus eliminating opportunities for re-introducing microbes via dippers, cups, or unclean hands. However, the cost of producing and transporting these containers became a barrier to use. The PSI safe water programs have moved, over time, from marketing large, expensive, and difficult-to-produce jerry cans with spigots that tended to break to promoting simple modifications of existing and commonly used storage vessels.

LESSON 7.2: IN MOST COUNTRIES, PRODUCT SUBSIDIES ARE NOT NECESSARY

On average, a family of five using the safe water solution spends approximately US\$0.01 per day to treat household water. In many country programs, PSI has never subsidized product price. In Kenya, research has indicated that price has not been a barrier to purchase. PSI undertook pilot studies in Kenya to determine a fair and affordable price for WaterGuard. In 2003, two-thirds of urban households and 88.9 percent of rural household believed that WaterGuard was inexpensive or just right (affordable); these figures rose to 91.1 and 93.2 percent, respectively, in 2005 as PSI launched communication campaigns and the product became more established.

Countries with higher COGS and/or low recognition and understanding of the severity and means of transmission of disease may require subsidies. For example, in both Zambia and Malawi, PSI has subsidized the consumer price of the product. In Zambia, in particular, where consumers compare the cost of purchasing water with the cost to treat their water, the product has proven to be highly price-sensitive.¹⁶ Studies in both countries also showed that the poor, the uneducated, and the rural populations are less likely to purchase and use the product, indicating that price may be a barrier.¹⁷

In specific cases, PSI has launched a subsidized safe water solution under the assumption that the subsidy was necessary to motivate trial of the product and consistent use. With the considerable reduction in COGS since the introduction of the standard product and a better understanding of what drives demand for the product, new programs are launching with immediate COGS recovery and no subsidy of base product cost. Program funds are then used to support additional BCC. If substantial donor support follows from the launch, a country program can determine the need for product subsidy and for whom (e.g., PLWHA, rural poor populations).

¹⁶ Quick R. et al. Diarrhea Prevention through Household-Level Water Disinfection and Safe Storage in Zambia. *American Journal of Tropical Medicine and Hygiene*, 2002; 66(5):584-589.

¹⁷ Stockman, L.J. et al. Awareness and Use of WaterGuard among Mothers in Malawi: Lessons Learned from a National Survey, 2005. *Emerging Infectious Diseases* (in press).

Thevos A., Quick R., Yanduli V. Motivational Interviewing Enhances the Adoption of Water Disinfection Practices in Zambia. *Health Promotion International*, 2000; 15(3):207-214.

SECTION 8: INTEGRATING WATER TREATMENT PRODUCTS INTO HIV/AIDS PROGRAMMING

The international response to the HIV/AIDS pandemic has focused on both prevention of HIV transmission and care and treatment of PLWHA. The provision of safe water is critical in HIV care and treatment programs for three reasons: (1) PLWHA are particularly susceptible to opportunistic infections and diarrhea; (2) HIV-positive mothers who do not breastfeed need clean water to make formula; and (3) anti-retroviral (ARV) therapy is better absorbed if patients use clean, treated drinking water.¹⁸ The safe water programs have also contributed to clean water and hygiene education programs for vulnerable children, including HIV/AIDS orphans.

The President's Emergency Plan for AIDS Relief (PEPFAR) program preventive care guidelines for both adults and children living with HIV and AIDS now recommend the provision of safe drinking water. A recent study in Uganda found that use of the safe water solution significantly reduced diarrhea in PLWHA.¹⁹ As a result, PSI is working with HIV/AIDS programs in Ethiopia, Nigeria, Uganda, Kenya, Rwanda, Zambia, and Malawi to implement HIV-related safe water programs and/or to include the product in basic care packages for PLWHA.

LESSON 8.1: PARTNERING WITH LOCAL NONGOVERNMENTAL ORGANIZATIONS THAT PROVIDE CARE FOR PERSONS LIVING WITH HIV/AIDS HAS BEEN A SUCCESSFUL MODEL FOR REACHING PLWHA

Mass media interventions that promote safe water solution use and the product itself do not directly target PLWHA for fear of stigmatizing both product users and the safe water product. However, mass media interventions include participatory and interpersonal strategies for promoting the use of the product as well as hygiene and hand washing, to groups working with and supporting PLWHA.

One successful approach for reaching PLWHA is reliance on local NGOs that provide care to PLWHA. These local organizations distribute the product through their membership or community agents via several channels: basic care packages, distribution directly to clients, and

¹⁸ Bushen O.Y. et al. Diarrhea, Impaired Intestinal Function, Antiretroviral Drug Malabsorption and Drug Resistance: Improvements with Glutamine or Alanyl-Glutamine in a Randomized Controlled Trial in Northeast Brazil. *Clinical Infectious Diseases*, 2004;38:1764-1770.

¹⁹ Lule J.R. et al. Effect of Home-Base Water Chlorination and Safe Storage on Diarrhea among Persons with Human Immunodeficiency Virus in Uganda. *American Journal of Tropical Medicine*, 2005;73(5):926-933.

community distributors. In several countries, women who are HIV-positive have been trained to become community health educators and product distributors. They are successfully and profitably selling water treatment products in their rural communities, specifically targeting families affected by HIV/AIDS and other marginalized populations with minimal access to water and sanitation services.

Mozambique launched a safe water campaign targeted to PLWHA after the general launch of the safe water solution. This approach had the dual benefit of averting an association between the product and HIV/AIDS while building on the existing branded marketing campaign when developing marketing strategies for PLWHA. While not confirmed by research, the high uptake of the safe water solution among PLWHA might be a function of free distribution of the product to this target group.



Safe water solution can also be an income generator for PLWHA. In Kenya, women in rural areas with high prevalence rates successfully market the PSI product to their villages, which are located beyond the reach of the traditional market. The women purchase the product at the wholesale rate and sell it in their communities at the retail rate. The margin provides much-needed income and an incentive to continue promoting the product and good hygiene. In addition to distributing the product, the women receive training to become community health educators and sell other PSI products, such as insecticide-treated bed nets. The project depends on the availability of the product from wholesalers and from a community store, located nearer to their villages and supported by Rotary International, which provides the product at cost to the female entrepreneurs.

In Nigeria, PSI, the CDC, and Hope Worldwide (an NGO) distributed WaterGuard to mothers enrolled in a prevention of mother-to-child transmission (PMTCT) program. The project documented diarrheal disease reduction,²⁰ and project partners are working to expand access to WaterGuard among PLWHA.

Experience in several PSI countries has shown that the safe water solution can be successfully integrated into HIV/AIDS programming without stigmatization, provided that promotion of the product to the general population occurs before initiation of a safe water campaign associated with HIV/AIDS programming.

²⁰ CDC, in press.

LESSON 8.2: INTEREST IN REACHING PLWHA CAN PROVIDE THE STIMULUS FOR A NATIONAL SAFE WATER CAMPAIGN

In November 2002, the Global AIDS Program (GAP), the CDC, and the Uganda Viral Research Institute and AIDS Support Organization completed an 18-month study documenting that use of the safe water solution reduced the risk of diarrhea by 25 percent and that the total number of days ill from diarrhea decreased by 33 percent among PLWHA.²¹ The results of the study led CDC/GAP to investigate mechanisms to expand the distribution of the safe water solution in Uganda.

In particular, PSI/Uganda has used the study results to guide a nationwide launch of the product, with funding assistance from CDC/GAP. PSI decided to use the standard product, not the bottle used in the study, in order to build on the positive attributes cited in Lesson 2.5 and to prevent (1) an association between the study product and the new national product and (2) any HIV/AIDS-related stigmatization of the study product. PSI/Uganda has been able to provide the product to the CDC for inclusion in over 40,000 preventive care packages annually.

The results of the Uganda study also informed the recent U.S. government (PEPFAR) Preventive Care Package for Adults and Children guidelines, which recommend the provision of safe water to prevent diarrhea. The recommendations have led to inclusion of the safe water solution in care and treatment packages.

²¹ Lule J.R. et al. Effect of Home-Base Water Chlorination and Safe Storage on Diarrhea among Persons with Human Immunodeficiency Virus in Uganda. *American Journal of Tropical Medicine*, 2005;73(5):926-933.

RECOMMENDATIONS AND CONCLUSIONS

The household water treatment and safe storage strategy developed by the CDC can lead to significant improvement in drinking water quality and significantly reduce the burden of diarrheal disease.

PSI's experience in 20 countries over the past eight years has demonstrated that the major ingredients of a successful program include:

- Involvement of key stakeholders from program inception;
- Due diligence in developing and maintaining a high-quality product;
- An appropriate strategy to address the unique marketing, communications, and distribution challenges and opportunities presented by the safe water solution; and
- Extensive work with government, private, and community partners to reach rural and target populations with product and communications.

BASED ON PSI'S EXPERIENCE LAUNCHING AND IMPLEMENTING SAFE WATER PROGRAMS, THE AUTHORS OF THIS REPORT RECOMMEND THE FOLLOWING:

STARTING A PROGRAM

- Actively seek diverse and consistent funding, as sustained funding is critical for bringing about long-term behavior change.
- Obtain technical expertise to help launch a product and to give it credibility.
- Outsource manufacture of bottle, cap, solution, and label to local companies. Institute consistent product quality control. Use a standardized bottle across countries, if possible.
- Instate simple, consistent, and correct dosing from the start.
- Involve government ministries from the very beginning.

COMMUNICATIONS

- Identify and address specific water treatment knowledge and attitudes in communications campaigns, including diarrheal disease transmission and severity, product efficacy, and self-efficacy.
- Utilize aspirational branded messages, and support them with generic health education campaigns.
- As possible, plan the product launch to coincide with local contextual factors, such as rainy seasons or cholera epidemics. Launch timing affects program success and perceptions of the product.

MARKETING AND SALES

- Establish program support to push product from wholesalers to vendors.
- Set an affordable price that allows for recovery of the costs of production and packaging. Typically, the water treatment product can be produced for less than US\$0.25 per bottle.
- Invest in marketing and advertising for the product. Ideally, strong marketing of the safe water solution encourages commercial sector participation in the production and distribution of POU products.

PARTNERSHIPS

- Build strong partnerships with government ministries and NGOs to gain public and governmental support for the safe water solution. In addition to the support of commercial retailers, distributors, and pharmacy chains, public and private healthcare providers and community health agents can improve distribution of the product and related educational messaging.
- Recruit trusted spokespeople as product champions, especially in rural areas, to improve awareness and market penetration.
- Effectively utilize partnerships to help distribute the product to target groups.
 - Working with NGOs that have a strong rural presence has been effective for distributing the product to populations at greatest risk.
 - Partnering with organizations that work with PLWHA has been successful for reaching PLWHA.

While this paper focused on water treatment with a chlorine solution, new, innovative products based on chlorine technology have emerged and are offering new opportunities for developing country programs. For example, PSI is now working with a manufacturer of chlorine tablets for

water treatment and these have been launched by two PSI programs. Chlorine tablets offer the advantage of easier transportation and storage, and longer shelf life. PSI also works with Procter & Gamble's PUR® product (a combined flocculent-disinfectant powder) that has been launched by eight PSI programs. The PUR® product is more easily transportable than traditional chlorine liquid, and offers the added advantage of clarifying turbid or muddy water.

The lessons learned from implementing the safe water programs detailed in this paper are now being applied to making programs promoting water treatment tablets and PUR® programs a success, and continue to be applied to new and evolving PSI safe water programs worldwide.

A few challenges remain: encouraging consumers to modify their behavior to use a water treatment product on a consistent long-term basis, ensuring financial sustainability by attaining full cost recovery in all programs without pricing the product beyond the reach of the target groups, evaluating the safe water system against other appropriate technologies (settling, filtering, flocculating, etc.), and effectively making stored water safe for infant formula. Program staff at PSI, CDC, and USAID are continuing to monitor and evaluate community mobilization and social marketing efforts, promising technologies and various other approaches to better address these issues.

With relatively low awareness or support among key government, multi-lateral, and non-governmental partners regarding the power of household water treatment programs to improve health, advocacy remains a major challenge. Still, these programs are garnering increasing attention in the international community. In the last four years, for example, donor financial support to PSI for the establishment and scale-up of safe water programs has tripled and other funding sources are beginning to become available.

Household-level POU water treatment has been shown to significantly reduce diarrheal diseases in vulnerable populations and should become an essential intervention within child survival, HIV/AIDS, and water supply programs. The key elements in implementing household water treatment programs using safe water solution are now quite well understood. These and other evidence-based POU water treatment programs should be scaled up and expanded throughout the developing world, filling a critical public health gap in drinking water quality.

APPENDIX A: POUZN LESSONS LEARNED QUESTIONNAIRE

We are writing a paper on PSI's 10 years of experience implementing safe water programs and wanted to ask you some questions about your program and lessons that have been learned.

Country_____

Product Launched_____

Beginning with project design:

What are some of the key elements in designing a POU launch versus other product launches? Any lessons learned?

What were some of the design obstacles that you encountered and how were they overcome?

Did you have sufficient funds and if not, what would the additional funds have been used for? Where did you feel you were forced to cut corners?

What role did the government play in your program? Which Ministries did you need to work with?

Did you encounter any problems with the government, and if so, how did you overcome them?

Do you maintain ongoing dialogue with the public sector, with whom, on what, and has that helped?

How did you identify a manufacturer and how was that relationship developed?

Who are your key project partners and what role do they play?

On the Product:

Have you had the same formulation and bottle size throughout your program? Which?

Have you encountered any problems with the product or container? If yes, at what point in the process?

If you changed bottles, did that cause any problems?

Which brand name did you choose, why and how?

Cost/Pricing:

What are your COGS, wholesale and retail price?

Do you see any room to reduce COGS? What advise would you give a new program when negotiating cost?

Do you believe price is a barrier to use in your program (do you have data on this)?

Do you have any information on consumer acceptability of your price?

If the price is subsidized, how do you cover the subsidy and do you have any plans to increase prices to cover COGS?

Do you implement any targeted subsidies? Give the product away for free? If so to whom and why?

Promotion/BCC:

What has been your communications approach (brand building, BCC, sales promotion, IPC) and which strategies have been most successful?

Has the community played any role, and if so what?

Does your program ever visit households to see if they understand how to use the product correctly?

What are your key messages and which have been the most successful? Do you have data to support this?

What is the balance of interpersonal communication, mass media and/or other communications vehicles in your program? Which channels of communication have worked best for which messages and at what point in your program?

What have been your greatest BCC challenges?

Who is your target audience (children, geographic areas with high diarrheal prevalence, PLWHA, the poor...) Do you have any data that looks at whether or not you have been able to reach them?

Do you have any information on whether people are using your product throughout the year, or at certain times, and what barriers exist to consistent use?

Has there been any complementary campaigns that have helped your program such as a MOH campaign or Hygiene improvement messages from other projects? What role have they played?

Have you worked at all with the schools?

What role have retailers/providers played in promoting the product? Has that worked?

Distribution:

Where is your product distributed, and which have been the most successful distribution channels? Do you have a MAP survey you could share?

Have you used CBDs or NGO partners for distribution? How did it work? How about public sector MCH clinics?

Do you have a specific distribution strategy to reach the poor or rural communities?

Other:

When you launched were there other POU water treatment products on the market? If so what and how were they sold and at what price point?

Since launching your brand, have commercial products come into the market? What type, at what price point, how are they marketed and have you sought to work with them?

If there are other brands on the market, do you have any data on the total market for water treatment products and relative product shares?

Thanks for your help and we look forward to sharing the final report with you!

APPENDIX B: CDC FACT SHEET: DISINFECTION BY-PRODUCTS AND THE SAFE WATER SYSTEM

In the early 1900's, chlorine began to be widely used as a disinfectant. Chlorine revolutionized water purification and dramatically reduced the incidence of waterborne diseases. The provision of safe drinking water has been hailed as the major public health achievement of the 20th century. Chlorine remains the most widely used chemical for water disinfection in the United States.

However, in 1974 it was discovered that chlorine reacts with organic matter and bromine naturally present in the water to create four compounds, which were collectively termed trihalomethanes (THMs). THMs are currently used as an indicator chemical for all potentially harmful compounds formed by the addition of chlorine to water. The following information is known about THMs:

The World Health Organization (WHO) International Agency for Research on Cancer reviews research conducted on potential cancer-causing agents. Based on research on animals, only two of the four THMs are considered potential human cancer-causing agents. None of the compounds is a proven human cancer-causing agent.

The WHO has established guideline values for the concentration of the four THMs allowed in drinking water. These guideline values are conservative, as they are based on a maximum of 1 additional cancer in 100,000 people who drink 2 liters of water every day for 70 years.

More importantly, however, WHO specifically and repeatedly states in the Guidelines for Drinking-water Quality (1996): "Where local circumstances require that a choice must be made between meeting either microbiological guidelines or guidelines for disinfectants or disinfectant by-products, the microbiological quality must always take precedence, and where necessary, a chemical guideline value can be adopted corresponding to a higher level of risk. Efficient disinfection must never be compromised."

The addition of chlorine to water can lead to the formation of disinfection by-products (DBPs), such as trihalomethanes. A significant amount of energy and time has been invested in Europe and the United States to restructure water treatment processes to prevent DBP formation in order to minimize the slight risk of cancer from long-term exposure to DBPs. Diarrheal disease in developing countries is still a leading cause of infant and under-5 mortality and morbidity. 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 cancer later in life from DBPs.

The Safe Water System (SWS) is a proven intervention that consistently reduces diarrheal disease incidence by about 50 percent in users in the developing world. This reduction of diarrhea morbidity leads to healthier children and adults. The SWS uses sodium hypochlorite, a chlorine compound, to inactivate the disease-causing organisms. There is a slight risk, measured in one additional cancer per 100,000 people after 70 years, to the ingestion of THMs at the WHO guideline value level. We are currently investigating THM concentrations formed in the SWS and strategies to mitigate THM production in the SWS. Although the risk from THMs is important to address, and to investigate, until centrally treated, piped water can be delivered to every family, the initial critical need is the provision of microbiologically safe drinking water that has been proven to reduce the incidence of diarrhea.

If you have any questions or comments on this document or the Safe Water System, please visit <http://www.cdc.gov/safewater> or email safewater@cdc.gov.

APPENDIX C: REFERENCE MATERIALS AND INTERVIEWS

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Primary Interviews

Carmen Chan, Family Health Program Director, PSI/India

Nils Gade, Country Representative, PSI/Tanzania; formerly PSI/Zambia

Daniele Lantagne, Environmental Engineer, Diarrheal Diseases Epidemiology Team, U.S. Centers for Disease Control and Prevention, Atlanta

Brad Lucas, Senior Manager, PSI/Washington; former Country Representative, PSI/Zambia and Tanzania

David McAfee, Former Country Representative, PSI/Madagascar; Director, Southern Africa Region.

Jennifer Peters, Former MCH Advisor, PSI/Mozambique

Rob Quick, Enteric Diseases Epidemiology Branch, U.S. Centers for Disease Control and Prevention, Atlanta

Guy Stallworthy, Country Representative, PSI/Myanmar

Chuck Szymanski, MCH Senior Manager, PSI/Washington

Chelsea Treadwell, Former Safe Water Advisor, PSI/Malawi

David Walker, Country Representative, PSI/Kenya