>> TECHNICAL BRIEF

This is part of a series of project briefs discussing the activities, research findings, and field experiences of PATH's Safe Water Project.

NOVEMBER 2011

PATH Safe Water Project's Monitoring and Evaluation Framework

Testing market-based solutions in four countries

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Assessing the intention to purchase a ceramic water filter during the baseline survey, Cambodia

Introduction

PATH's Safe Water Project (SWP) is working to identify ways to stimulate a robust and sustainable commercial market for household water treatment and safe storage (HWTS) products for low- and middle-income consumers. Correct, consistent, and sustained use of these products can prevent diarrheal and other waterborne diseases.

From 2008 to 2011 the SWP led a series of pilot projects in Africa and Asia that made low-cost HWTS products available through commercial marketing and distribution channels (see Table 1). PATH partnered with local commercial organizations, including manufacturers and microfinance institutions (MFIs), to find ways to overcome distribution and cost barriers that make it difficult for HWTS manufacturers to penetrate middle- and low-income markets. The pilots tested various approaches to:

- Improve distribution and marketing, including door-to-door sales by mobile sales agents
- Make HWTS products more affordable, for example, by offering consumer credit and discount coupons.

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Monitoring and evaluation (M&E) formed an integral part of these pilots and was geared toward the needs of commercial partners. Routine monitoring of sales and cost data enabled managers to identify and address problems that arose during the implementation process and to make real-time adjustments. Baseline surveys and qualitative research helped commercial partners refine their pricing and marketing approaches. Additional data collection and analysis activities were conducted to evaluate whether the business models were effective in stimulating product adoption, commercially viable in terms of cost recovery, and potentially scalable.

This brief describes the M&E Framework developed for the SWP, along with the data collection methods and outcome indicators used in the pilots. The M&E results from the SWP pilots are reported in other publications that can be found at www.path.org. The framework offers a unique approach to evaluating private-sector models for HWTS that may be of value to businesses entering the market as well as to nongovernmental organizations (NGOs) and donors seeking to encourage them.

Developing the M&E Framework

The M&E Framework is anchored in six key research questions posed by the SWP on the uptake of HWTS products and the commercial potential of the business models tested by the pilots:

1. What is the uptake rate among target consumers of HWTS products made available through commercial distribution channels and marketing?
2. What is the extent of consistent and correct use among target consumers of HWTS products made available through commercial distribution channels and marketing?
3. What are the triggers and barriers to trial and use of HWTS products made available through commercial distribution channels and marketing?
4. Can commercial partners earn a profit from sales to target consumers?
5. Will commercial partners continue and/or scale up the SWP pilot business model to reach target consumers?
6. What other efforts/inputs/incentives are needed to stimulate supply and demand for HWTS to target consumers?

To answer these questions, PATH worked with Emory University and PATH's evaluation partner, Abt Associates, to develop the novel M&E Framework for the SWP. In contrast to existing approaches, this framework directly addresses issues raised by using market-based approaches and seeks to meet the needs of for-profit businesses entering the HWTS market. Commercial business sustainability is a primary focus. This can be defined as the ability of a business to thrive without subsidies or other outside financial support.[1] Sustainability distinguishes commercial models from social marketing and is essential for a business model to go to scale. Even when complete cost recovery is not possible, understanding the potential return on investment can help businesses and donors make strategic investments that help meet the need for safe water.

Who are the target consumers for the Safe Water Project

The SWP targets households living beyond the subsistence level, because they have the resources to treat drinking water if they are so motivated. The project does not target the poorest households, because commercial efforts will not meet their needs without subsidies. The project also does not target the wealthiest households, because the commercial sector in developing countries is already serving their needs.

Therefore, target consumers for the SWP are defined as the middle three wealth or income quintiles, in other words, the middle 60% of all households. This definition relies on consumers' relative socioeconomic status, using nationwide data on the wealth or income distribution within a given country. The absolute wealth or income of target consumers varies among countries. Of course, households from the poorest and richest quintiles may also use HWTS products promoted by the project.

Table 1. Description of pilot activities

Location	Business model	Product	Commercial partners	Pilot implementation
Cambodia				
Kampong Cham	Retail sales model; full price sales were compared with two coupon schemes	Ceramic water filters (Tunsai and Super Tunsai)	***Manufacturer:*** Hydrologic	Mar 2011–Jul 2011
Kampong Speu	Compared door-to-door sales with consumer credit sales offered through a MFI	Ceramic water filters (Tunsai and Super Tunsai)	***Manufacturer:*** Hydrologic ***MFI:*** VisionFund	Dec 2010–Dec 2011
India				
Andhra Pradesh	Compared loans with 15- or 20-week repayment options to finance purchase	Tabletop combination filter/purifier (Aquasure Xtra)	***Manufacturer:*** Eureka Forbes Limited ***MFI:*** PSS - ACCESS	Dec 2010–June 2011
Madhya Pradesh	Compared two levels of price subsidies	Tabletop combination filter/purifier (Pureit)	***Manufacturer:*** Hindustan Unilever Limited ***MFI:*** Spandana	Nagda: Jan 2010–Mar 2010 Neemuch: Sep 2010
Tamil Nadu	Compared loans with 24- or 50-week repayment options to finance purchase	Tabletop combination filter/purifier (Pureit)	***Manufacturer:*** Hindustan Unilever Limited ***MFI:*** Spandana	Jul 2009–Apr 2010
Uttar Pradesh	Mobile sales agents on bicycles sold product door-to-door and at weekly markets	Chlorine tablets (Aquatabs)	***Manufacturer:*** Medentech ***Distributor:*** MART	Feb 2009–Apr 2010
Kenya				
Nyanza and Western Province	Door-to-door sales, with water filter integrated into larger basket of goods	Ceramic water filter (Chujio)	***Manufacturer:*** Chujio Ceramics ***NGO:*** Safe Water and AIDS Project (SWAP)	Oct 2010–May 2011
Vietnam				
Can Tho	Government health staff sold product door-to-door	Chlorine tablets (Aquatabs)	***Distributor:*** Zuelig Tien ***Manufacturer:*** Medentech ***Sales force:*** District Medical Centers	Oct 2010–May 2011

Although the SWP M&E Framework expands the scope of M&E metrics and methods in order to assess commercial viability, it also draws heavily on established indicators, tools, and approaches for evaluating HWTS programs developed by other organizations.[2] Important sources include:

- Strategies for measuring behavior change in HWTS promoted by the United States Agency for International Development (USAID), which clarify the challenges in defining HWTS use.[3,4]
- Population-based and targeted surveys conducted by the United States Centers for Disease Control and Prevention to measure the adoption of chlorine disinfectants and behavior change within specific sub-groups.[5]
- Tools developed and fielded by Population Services International to inform strategic planning, monitor outputs, and determine the impact of social marketing programs; these include nationally representative surveys of potential users.[6]

Selecting Study Designs

In recent years there have been calls for more rigorous and relevant evaluations of development interventions, including those in the water and sanitation sectors.[7,8,9,10] However, different situations call for different methods and techniques. Table 2 shows a continuum of approaches to evaluating program outcomes and impacts, along with their different strengths and weaknesses. When selecting the most appropriate evaluation design for a project, researchers must consider the nature of the intervention and the purposes of the impact evaluation.[11]

As the SWP research questions suggest, the evaluations of the commercial pilots were formative rather than summative and focused on outputs and outcomes rather than impacts. Their primary purpose was to investigate and improve the effectiveness, efficiency, and sustainability of commercial marketing and distribution systems for HWTS products. To this end, they focused on understanding consumer decision-making and its implications for generating demand for the products being promoted and operational feasibility of the models. The evaluations did not attempt to determine whether—or measure the extent to which—pilot activities improved health indicators.

It should also be noted that most of the pilots were brief and exploratory in nature. Commercial partners preferred 3-month trials, but in some instances PATH negotiated pilots of 6 to 12 months in order to observe the effect of seasonality on sales. Some pilots were cut short because of operational issues. Implementers reacted quickly to discontinue unproductive approaches. In Cambodia, for example, a scheme to sell water filters door to door was discontinued in a matter of weeks when it was outcompeted by a microfinance model.

Due to the fast pace and the iterative learning orientation of the SWP pilots, randomized control trials were not considered feasible or appropriate, even though they are considered to be the gold standard for evaluations.[7,10,12] Randomly assigning individuals, facilities, or communities to be part of an intervention or control group addresses two major threats to the validity of a study, first, biases in the selection of program participants and, second, the influence of outside events on outcome and impact indicators. There is no doubt that this experimental approach produces the strongest evidence that an intervention has caused any changes observed.

In the SWP pilots, however, commercial concerns—including the likelihood of consumers buying HWTS products and the need for viable distribution channels—necessarily dictated the selection of the pilot areas. Nor was it possible to prevent the leakage of marketing efforts or the movement of people out of the intervention area, which weakened the experimental conditions. Furthermore, the SWP research questions did not require the strict attribution of causality, making it wasteful to expend the money and energy needed to conduct a randomized control trial at this early stage of experimenting with new market-based models.

Quasi-experimental designs also rely on a comparison group to strengthen the evidence for causality, but they use non-random methods to select that group. This is the design most often used by water and sanitation impact evaluations.[8] One common approach, frequently used in water and sanitation impact evaluations and used by two of the SWP pilots, is to compare outcomes in areas that receive a program with similar areas that do not. The strength of the evidence attributing outcomes to an intervention

Table 2. Characteristics of study designs across the research continuum

Characteristics	Study designs			
	Post-only	Pre-post	Quasi-experimental	Randomized control trial
Number and type of study groups	Intervention group only	Intervention group only	Intervention and comparison groups are matched based on characteristics believed to influence program outcomes	Intervention and control group members are randomly assigned
Timing of data collection	After intervention	Before and after intervention	Before and after intervention	Before and after intervention
Controls for selection biases	No	No	Not entirely	Yes
Controls for outside influences and events	No	No	Depends on how well matched groups are	Yes
Can establish causality	No	No	Depends on how well matched groups are	Yes
Can determine magnitude of outcomes	No	No	Depends on how well matched groups are	Yes
Can measure changes over time	No	Yes	Yes	Yes
Time, resources, and expertise needed	Least	Less	More	Most
Difficulty of implementing	Least	Less	More	Most

Sources: Trochim 2006; World Bank 2011

depends on how well matched intervention and comparison areas are on characteristics relevant to program outcomes. This proved difficult to achieve in the SWP pilots, which involved the real-life implementation of a business model over a relatively large area to measure operational feasibility and profitability. The reliance on large geographical clusters—on the scale of districts and sub-districts—made it difficult to find comparison areas with similar key baseline characteristics in most countries.

Most of the SWP pilots used a nonexperimental, pre-post evaluation design that measures changes over time by comparing data collected before and after an intervention; there is no control or comparison site. While easier to conduct, this design cannot exclude the impact of outside events and influences, such as a drought or government media campaigns for safe water, on product purchase and use. Even though it is less scientifically rigorous, the pre-post design is well suited to just the sorts of research questions posed by the SWP. Pre-post studies can produce useful information concerning program implementation and effects, including variations in outcomes like HWTS use that are associated with consumer characteristics or differences in marketing efforts.[13]

In one instance in Vietnam we had credible evidence that the awareness or use of Aquatabs was zero and thus a meaningful baseline was precluded. In this pilot we did not collect data before the intervention

and instead relied solely on a survey conducted afterwards. While this is a weaker study design, it was able to determine the uptake of a truly new product since, by definition, there was no use beforehand. In Vietnam, the use of any kind of chlorine water treatment was extremely rare before the pilot, so omitting a baseline in order to conserve resources was reasonable.

The lack of comparison groups or control sites in most of the pilots meant that certain questions could not be answered. For example, it was not possible to exclude outside influences on the pilots' outcomes and attribute changes solely to project activities. It was also not possible to determine whether pilots increased overall demand for HWTS or assess the impact of the pilots on health indicators. However, the M&E approach used was appropriate to the task at hand: identifying which business models are most promising—based on their ability to promote uptake among target populations, feasibility, and commercial viability—and merit more rigorous evaluation at a larger scale.

Elements of the M&E Framework

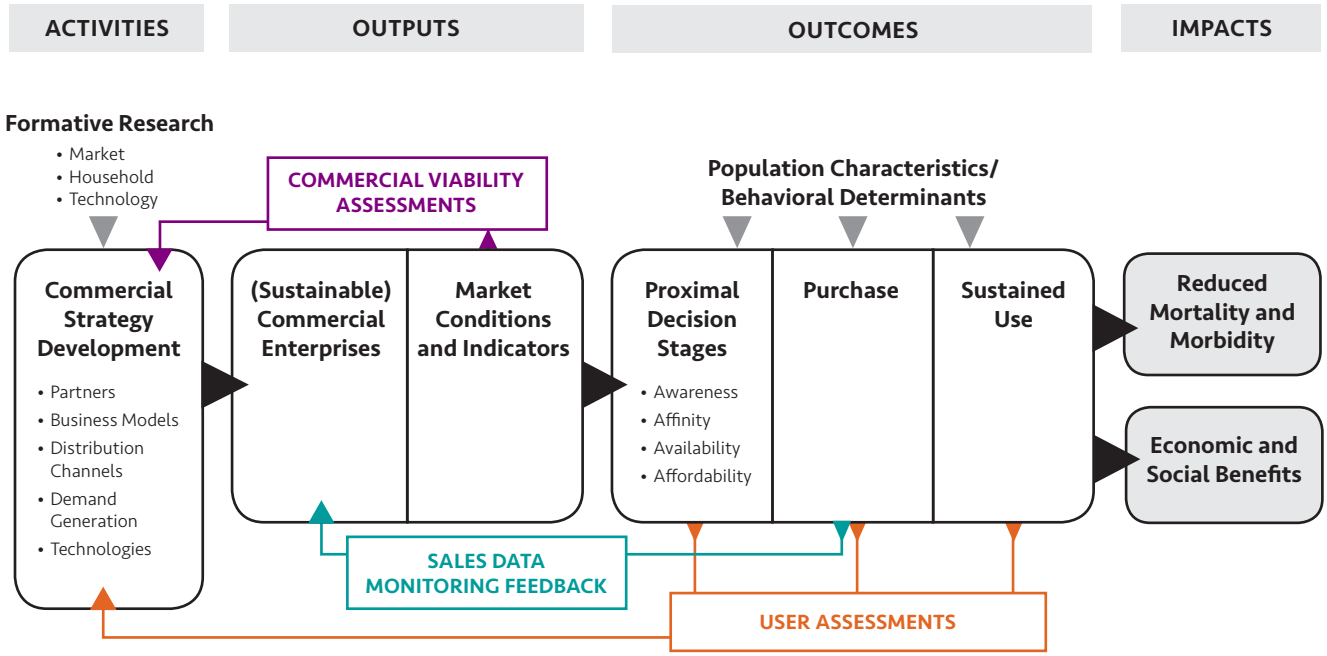
The M&E approach used by the pilots was based on and informed by a broader conceptual framework developed for the SWP. This conceptual framework describes how project activities logically lead to the intended objective, i.e., generating sustained, correct use of effective home water treatment products by target consumers through market-based approaches. The framework suggests key data collection points for use in:

- Devising project strategies and activities.
- Tracking the implementation process and project outputs.
- Assessing project outcomes.

While the conceptual framework builds on existing HWTS delivery models, it shifts the focus to the commercial market. It elaborates on how households interact with messages, products, and points of sale in the marketplace. This market-user focus is intended to serve as a bridge between commercial models of consumer decision-making and psychosocial models of behavior change.

Figure 1 depicts the conceptual framework as a linear pathway, moving from left to right. Project activities and their intended outputs, outcomes, and eventual impacts are indicated in black, while data collection activities are shown in colored boxes. The figure illustrates how M&E activities relate to and inform each step in the project pathway.

Figure 1. Conceptual framework for the Safe Water Project with highlighted M&E data collection activities and feedback loops



Project activities:

Using formative research to develop commercial strategies

The core activity for each pilot was developing one or more viable commercial strategies to bring affordable and effective HWTS products to low- and middle-income populations in that country (see box for a description of the SWP's target consumers). To a large extent, the decision for what commercial strategies to use was based on information about market conditions, consumer perspectives, and proven HWTS technologies identified by formative research activities including **literature reviews**, **market assessments**, segmentation research, development of **consumer profiles**, and extensive laboratory and **field-based product testing**. Formative research findings were used to:

- Determine which business models and distribution channels are best suited to local market conditions.
- Select products that meet consumer preferences, water treatment practices, and health and lifestyle needs.
- Understand households' media use and exposure, trusted sources of health information, decision-making behaviors, and consumer buying habits.
- Identify potential commercial partners.
- Make marketing decisions on products, placement, promotion, and price.

Formative research findings also fed into later M&E activities. They identified consumer groups of special interest who could be recruited to participate in research activities. The findings pointed out potentially important influences on HWTS decisions that needed to be covered in surveys, interviews, and discussions. They revealed market challenges that needed to be investigated in assessments of commercial viability.

Identifying the gaps and opportunities for reaching households that have lower income than those currently served by commercial models allowed PATH to make select investments in partners with the capabilities to fill those gaps. PATH's strategy to increase HWTS access consisted of bridging three main gaps: the lack of affordable and effective products designed for low-income users, the lack of distribution channels that reach low-income populations, and the lack of demand for HWTS products. PATH then sought to partner with organizations best positioned to fill these gaps: product manufacturers, organizations with innovative distribution models, and agencies with local marketing knowledge.

In contrast to more common NGO-implemented projects, these market-based pilots were driven by commercial partners. PATH developed strategies and identified partners with strong competencies, but the partners operationally implemented the models using their skills and primarily their own assets. This approach reduced PATH's control of how the pilots were conducted but also created less dependency on PATH, making this a more effective test of how well these models could be independently scaled.

Outputs:

Assessing the viability of business models and monitoring implementation

After developing a strategy and assembling a team of commercial partners, the next step —and the main project output—was for a commercial enterprise to bring the selected HWTS product to market. Assessing the commercial viability of this enterprise is a key part of the M&E Framework, because it determines whether the enterprise can continue to operate or scale up after a pilot ends. To be sustainable, businesses must produce enough sales and revenues to cover their operating costs and generate a profit for every participant, including manufacturers, MFIs, wholesalers, distributors, retailers, and sales agents. Sustainability also requires that all of these participants are willing to continue their involvement in the business after the pilot ends.

Commercial viability assessments rely on a mix of quantitative and qualitative data. First, routinely collected data on sales, costs, and revenues are used to calculate profits and losses; to project growth in sales and revenues; and to determine the break-even point in a future trajectory. Second, interviews with commercial partners are examined to determine their willingness to continue with and/or scale up the business, potential challenges to the business model, and needed modifications. Third, household survey data are analyzed to determine the effectiveness of marketing activities and potential market size.

Routine tracking of sales and cost data also serves an important

monitoring function. It enables managers to troubleshoot problems and modify business strategies to increase the effectiveness and efficiency of operations. For example, managers may use sales records to compare the performance of mobile sales agents and decide who should be promoted, who needs further training, and whose engagement should be discontinued.

Outcomes:

Assessing the uptake and use of a promoted HWTS product

The intended outcome of the SWP pilots was for target consumers to purchase the HWTS product being promoted and to use it correctly and consistently over time. Purchase and sustained use are prerequisites not only for building a profitable and sustainable commercial enterprise but also for achieving intended health benefits.

Thus, the success of the enterprise depends on its ability to influence household decisions and daily habits related to home water treatment. As shown in the conceptual framework, Figure 1, the decision-making process is shaped by a series of proximal determinants which form a bridge between commercialization activities and individual behavior. These proximal determinants fall into the following four categories known as the four A's:

- Awareness of the need for water treatment and of HWTS products,
- Acceptability of the practice of home water treatment and specific products,
- Availability of products and knowledge of sales outlets.
- Affordability of products.

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Cambodian enumerators reviewing the questionnaire prior to data collection

Research on the adoption of HWTS suggests that behavioral determinants and population characteristics also influence purchase and use decisions.[3,14] Behavioral determinants operate at the individual level and include social norms, attitudes and beliefs, knowledge, and the perceived need to treat water. For example, individuals may be more likely to adopt HWTS if they believe that other community members approve of and have adopted the practice, or if they think it is a good idea for children or others to drink treated water.

Key population characteristics—which include socio-demographic characteristics, health status, and residence—influence the behavioral determinants of HWTS use as well as the potential health and development impacts of the SWP program. For example, younger and better educated persons are more likely to understand and appreciate the benefits of home water treatment, while wealthier households will find it easier to pay for commercial HWTS products. Households living in areas with contaminated water sources will receive greater health benefits from HWTS.

The M&E Framework includes a variety of user assessments to determine which proximal determinants, behavioral determinants, and population characteristics have the greatest influence on consumer decisions and actions regarding HWTS. Because these factors are precursors to the actual purchase and use of HWTS products, they may be used as outcome or performance indicators. Managers can include the insights provided into the consumer decision-making process to help inform market segmentation and tailor marketing strategies to specific consumer groups. They can also use data on population characteristics to define and target at-risk populations who are especially vulnerable to the health consequences of unsafe water, although commercial partners were reluctant to target solely based on vulnerability during the pilots.

Two types of user assessments are quantitative in nature: cross-

sectional surveys of potential users and longitudinal surveys of current users. They provide data on the proximal determinants, behavioral determinants, and population characteristics that influence the decision-making process. They also measure exposure to project activities, purchase and trial use of products, and correct and sustained use of products. The third type of user assessment is qualitative and involves open-ended discussions and interviews with respondents selected for their HWTS usage behaviors.

Impacts:

Reducing morbidity and mortality

The end of the pathway in the conceptual framework—and the intended impacts of the pilots—are reductions in the:

- Prevalence of waterborne disease, primarily diarrheal disease.
- Number of deaths linked to waterborne disease, especially among children under age five.
- Social and economic costs associated with waterborne disease.

As explained in the section on study design above, it was not within the scope of the SWP to assess health impact, which requires different research methods than those used for business viability. To measure reduction in morbidity and mortality, PATH recommends a second phase of this work in which the most successful pilots are expanded and examined for their health impact using rigorous randomized control trial methods.

Data Collection Methods

As described above, all of the project's M&E activities relied on data from six sources:

- Cross-sectional quantitative surveys of potential user.
- Longitudinal quantitative surveys of current users.
- Qualitative research with target consumers, pilot implementers, and other key informants.
- Routine tracking of sales, cost, and other management data.
- Operational analysis.
- Water quality testing in pilot areas.

Cross-sectional surveys of potential users

Potential user surveys collected cross-sectional data from households in the target consumer group, regardless of their water treatment practices. The questions covered:

- Proximate determinants of household decisions, including awareness, accessibility, acceptability, and affordability,
- Behavioral determinants of HWTS use,
- Population characteristics of users and non-users,
- Perceived availability and affordability of HWTS products,
- Self-reported use of HWTS products and intentions to use, and
- Self-reported purchasing behaviors.

In each household, the person most responsible for water collection, storage, and handling was asked to respond to the survey. As a result, survey respondents were overwhelmingly female. Multistage systematic random sampling was used to select a representative sample of households. The size of the sample was calculated based on the:

- Target values for the primary outcomes of interest in specific sub-groups.
- Desired level of precision of the estimates (level of statistical significance and power of estimates).

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Household interview, Vietnam

With one exception, all of the SWP pilots included two rounds of potential user surveys in order to measure changes in project outcomes over time. *Baseline surveys* were conducted before and *endline surveys* after project activities were implemented. While most questions were repeated in both surveys, the endline survey included additional questions on exposure to project activities.

Data from the two surveys were used to assess project outcomes by:

- Measuring changes in the percentage of respondents who purchased a HWTS product, used it correctly and consistently, and sustained their use over time.
- Identifying sub-groups that were most or least likely to purchase and use a product.
- Detecting alterations in patterns of household decision-making and preconditions for purchase.

Longitudinal surveys of current users

Current user surveys collected longitudinal data during a series of unannounced home visits to households that were using the HWTS product promoted by the pilot. These households were identified from sales records or from endline surveys of potential users. A major advantage of current user surveys is that they enable field workers to make observations as well as interview household members. For example, field workers may test stored water for residual chlorine, look for a supply of consumables in the house, check whether filters are clean and consumable parts have been replaced on schedule, or observe whether household members use the product correctly. Direct observations are inherently more reliable than the self-reported behaviors recorded by potential user surveys.

Because current user surveys involve multiple visits to the same household over time, they also can track how behaviors evolve: for example, whether home water treatment is sustained over a period of months or years; whether a product is used consistently, seasonally, or irregularly; or whether households switch products. Repeat visits are kept brief to minimize their impact on household practices. However, the final visit permits deeper probing into attitudes and beliefs, such as motivations for purchases, the position of water treatment among other life priorities, and the reasons for (dis)continuing HWTS.

Longitudinal surveys were only feasible and appropriate when pilots were launched early enough to shed light on sustained use and distributors continued to make HWTS consumable supplies available to consumers. Two SWP pilots in India met these conditions. Each surveyed a sample of 100 current user households, which was considered sufficient to capture different subgroups. A SWP pilot in Cambodia is also tracking long-term usage and satisfaction with the water filters they promoted.

Qualitative research

Qualitative research with target consumers helped interpret the results of the quantitative surveys by providing a deeper understanding of the HWTS decision-making process and the factors that influence it. Focus group discussions and in-depth interviews were conducted after pilot activities had been implemented with subgroups of special interest. For example, researchers probed:

- Never-users who are aware of a product about barriers to trying it.
- Current users about motivations for purchasing a product and sources of support for continuing use.
- Lapsed users about reasons for discontinuing use.
- Irregular users about when and why they treat water.

Depending on the nature of the pilot approach, interviews with other key informants, such as HWTS vendors and health care workers, were conducted to shed light on consumer behaviors.

Interviews with commercial partners produced a wealth of information about the implementation process, notably whether it met expectations, what challenges were encountered, and the lessons learned. These interviews also offered insights into commercial viability by identifying supply-side barriers, assessing the willingness of commercial partners to continue participating in HWTS sales, and seeking suggestions for improvements to the marketing and distribution system. Depending on the issues of interest, manufacturers, MFIs, distributors, retailers, and individual sales agents were selected for interviews.

Routine tracking of sales, cost, and other data

Businesses routinely track sales, operating costs, and revenues and

use this information to draw up profit and loss statements. These provide basic information on how many products are sold and whether revenues cover costs. Routine information is also available on the number and location of sales points and the activities of sales agents. Managers can analyze these data in a variety of ways for monitoring and evaluation purposes. For example, they may:

- Calculate how much profit (or income) is earned by each actor, including the manufacturer, distributors, retailers, sales agents, and microfinance partner.
- Compare sales volumes and profitability in different geographic areas.
- Compare the performance, in terms of sales volume and profitability, of different retail outlets and mobile sales agents.
- Examine the impact of different marketing activities on sales.
- Use past sales trends to project future growth in sales.

Businesses consider this sensitive information and strictly control access to it. PATH had to negotiate with the commercial partners involved in each pilot to gain access to the data and reach agreement on how the information could be disseminated. The goal was to add to the general body of knowledge on market-based approaches to HWTS without undermining the business interests of the commercial partners.

Operational Analysis

Understanding the operational context and potential constraints of the model being implemented was also critical to the assessment of scale and sustainability. PATH developed a framework for identifying the operational challenges and best practices of each model so that future implementations or scale-up could be led in the most optimal way.

Several factors must be taken into account when considering the operational aspects, such as:

- **Partner interaction and engagement**—What roles do each play? What are each party's strengths? Are incentives aligned?
- **In-field execution**—What infrastructure exists to support the model? How is inventory managed and distributed? What is the nature of the customer interaction? How are payments collected and what are the payment options?
- **Sales force management**—How are salespeople identified and recruited? How are they trained? What is their incentive structure and how is it aligned with the organization and with the health-related goals of the model? How are salespeople evaluated?
- **Promotions and messaging**—What marketing medium was used? What promotional techniques were tried? What process must be followed to develop appropriate messages and work through local media?
- **Reporting and tracking mechanisms**—What mechanisms are in place to measure either the efficiency or effectiveness of the model? How easily can they be implemented? How accurate are they? How can they be used to optimize the model?

Figure 2. Example of an operational analysis from the direct sales Cambodia pilot

EXPECTED	CHALLENGES	IMPACTS	NEXT STEP/BEST PRACTICES IMPLEMENTED
MFI credit service officers (CSOs) would work closely with filter manufacturer salespeople to quickly and efficiently assess loans.	CSOs were often too busy and did not have time for additional work. The MFI partner could not adjust the workload expectations or compensation of their CSOs working with the manufacturer.	Long loan processing times, unwritten loans, higher costs, and lower customer satisfaction. CWEs informally did the job of many CSOs. The manufacturer introduced a bonus incentive for MFI CSOs.	MFI agreed to contribute fully dedicated CSO's to the program who focus solely on making water filter loans.

Below is an example of an operational challenge identified during our direct sales pilot in Cambodia to sell water filters to households through a MFI installment scheme. In this pilot a sales team of "clean water experts" were trained to sell filters to the community. Shortly after the initiation of the pilot, Hydrologic, the filter manufacturer, partnered with the MFI VisionFund to increase the reach of water filters through offering microfinance loans. This table gives an example of how challenges were identified and adjustments were made to increase the efficiency of scale-up activities.

Model Optimization

By actively tracking the sales, cost and other commercial data and combining this with the learning from the operational analysis, we were able to make several recommendations for optimization or enhancement to the models tested. Of particular value was the ability of the pilot partners to streamline operations and focus energy on the most efficient and effective drivers of sales, while minimizing the costs to do so. The end results were recommendations that offer potential to maximize cost recovery of each model.

In many cases, pilot models begin at relatively low levels of cost recovery, due to the fact that PATH and our pilot partners invested in testing numerous variables such as price points, product redesign, payment plans, various marketing approaches, and use of coupons. Once tested, some variables were found to be more effective than others so refinements to some of the pilots led to higher optimization and dramatic improvements in cost recovery in the period immediately following the formal pilot period. While the goal of the commercial partners is to eventually surpass 100% cost recovery, in many models this may not be achievable due to a variety of factors (especially if the target consumer was very low income). In these situations, rather than assume a model is not viable, it should be considered that perhaps this could be a suitable model for a public/private partnership, whereby some portion of the model is subsidized to achieve maximum health impact while leveraging private-sector expertise, infrastructure, and financial resources.

Water quality testing

Commercial partners chose the initial pilot sites with the aim of reaching low-income populations in settings where they could extend their operations and it was feasible to build out distribution channels. Partners also considered whether local source water was contaminated with pollutants, such as arsenic, that their products were not able to treat. However, the degree of microbiological contamination in local water was not generally a factor in decisions regarding site selection.

It was important for the SWP to know whether a pilot was reaching a population with compromised water quality. After all, the project's ultimate goal is to enable households with unreliable and/or unsafe sources of water to consistently access and use effective home water treatment products. Water quality testing can determine whether a pilot is targeting a vulnerable population, that is, a population in which high proportions of households (1) get water from unsafe sources and (2) consume unsafe drinking water (either stored or drawn directly from the source). To define unsafe water, PATH relied on international standards for the quality of drinking water established by the World Health Organization.[15]

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Protected spring that was tested for water quality, Kenya

Microbial water testing was used to determine whether the population targeted by the pilot could be considered vulnerable according to these standards. Around 10% to 20% of households in the pilot area were randomly selected for water testing, during either the baseline or endline user assessment. Both the source water and water stored in the home were tested for total coliform bacteria and for E. coli, which is an indicator of fecal contamination.

In some pilots, additional water testing was conducted as part of longitudinal surveys of current users. Field workers tested stored water for residual chlorine during unannounced home visits to verify whether households that reported using disinfectants were actually doing so.

Outcome Indicators

A core set of outcome indicators were developed to answer the key research questions posed by the SWP. These indicators permitted comparisons across pilots, partner teams, and products and revealed whether a pilot achieved numerical targets. Most indicators were quantitative in nature, but qualitative research results helped interpret them. Sample indicators are presented in Table 3. When necessary, the SWP pilots modified indicators to fit the product being promoted or the business model being tested.

Indicators for proximal determinants and behavioral determinants helped us better understand the triggers and barriers to purchase and use of HWTS products. These indicators are quantitative and draw on data from surveys of potential and current users.

Table 3. Illustrative outcome indicators for the SWP M&E Framework

Domain	Sample indicator
Proximal Determinants	
Awareness	Percent of respondents who have heard of specific HWTS products (brand recognition)
Acceptability	Percent of respondents that feel confident they are able to use the product or filter to make their water safe to drink
Availability	Percent of respondents who know where to buy HWTS products
Affordability	Percent of respondents who wanted to purchase HWTS products, but lacked the necessary funds
Behavioral Determinants	
Social norms	Agree that: "Most of my friends do something to make the water safer to drink"
Knowledge and perceived need to treat	Disagree that: "I don't need to treat my drinking water because the water I get/collect is safe to drink"
Attitudes	Agree that: "Giving children purified drinking water would be good for them"
Population Characteristics	
Socioeconomic status	Household assets
Health status	Prevalence of diarrhea within last 14 days
Geography	Normal drinking water source
Demographic characteristics	Age of respondent / female head of household
Purchase and Use	
Purchase	Percent of respondents who report purchasing HWTS product
Sustained use	Percent of respondents who have repurchased consumable HWTS products (confirmed by observation)
Current and correct use	Percent of respondents who use HWTS correctly (verified through observation or water testing)
Consistent use	Percent respondents who report using disinfectant on all or most days in the past 30 days
Commercial Viability	
Channel effectiveness	Number of HWTS units sold per capita or defined geographical/ population catchment unit
Channel efficiency	Average number of HWTS units sold at each point of sale or by each sales agent per day/month Close rate as calculated by the number of purchases divided by number of client contacts
Channel sustainability	Level of cost recovery as measured by the total delivery channel revenues divided by the total costs Number of sales agents, distributors, and manufacturers interested in continuing with the model after the pilot ends

Survey data on population characteristics were used to determine which consumers are most or least likely to try a product, define market segments, and decide which marketing messages and activities would be most influential.

Indicators for the purchase and use of HWTS products focus on the intended outcomes of the pilots. No single indicator can fully capture the nature of HWTS use, so a series of indicators are used to measure the different aspects of use, i.e., sustained use, correct use, and consistent use. Data may come from potential or current user surveys. Because potential user surveys rely on self-reporting, their findings may not accurately reflect consumers' actual behavior. More reliable data came from direct observations and tests of chlorine residual in stored water conducted as part of current user surveys.

Indicators for commercial viability measure the effectiveness, efficiency, and sustainability of HWTS sales and distribution channels. While most of the indicators drew on data routinely collected by management systems, some—such as interest in continuing with the business—required interviews with commercial partners.

Conclusion

The M&E Framework developed for the SWP proved to be a unique and valuable tool for evaluating commercial approaches to HWTS. The framework, together with the data collection methods and indicators developed for the pilots, can be of use to businesses that are trying to enter the HWTS market or wish to improve their performance, to NGOs working with the private sector, and to donors who want to know where to invest their limited resources.

The framework succeeded in meeting the fundamental goal set by the SWP: that is, to identify robust, feasible, and commercially viable business models that can promote the uptake of HWTS among vulnerable populations and may have eventual health impacts. Review of the data and results generated by the M&E methods employed helped the SWP identify which models have the greatest potential to yield impact, scale, and sustainability. In addition, these data suggest how to improve the effectiveness and efficiency of a HWTS business.

The M&E Framework highlights some of the potential risks and limitations of working with the commercial sector. Access to sensitive business (cost and sales) data is challenging to negotiate. It is important to clarify contractually what data will be collected for analysis and what will get publicized more broadly to advance the field. In some cases it is necessary to sign nondisclosure agreements in order to assure confidentiality and boost confidence. Commercial partners are generally oriented toward maximizing profits and optimizing return on investment making it less desirable to have their sales and distribution efforts randomized for the purpose of comparison; they tend to choose geographies and populations that are easier to access which may not be where the greatest public health impact can be achieved. Lastly, our experience suggests that commercial partners typically prefer to make short-term investments in a pilot effort (i.e., three month run time) which is not conducive to generating the type of rigorous evaluation results that are more compelling to the public health sector. NGOs and donors can negotiate on behalf of the public good by incentivizing established businesses and new entrants to target underserved communities, fostering competition in order to improve coverage and drive down prices, and increasing consumer choices.

Forthcoming results* from the SWP commercial pilot evaluations yield unique insights on the strengths and limitations of market-based approaches, lessons that PATH and others can apply to future efforts to promote HWTS use through public- or private-sector initiatives. The most promising of the SWP commercial models are strong candidates for additional investment to extend the implementation timelines in order to apply the lessons learned and optimize the functioning of the models, as well as to replicate and adapt the approaches in other settings. While we expect our commercial partners to streamline their approaches to evaluating their on-going operations, we recommend more rigorous evaluation of the best of the SWP market-based approaches implemented at a larger scale now that the feasibility of the models have been assessed.

** From December 2011 through mid 2012, results from Safe Water Project pilots will be posted at www.path.org.*

Acknowledgments

PATH greatly appreciates the work of Rick Rheingans and Robert Dreibelbis of Emory University who assisted with the preliminary development of the SWP Monitoring & Evaluation Framework for the commercial pilots. Abt Associates aptly adapted the SWP M&E Framework for their independent evaluation of each of the eight SWP commercial pilots. The SWP M&E Framework builds on tools, indicators, and approaches developed by PSI, USAID, and the CDC. The SWP Framework benefited from review of the Safe Water Project Technical Advisory Group members including Tom Clasen of the London School of Hygiene and Tropical Medicine, Maria Elena Figueroa of Johns Hopkins University, Rob Quick of the CDC, and Makarand Phadke of Reliance Industries Ltd. in India.

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