>> PROJECT BRIEF

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

SEPTEMBER 2011

Newly designed ceramic water pot for low-income households

Introduction

In 2006 PATH launched the Safe Water Project (SWP) to investigate the potential for market-based approaches to providing clean water for household use with the ultimate goal of reducing the incidence of waterborne disease. While governments and nongovernment organizations (NGOs) have been providing household water treatment and safe storage (HWTS) systems in low-resource areas for many years, the SWP is working to identify solutions to the continuing problems of sustainability and scale-up. We do this by identifying commercial enterprises that can produce, distribute, sell, and maintain these products for low-income populations.

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PATH developed and introduced a ceramic water pot to suit the needs of low-and middle-income families.

The initial focus of the SWP was on identifying market models and developing new or improved distribution channels to expand access and improve consumer uptake of HWTS products by low-income consumers. However, during this early work it became clear that there was also a real need for new and improved technologies and products for water treatment to support these distribution channels and promote consumer uptake,

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sustained use, and rapid scale-up of HWTS products. Therefore, the goal of the SWP's product development work has been to foster widespread demand for and availability of new or improved products and to raise the bar for affordability, quality, value, and performance of HWTS products.

The ceramic water pot (CWP) was identified as a product that provides an excellent potential for improvement through optimizing materials and processes as well as an opportunity for creating an updated design with greater aspirational appeal for consumers. CWPs can be found in Africa, Asia, and Latin America, and, in Cambodia, CWPs have been in use for several years. While CWPs are effective at water treatment, acceptable to consumers, and have demonstrated profit potential for local producers, scale-up and sustainability via market forces have been limited by factors including aspirational value, durability, production quality and efficiency. Distribution has also been impeded by breakage in transport and handling both before and after household purchase.

This project brief summarizes the work that PATH undertook with **Hydrologic**, a Cambodian manufacturer of CWPs, and **CAD-Based Solutions**, a Seattle design firm to improve Hydrologic's CWP to increase sales and use among low- and middle-income consumers and to help build a sustainable market for the product.

"Give users choices, and make the options not only functional, but also attractive and appealing. Enable users by providing solutions that are convenient, accessible and affordable…"

— Tom Clasen (2009)

Background

Many people in Cambodia lack access to clean water

A drink of clean water is nearly always within reach in the industrialized world, but a billion people across the globe struggle for access to this basic commodity.[1] In resource-poor countries, families often rely on unimproved surface water and, as a consequence, suffer from waterborne diseases. In Cambodia, 44 percent of the rural population does not have access to a clean water source, which means that if these families are to avoid illness—most often diarrheal disease—they must treat and protect their own drinking water. Waterborne illnesses are a major cause of the high mortality rate in Cambodia for children under five, 89 per 1000 live births, which is higher than many of their neighbors.[2]

Numerous safe water programs focus on improving quality at the source. However, water is often re-contaminated during its trip to households; during storage, where it may be transferred through a number of containers; and during dispensing, when hands make contact with water or when the same cup is used to both dispense and drink water.[3] Research has shown that interventions to improve quality at the household level are about twice as effective as those aimed at the source.[4] Among the most effective and economical of HWTS products is the CWP, a gravity-fed filtering device that is available in a number of low-resource countries, including Cambodia (see ceramic filter technology box).

A study of consumers in India provides insights for improving a CWP

In its initial research into HWTS products that would be acceptable and appropriate for low-income consumers, PATH worked closely with **Quicksand Design** in India to look into the needs and preferences of this population, with an eye to finding out how to overcome barriers to the use of these devices. In this study, termed **extended user testing (EUT)**, researchers observed how households interacted with a selection of water filters and purifiers over a six-month period, from acquisition and setup to ongoing use, maintenance, and repair.

PATH selected five different HWTS products to test in 20 low-income households, including a CWP produced in Cambodia by **International Development Enterprises (IDE)** (now Hydrologic) —a social enterprise focused on the rural poor. None of these products required electricity, and

PATH/Patrick McKern

The Tunsai CWP is popular for its affordability and ease of use, but its simple appearance is a barrier to uptake and perceived value.

all were effective in removing microbiological contaminants from water. Unfortunately, the Cambodian CWP container resembled a garbage bin, and, in comparison to the more sophisticated devices that other households received for the study, users were unenthusiastic about receiving the CWP and displaying it in their homes. However, among the findings of the study was that while the CWP was the least appealing product initially, by the end of the study participants appreciated its value, in particular that it was both easy to use and maintain.

The Cambodian CWP: the Tunsai

The Cambodian CWP that was included in the India user testing program was initially provided by the NGO that developed it, IDE. With its market-based approach to reducing poverty in developing countries, IDE had recognized the need for improving drinking water and had introduced the CWP in 2001. IDE branded it the Tunsai, or "Rabbit" in English, an animal associated in folktales with wisdom and cunning. In 2009, IDE spun off Hydrologic as a commercial entity, and by the time PATH's Safe Water Project began work on product improvement in Cambodia, Hydrologic was making the CWP. Prior to PATH involvement with Hydrologic, the Tunsai CWP had been sold predominantly to local NGOs who often distributed it at a wide range of price points to Cambodian households, from full subsidy to full price. To date, there are more than 150,000 Tunsai CWPs in circulation in Cambodia. The Tunsai CWP was popular in the India EUT because it was simple to use and easy to clean. It provided such a positive user experience in that study that even the relatively slow filtering time was not a deterrent to its use. People learned to fill it at night to have a full container of clean water in the morning, a modification of their usual behavior. However, as noted above, the appearance of the device was a barrier to initial use, limiting both uptake and the perceived initial value of the product.

PATH partners with Hydrologic to enhance the appeal of the Tunsai CWP

With the evidence from the EUT in hand, PATH's Safe Water Project went back to Hydrologic in Cambodia proposing to work with them to transform their CWP to meet not only the needs but also the aspirations of low-income consumers. Intertwined with this goal was the aim of commercial sustainability for this type of HWTS device, an outcome that would provide CWPs via retail markets at a reasonable price for low- and middle-income families.

From the start of the partnership, both PATH and Hydrologic were interested in the potential for market-based solutions to clean water for low-income populations. Hydrologic was already producing the well-regarded Tunsai CWP, but market penetration was low, with only 3.7 percent uptake in the decade following the introduction of the device problems were causing the tepid sales. First, the Tunsai CWP looks and works very much like CWPs offered by other NGOs in Cambodia. Both the Tunsai and the other versions of CWP have been subsidized and distributed to very low-income households through charitable networks, potentially making those with somewhat higher incomes wonder why they

In a 2008 study in Cambodia, 180 households using a ceramic pot filter reported only half the cases of diarrhea of those in matched control households without a filter.

Ceramic filter technology

Ceramic water pots (CWPs) consist of a ceramic filter and accompanying receptacle for the filtered water. The typical filter holds eight to ten liters of water and is suspended inside a plastic or ceramic receptacle with a capacity of around 10 to 20 liters. The receptacle is fitted with a tap and a lid: users pour water into the filter, wait for the water to flow through into the receptacle, and dispense filtered water from the tap.

Ceramic water filters are one of a number of products for household water treatment and have been in use since ancient times.[5] Candle-shaped ceramic filters were first produced commercially in England in the early 1800s and are used today in devices such as mineral pots and traditional drip pots in India. The most widely promoted CWP filter design today in the developing world is a flowerpot-shaped ceramic vessel based on a filter developed in Guatemala in 1981 by Dr. Fernando Mazariego. In the mid-1990s, Ron Rivera of the nongovernment organization Potters for Peace redesigned the manufacturing process, and filters based on this design now are made in over 20 countries. Locally produced ceramic pot-style filters have the advantages of being relatively inexpensive, low-maintenance, portable, effective, and easy to use. The filters remove microorganisms from water by gravity filtration through porous ceramics, with typical flow rates of 2–3 liters per hour.[6]

Filters for CWPs are made by pressing a mixture of clay and a combustible material such as finely ground sawdust or rice husks into the filter shape, allowing it to dry, and firing it in a kiln. The tiny holes left when the flammable material burns determine the effectiveness of filtering the water. The pore size can be made small enough to remove bacteria, protozoa, and worm eggs, down to a diameter of 0.2 microns. Challenge tests on filters in Nicaragua achieved a 4-log reduction in protozoa (Lantagne, 2001);[7] other tests of filters in Nicaragua, Ghana, and Cambodia, achieved 2–6 log reduction value in protozoa (van Halem, 2006)[7]. After firing, pots are typically coated with colloidal silver, a liquid suspension of microscopic silver particles with bactericidal properties.[8] CWPs are very effective against bacteria as well. Studies in Cambodia have shown a mean 1 to 1.4 log reduction value of E. coli and total coliforms.[9,10]

Hydrologic produces the ceramic filter element of its Rabbit unit at factories in Kampong Chhnang and Prey Veng using local clay mixed with finely ground rice husks. The factory workers form the pots with a press mold and fire them in a kiln. The plastic exterior of the unit is produced at another facility in Cambodia, and the final product is assembled and packaged at the Hydrologic plant.

As part of its safe water work, PATH also provided funding for members of the Ceramics Manufacturing Working Group (CMWG) to complete a set of best practices and recommendations for the manufacturing of ceramic water filters. The product of this collaboration, **Best Practice Recommendations for Local Manufacturing of Ceramic Pot Filters for Household Water Treatment**,[7] has been released and distributed worldwide through the CMWG and its members.

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Ceramic water pots are popular household water treatment devices with low- and middle-income families.

should pay for a product that was being given away for reduced cost or for free. Second, the CWP was large enough to pose a problem for shipping and for storage and display by retailers.

Evidence suggests that a market-based approach can work

When people invest in a product—whether with their time, money, or other resources—they tend to value, use, and maintain it to a greater degree than if they receive it for nothing. Investigators in a recent study in Cambodia found that households that invested cash in a ceramic filter unit, even a small portion of the cost, used the device for a longer period than households that received the filters gratis. Families that had discontinued using the filter unit (usually because of breakage of the ceramic pot) also were more willing to purchase a new ceramic element if they had contributed to the cost of the original device.[10]

In 2008 PATH conducted studies of consumer preferences and behaviors in low- to middle-income households in **Cambodia**, we found that while earnings were very low compared to those in wealthy countries, people do purchase items such as televisions, cell phones, and radios. Mineral pots were widely available and in high demand in urban areas: they were perceived to have great visual appeal related to social status but were too expensive for many families. The study indicated that many families could allocate money to pay for HWTS products; that they want devices that are not only practical but also aesthetically appealing; and that improved design and effective promotion could help this market. Low-income families are keenly aware of the consumer products that are popular in their communities and in higher-income households.

Some advantages of a market-based solution to HWTS products are that the private sector typically is willing to devote resources to a particular product, is more responsive to consumer preferences, and has the potential and motivation to sustain sales and scale up production. PATH's goal in working with Hydrologic has been to improve the appeal of a practical product so that low- and middle-income consumers will invest, sales will enable the company to scale up and possibly reduce prices, and clean water will have an impact on health.

CWP upgrade objectives

The goals of the redesign of the Tunsai were to develop a CWP that would have the positive characteristics of the original—a simple device that produced clean water in a reasonable amount of time—but would be more attractive, easier to ship and store, and priced for the low- to middle-income consumer. As work progressed, another goal was defined: making the design flexible enough that the unit can work with ceramic pots of varioius sizes that might be available from different manufacturers or in different countries. This goal was met by introducing a new element, the adaptor ring, which will be described below.

In addition to the work on the Cambodian CWP, a parallel PATH SWP objective was to develop general **design guidelines** for HWTS products. The guidelines, which informed the CWP work, provide evidence-based criteria for effective, commercially viable products that meet or exceed user expectations for long-term use, taking into account the unique needs of users in the developing world (see PATH household water treatment and safe storage guidelines box).

PATH household water treatment and safe storage guidelines

As a part of its Safe Water Project (SWP), PATH created **guidelines** for designing and developing products for household water treatment and safe storage (HWTS). The guidelines provide evidence-based criteria for effective, commercially viable products that meet or exceed user expectations for long-term use, taking into account the unique needs of users in the developing world.

PATH extends appreciation and gratitude for the product research that preceded the SWP. The WHO HWTS Network members, researchers on the ground, and hundreds of implementation lessons from dozens of countries created the foundation on which the PATH research and design guidelines were built.

Some objectives of the guidelines that apply directly to PATH's work to upgrade the Cambodian Tunsai filter are the following:

- Provide commercial firms and other stakeholders with credible product design information and recommendations.
- Enable more rapid development of products with aspirational value to low-income consumers, products of high quality, and products that offer the best performance for a given price.
- Promote correct and sustained use of HWTS products—especially by low-income users—by identifying and prioritizing product attributes with the greatest impact on user behaviors.
- Increase innovation, quality, and consumer choice in HWTS products.
- Catalyze discussion of product design approaches and the value of developing performance and design standards at the national and international levels.

The guidelines include the following attributes that were taken into account in the Rabbit upgrade:

Key indicators for product aesthetics

- Consumers find products visually appealing and appropriate for their sociocultural use environment (often based on prior experience with the aesthetics of other products).
- Product aesthetics contribute to long-term pride of ownership among users.

Key indicators for fitting into the household

- Product does not require a connection to electricity or piped water.
- Device can be set up, operated, and maintained without the need for tools, written instructions, or outside assistance.
- Device can be located anywhere in the house.
- No water is spilled when filling, operating, or dispensing water from the device.

Key indicators for product format

- Products employing a free-standing tabletop format are observed to offer the best combination of user accessibility, adequate head height, and minimal footprint. The freestanding tabletop format provides the greatest flexibility for placement in diverse use environments.

Designing the new CWP

The partnership with Hydrologic and CAD-Based Solutions produces initial design concepts

In creating Hydrologic to take its CWP forward in the commercial arena, IDE had determined that Cambodian spending power was increasing and that the product could do well in conventional retail channels (although distribution through charitable networks has continued). Subsequently, Hydrologic invested in training a Cambodian manufacturing and sales force, thus providing professional development and nonagricultural jobs in rural areas. They have partnered with 600 retail centers throughout the provinces for distribution, setting the stage for scaling up delivery of HWTS products in the country.

The PATH Safe Water team and Hydrologic decided to work with the Seattle firm CAD-Based Solutions to redesign the external portions of the Tunsai CWP for the Cambodian market. The ceramic pot, the core of the filtering process, would remain the same, but changes in appearance of the clean water container and other exterior components were proposed to make the CWP more atrractive and desirable and to encourage sales. The process of redesigning was an iterative one and included the activities outlined below:

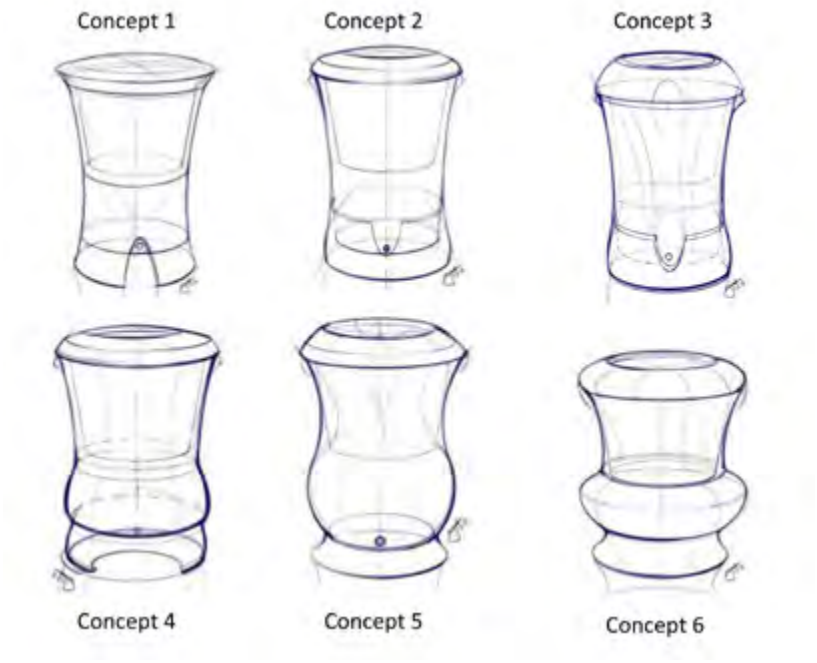
- PATH Safe Water staff provided information from the EUT in India to CAD-Based Solutions.
- The design firm produced a series of different design sketches for a new exterior shell.
- PATH discussed the sketches with the Hydrologic CEO.
- PATH took informal surveys of potential users in Cambodia to gauge which design features are most appealing.
- Safe water team gave the results of Cambodian survey to CAD-Based Solutions.
- CAD-Based Solutions, Hydrologic, and PATH worked together to progressively refine the design until it was ready for production.

The partners create the Super Tunsai

Because the intent of the redesign of the CWP was specifically to develop a more appealing and aspirational product for end-users to both increase sales and use in Cambodia, the design team reviewed Cambodian art and cultural icons as well as a number of commercially available filtering devices for ideas on improving the exterior appearance. The commercial devices included mineral pots that are favored by higher-income urban users in Cambodia and other Asian countries and have aspirational value for other potential users. PATH also shared videos of families in the EUT study in India using various HWTS devices to provide direct information on how users interacted with these appliances. The design firm then created a series of six sketches for a new exterior, ranging from a sleek, slim-waisted vessel to a squat, jug-like container (see figure 1).

The next step was to put the sketches in front of Cambodian eyes. An informal survey of high-income Western males produced a consensus for sketch number one, the most streamlined (modern, sleek) version of the exterior. In contrast, when the question was put to a Cambodian audience of about

Figure 1.



These product sketches were developed based on popular Cambodian household products and influential Cambodian artwork to ensure the appropriateness of their aesthetic.

20 male and female workers at the Hydrologic factory, the unanimous verdict was for sketch number three—a hybrid of traditional and modern designs.

Upon returning to Seattle, the Safe Water team, informed by further discussions with Hydrologic, worked with the design firm to pinpoint other changes that would improve the aesthetics of the CWP and increase its acceptability and sales:

- Make it easier to fill a container with clean water by adding a stand to allow clearance under the tap for a typical Cambodian water cup.
- Provide a visual cue to the user when to refill the top chamber.
- Develop a method for accommodating ceramic filtering pots of different sizes.
- Allow breakdown and nesting of components for shipping and storage.

The design team refined the overall shape of the unit based on Cambodian preferences and then used a CAD program to generate renderings. They chose a blue color for the shell because of its association with clean water and decided on the design for a stand, which had been requested by Hydrologic. Adding the stand to the device served purposes in addition to providing clearance for a drinking cup; cutouts in the wall of the stand allowed storage under the unit and the top of the stand now indicated the water level at which the ceramic pot could be refilled.

To address the problems of shipping the bulky unit and finding storage space on retail shelves, the design firm proposed a modular configuration that allowed nesting of parts. The final design has seven parts: ceramic filter, holder for the filter, lid, clean water receptacle, stand, tap, and an adaptor ring to allow use of ceramic filters of different sizes. This is a larger number than the four components of the original Tunsai—ceramic filter, bucket, lid, and tap (See Figure 2)—but in spite of the increase, the new model packs into a smaller box for shipping and storage because of the nesting design.

With the advances to the improved CWP that resulted from the redesign efforts, there were also compromises. Initially, PATH intended to create an improved CWP that could be purchased by low-income families for US$17—only US$5 more than the original Tunsai. However, complications and unexpected costs

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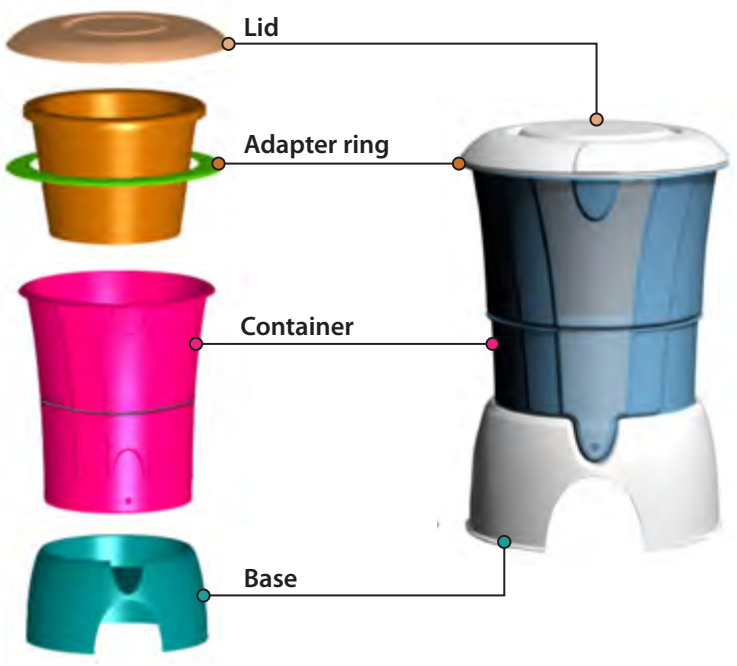
Figure 2. Exploded part view



PATH combined positives characteristics of the original Tunsai with new components that make the Super Tunsai more attractive and appropriate for low-to middle-income users.

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Despite its larger size, the Super Tunsai is easier to ship than the Tunsai due to its nesting feature, which allows compact packing.

ultimately raised the price to US$22. Some of the unanticipated expenses included an increase in the size of the device and the creation of a colorful, attractive retail box. The addition of the stand (to raise the tap height) and the adaptable support ring were other improvements to the device that while making the CWP more adaptable and appropriate for low-resource settings, also increased the price. While the price does not take the new CWP entirely out of reach for low- to middle-income families, it did exceed the target cost for the new design.

The CAD information for the new design was sent to a facility in China for production of injection molds for the plastic components. After a review of the first production run at the PATH Seattle office for some tweaks—lengthening of the filter holder and the clean water receptacle and refining the texture and polish of the shell—the molds were shipped to Hydrologic.

At this point, the rejuvenated Tunsai needed one more important change: a new name. The CWP was reborn as the "Super Tunsai" and given a jazzed-up sticker featuring a healthy, athletic rabbit in jogging gear. Colorful new packaging and promotional material that included the Super Tunsai figure was created for further consumer appeal.

The CWP platform is an outcome of the redesign of the Tunsai filter

An inconspicuous but crucial new element of the Super Tunsai is the adaptor ring, a thin plastic disc whose internal diameter can be chosen during manufacturing to accommodate ceramic pots of diverse sizes from different countries or factories. This adaptor ring and the ceramic pot comprise the CWP interoperable platform interface , or basic filter technology, of the Super Tunsai, with the exterior plastic components making up a static portion—the part that has undergone the cosmetic upgrade. For full details on what was changed between the Tunsai and the Super Tunsai, see Figure 3. Creating this filter platform allows PATH and others to promote use of the design in many different settings, while allowing manufacturers to make use of locally available ceramic pot filter elements.

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Figure 3. Comparison of the original Tunsai and the Super Tunsai CWP

	Original Tunsai		Super Tunsai	
Component	**Overall design**	**Details**	**Overall design**	**Details**
Lid	Cylindrical shape—wall is at 90-degree angle to top surface	Accommodates small range of pot rim heights	Tapered from rim to center	Accommodates wider range of pot rim heights
Ceramic pot holder and clean water receptacle	**One unit:** Single cylindrical bucket for filter holder and clean water receptacle **Capacity:** 18 L total	Translucent food-grade plastic, no color. Reddish-brown color of ceramic pot clearly visible. "Garbage can" appearance	**Two units that nest:** Pot holder and clean water receptacle, each about half the height of the original single container. **Capacity:** filter—23L total; 9.5L; receptacle—14 L	Translucent blue food-grade plastic; tapered shape. Clean water receptacle nests within pot holder for transport, reducing size of boxed unit for shipping and storage
Ceramic pot	Conventional (pore size approximately 0.2 microns; colloidal silver coating)	Reddish-brown color	Same as original	Same as original
Tap	Conventional turn tap	Turn handle to dispense; turn back to shut off	Conventional push tap	Press handle down to dispense; let go to shut off.
Adaptor ring	None	NA	Plastic ring that supports the ceramic pot as it nests inside the pot holder	Can be made with different internal diameters to accommodate ceramic pots of different sizes
Stand	None	NA	White plastic; cut-outs allow under-unit storage	Cue to refill filter is when water level in receptacle is at top of stand

Pilot sales programs test uptake of the Super Tunsai in the market

The upgraded Tunsai, or Super Tunsai, was designed to be more appealing to low- and middle-income consumers. It has a more contemporary look than the original, and incorporates new design elements—the adaptor ring and stand. To test consumer appeal and the impact of the new design on product uptake, pilot sales programs using different distribution channels were set up in two provinces of Cambodia. In one province, a retail sales pilot was conducted to monitor sales of the two products when sold head to head at different price points. In one region both products were sold at their full prices of approximately US$12.50 for the original Tunsai and US$22 for the new Super Tunsai. In other regions, customers were given either a US$5- or US$10-off coupon for the new CWP.

In the other province, PATH tested a direct sales approach, employing a managed sales force to sell the filters door to door. In one region, the salespeople sold both products at full price, while in another, the salespeople worked with a local microfinance institute to offer financing to customers over six months. Final results of the pilot programs are not yet in, but initial results show that users have voted overwhelmingly in favor of the Super Tunsai and seem to indicate that the increase in price for the Super Tunsai versus the Tunsai are more than offset when households have the ability to pay for that product over time.

The results of the **two pilot projects** comparing sales of the original Tunsai and the new Super Tunsai will be available in 2012 and will include baseline and endline surveys with information on uptake of both filters, attitudes toward water filtration, customer satisfaction, and correct and consistent use over a period of six months. Commercial viability will be measured using monthly sales reports to determine profit and loss, margins per product, sales per product, sales per salesperson, and other useful statistics to determine whether, when, and at what price each strategy can become financially sustainable.

These data will help both private companies and NGOs better understand the possibilities and limits of market-based approaches in addressing the need for clean drinking water in low-income areas. For social enterprises, like Hydrologic, consumer uptake of a more appealing and, in this case, more expensive product, also has the potential to improve sustainability. Greater revenues from products such as the Super Tunsai could also support the distribution of both lower- and higher-cost products through charitable distribution networks, thus providing even more households with access to safer drinking water. Any successful strategies related to product sourcing, production, marketing, sales, and distribution can also be shared with public-sector partners to improve their efforts to disseminate subsidized products to low-income households. Globally, the pilot projects helped PATH understand more about the role that culture, market maturity, and choice can have in uptake and use of commercial products among low-income households.

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Colorful new packaging and promotional materials were created for the Super Tunsai to make it attractive to consumers in the marketplace.

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During marketing events, users were able to interact with the Super Tunsai.

Globally, the pilot projects helped PATH understand more about the role that culture, market maturity, and choice can have in uptake and use of commercial products among low-income households.

Discussion and lessons learned

Partnering with Hydrologic and CAD-Based Solutions, the PATH Safe Water team completed the redesign of the Tunsai CWP exterior to improve its aspirational appeal and shipping efficiency. The new design has been shared with influential stakeholders in the CWP community and was highlighted in presentations at World Water Week in September 2010 and at the University of North Carolina Water and Health conference on HWTS products, Where Science Meets Policy, in October 2010. The new CWP has been well received, with many CWP producers from different countries requesting access to the design. Despite the positive reaction to the Super Tunsai by the HWTS sector, PATH has taken note of lessons learned along the way:

Lessons Learned

- A market-based approach can work in providing household water treatment and storage products to low-income users.
- Aesthetic concerns are important in low-income consumer markets, as in any market. A key challenge is to appeal to the aspirations of lower-income consumers: a design that is overtly contemporary may not work as well as a blend of modern and traditional styles.
- Finding a partner whose goals align with those of PATH on a market-based approach for health-related products targeted at low-income consumers is crucial.
- Working across countries can facilitate getting the right product to the lower-income consumer market. The Tunsai upgrade involved a user-testing study in India, a Cambodian commercial partner and product, a US NGO (PATH), a US design firm, and a Chinese injection-mold producer.
- Managing product design decisions that impact cost is essential. Low-income families are extremely price sensitive and the design process must make final cost a top priority.
- While the final retail price on the Super Tunsai was higher than we originally targeted, the aspirational appeal of a new design along with locally appropriate product improvements and the availability of financing mechanisms have had a strong impact on product uptake.
- Understanding local manufacturing costs can be difficult. Where possible, we shoud compare multiple manufacturing sources for procured components and involve the manufacturing partners in the design process as much as possible.

Next Steps

PATH is seeking funding to produce another iteration of the Super Tunsai at a reduced price by making it smaller and reducing the number of parts. PATH will employ lessons learned from the Tunsai upgrade process to reach a price point targeted to very low-income consumers.

In addition, PATH is exploring the appeal of the Super Tunsai design in other regions to understand whether the design modifications chosen by Cambodian users may be of interest to those in Bangladesh, Kenya, or other countries.

In Cambodia, people now have a choice of household water filtering devices. When they can invest in a product that they like, the expectation is that they will value it, use it correctly and for a longer time, replace parts when appropriate, and ultimately practice household water treatment consistently with their families to reduce diarrheal disease.

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