>> 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.

AUGUST 2010

Market Assessment of Household Water Treatment Products in Eight African Countries

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According to the World Health Organization, 1.1 billion people lack access to an "improved" drinking water source.

Introduction

Safe drinking water is essential to good health. However, in resource-poor settings, water often comes from unsafe sources and carries deadly pathogens. The World Health Organization estimates that 1.8 million people die each year from diarrheal diseases, many of which are attributed to unsafe water. Safe drinking water is one of the United Nations Millennium Development Goals—by 2015, the United Nations hopes to decrease the proportion of people without sustainable access to safe drinking water by 50 percent.

To increase access to clean water, PATH is working to identify, adapt, and develop appropriate products and business models to build a sustainable commercial market in household water treatment and storage (HWTS) for low-income consumers. In Africa, PATH's Safe Water Project is looking to gain a better understanding of:

- Household behaviors and consumer preferences regarding household water treatment.
- The current market for HWTS products.

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A catalyst for global health

Figure 1. Countries of focus for Africa market assessment work.

- The potential for innovative distribution and marketing models to catalyze the sale and use of affordable HWTS products among low-income consumers.

To explore these issues, PATH identified eight focus countries across three regions for comprehensive market assessments: Ghana, Kenya, Nigeria, Senegal, South Africa, Tanzania, Uganda, and Zambia (see Figure 1). The Safe Water Project will use these findings to inform further market research and the development of HWTS pilot projects in Africa.

Methods

The team conducted a preliminary literature review to collect information on current HWTS approaches, research, and initiatives in all eight countries. The countries were then divided into two groups for further market research (Table 1).

Market research

One group of countries—Nigeria, Senegal, Tanzania, and Uganda—was selected for further market research because PATH had little or no previous presence and minimal knowledge of the water sector in these countries. The team contracted with Whitehouse & Associates, a market research firm based in South Africa, to conduct comprehensive research on the HWTS market in these four countries. Topics covered by the market research include products, distribution channels, and consumers. From June to September 2009, the Whitehouse research team in each country conducted:

- Interviews with 15 to 30 key stakeholders.
- Eight focus group discussions with 64 to 80 low-income consumers.
- Ten in-depth interviews with consumers and community leaders.
- An audit of small-scale retailers and suppliers.

Table 1. Data-collection methods by country

Country	Data-collection method			
	Literature review	Comprehensive market research	Rapid market assessment	Pilot feasibility assessment
GROUP 1				
Nigeria	X	X		
Senegal	X	X		
Tanzania	X	X		X
Uganda	X	X		X
GROUP 2				
Kenya	X		X	X
Ghana	X		X	
South Africa	X		X	
Zambia	X		X	

The second group of countries—Kenya, Ghana, South Africa, and Zambia—are countries in which PATH already has a significant presence and knowledge about some HWTS activities, partners, and products. The team hired an independent consultant to conduct a rapid assessment of the market for HWTS products in these four countries. Conducted from May to June 2009, this study included:

- Interviews with 5 to 11 key stakeholders in each country.
- Market visits around Accra, Nairobi, and Lusaka.
- Field visits to rural western Kenya and rural southern Zambia.

No focus group discussions or in-depth interviews were conducted with consumers. Limited information about consumer behaviors and perceptions was collected indirectly from stakeholders and interactions with consumers during market and field visits.

In all eight countries, the researchers paid special attention to innovative distribution and marketing models with the potential to reach consumers at the base of the pyramid (BoP)—consumers who earn between US$1 and $5 per day. Consumers in this large but underserved market live on just a few dollars a day, have little access to credit, and are hard to reach via conventional distribution channels.

Feasibility studies

The market research revealed two promising business models that warranted additional research. These models are based on:

- Local water vendors, who are a key customer base for HWTS and offer a potential distribution channel for consumable HWTS products in more densely populated areas.
- Networks of local micro-entrepreneurs, which have proven to be effective distribution channels for a health-related "basket of goods" in rural areas. Adding a water filter to their range of products would fill a gap in the market.

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A feasibility assessment of each of these business models was conducted in Kenya, Tanzania, and Uganda from October to December 2009. The goal was to assess the potential for PATH to conduct pilot activities around either or both approaches. This study included:

- Four meetings with organizations and two field visits with water vendors in Kibera and Kisumu, Kenya.
- Discussions with seven organizations in Tanzania.
- Interviews with four organizations and individuals and field visits in Kampala and nearby provinces in Uganda.

The results of this work are described below.

Findings

The literature review, market research, and feasibility study generated information about the overall water sector in each country. Specifically, the findings provided insight into consumer attitudes and behaviors, HWTS products already on the market, distribution channels, and promotional strategies.

Country sketches

Ghana. About half of Ghana's 23 million people lives in urban areas, where 90 percent of residents have access to improved drinking water. However, the inefficiency of the state-owned water utility leaves most of them without 24-hour access to water. In rural areas, where responsibility for water and sanitation is decentralized to District Assemblies, 74 percent of the rural population has access to improved drinking water. Guinea worm is endemic in some areas.

Kenya. Kenya suffers from frequent droughts, floods, and outbreaks of disease related to water and sanitation. Cholera is endemic, especially in the lake and coastal regions. Four-fifths of the country's 38 million people live in rural areas, and only 52 percent of them have access to improved drinking water. In contrast, 83 percent of people in urban areas have access. Several bilateral groups are working with the government to improve the quality of urban water services and to attract private-sector investment.

Nigeria. Historically, safe water has not been a government priority in Nigeria, and the country is struggling to address that legacy. In particular, Nigeria's rapid population growth—the country now has 151 million people—has made it difficult to keep up with the demand for water. In 2008 about 75 percent of urban residents and 42 percent of rural residents had access to an improved source of water. The Ministry of Health (MOH) has taken up the issue of safe water as part of its efforts to improve maternal and child health, and it has attracted a large number of donors, nongovernmental organizations (NGOs), and local companies to work in the water sector. They have found Nigeria a difficult market in which to work because of the many layers of government and the country's considerable political, religious, social, linguistic, and ethnic diversity.

Senegal. The water supply sector in Senegal is regularly touted in development circles as a success story. A move away from state control to a mix of public and private management has dramatically increased the provision of potable water over the past decade. More than 90 percent of the population in urban areas (where about half of Senegal's 12 million people live) already has access to an improved source of water. Coverage in rural areas is only 52 percent, but rural water projects are gathering momentum. Human rights groups have raised concerns that the partial privatization of the water system has increased the cost of water for the poorest households. The presence of fluoride and salts in the water also poses a problem in some parts of the country.

South Africa. Free provision of safe water is a right guaranteed by South Africa's constitution, and its 48 million people expect the government to provide them with clean water. In fact, 99 percent of people living in urban areas and 78 percent of those in rural areas have access to improved water sources. The quality of piped water is not always good, but the recent Blue Drop campaign requires certification of all water providers and is improving the quality of the piped water around the country. Because municipalities are responsible for providing safe water, there could be considerable challenges to generating enough sustainable consumer demand for HWTS products through commercial channels.

Tanzania. Despite government efforts, only 45 percent of Tanzania's rural population has access to improved water sources, compared with 80 percent of the population in urban areas. As a result, the burden of water-related disease—including diarrhea, typhoid, bilharzia, and

amoebic dysentery—is considerable. The Tanzanian government has recognized that it cannot afford to provide universal access to safe water to its 42 million people in the near future. The Ministry of Health and Social Welfare (MOHSW) has therefore developed a strategic plan to bridge the gap with HWTS. The MOHSW is encouraging the commercial sector to take the lead in developing, promoting, and distributing effective, acceptable, and affordable HWTS products.

Uganda. Access to improved water sources in Uganda increased from 43 percent of the population in 1990 to 67 percent in 2008, but the water still requires treatment before it is safe to drink. The provision of water and sanitation services to the country's 31 million people also faces growing challenges, including rapid population growth, urbanization, and environmental degradation. The burden of waterborne disease (including diarrhea, cholera, and typhoid) remains high, especially among children and in rural areas. Diarrhea is the third leading cause of illness and death in Uganda, and the share of diarrhea-related deaths more than doubled from 4 percent in 2003 to 9 percent in 2006. There is increasing concern that, despite improved access to water supplies, poor hygiene practices are reducing the quality of the water at the point of consumption.

Zambia. Almost two-thirds of Zambia's 12.6 million people live in rural areas, where only 46 percent of residents have access to improved drinking water. In contrast, 87 percent of urban residents do. There has been little progress in expanding access to safe water in the dry season, in part because of poor coordination among government ministries responsible for water and sanitation and NGOs working outside the government framework.

Consumer attitudes and behaviors

Households across these eight countries obtain water from a variety of sources, including household and community taps, rivers and lakes, wells, boreholes, rainwater, and bottled and sachet water—water sold in small plastic bags or sachets. Many rely on water vendors to supply them. Tap water is the most common source in urban areas and in some rural areas. The piped water supply is often intermittent, and its safety cannot be guaranteed due to leaks in the system.

Entrenched perceptions discourage HWTS

Public awareness of the health benefits of safe water varies across and within countries, depending on the extent to which governments, donors, and NGOs have communicated about these issues. Focused campaigns in Senegal and Tanzania have made most consumers aware of water safety issues, as have extensive promotion of WaterGuard in Kenya and campaigns against guinea worm in certain areas of Ghana. The landscape is also shifting in Nigeria as the state, donors, NGOs, and other actors slowly push water and sanitation issues to the forefront of public debate. Many Ugandan focus group participants associated untreated drinking water with disease and were aware of contamination both at the point of collection and at the point of use. In contrast, there is little awareness of safe water issues in South Africa and Zambia except when a disease outbreak occurs.

Knowledge of the link between water quality and waterborne disease often does not translate into home water treatment. Common perceptions contribute to the belief that it is not necessary to treat water before consuming it. Many people think that:

- Water is safe to drink if it looks clean and clear. Consequently, they only feel a need to treat turbid water.
- Piped water, sachet water, and bottled water are safe.
- Local water sources must be safe because they have been used for generations.

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As a result, most households do not consider treating water a priority and do it inconsistently, if at all. Some study participants in Nigeria and Tanzania, for example, reported that they decided on a daily basis whether or not to treat water, based on factors such as the availability of cash, the appearance and odor of the water, and the local incidence of disease. People in Zambia are more easily persuaded to treat water during disease outbreaks, but most return to drinking untreated water once the perceived danger is over. And health workers in Uganda generally recommend using disinfectants to treat water only when a family member gets sick with a waterborne disease. Some study respondents in Uganda said they associated disinfectants with HIV/AIDS care.

The situation in Senegal is unique. Although experts agree that the tap water is safe, many people are unhappy with its color, odor, and taste, and some question its safety. This fuels a lucrative business in bottled and sachet water and prompts many urban households to filter their water—mostly for aesthetic and aspirational reasons rather than health reasons.

Traditional methods are preferred

When households do treat water, many prefer to use traditional methods, including boiling, straining water through a cloth or mesh filter, letting water settle, or adding alum or moringa seeds to reduce turbidity. The use of modern water treatment methods, such as chemical disinfectants and filtration systems, is exceedingly low among BoP households. There appears to be considerable suspicion surrounding non-traditional solutions, especially products that smell like bleach. Some people worry about the long-term impact of chemicals on their health.

In many countries, notably Uganda, boiling is considered the best way to purify water. Ninety percent of Ugandan focus group participants reported regularly boiling their water, and boiling is promoted by government health workers and NGOs. BoP consumers in Uganda consider boiling to be a modern treatment, and women are proud of their efforts to keep their families healthy by boiling drinking water.

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The level of trust regarding the safety of boiled water is so high that many consumers who use WaterGuard also boil the treated water to make it safe for drinking.

Many consumers opt for sachet water

Instead of treating their drinking water, many affluent consumers opt to buy bottled water, and lower- to middle-income households may purchase sachet water. Sachet water is inexpensive and easily available, and it is considered relatively safe to drink even though the actual quality of the water varies by supplier. The preference for sachet water drives down demand for more expensive solutions, even if they are more effective, and limits commercial incentives to produce and sell HWTS products. The prevalence of sachet water poses a major barrier to entry for HWTS products in Ghana, Nigeria, and Senegal while opening the potential to adapt sachet or unit-packaged water sales as a means to provide safe water.

HWTS products on the market

Choices are limited

Few HWTS products targeted to the BoP have been brought to scale in the countries studied. Businesses assume that demand is low and that BoP consumers cannot afford anything beyond simple chemical treatments. In Ghana, Senegal, and South Africa, there are no widely available, affordable, and effective HWTS products on the market. Elsewhere, commercial HWTS products for the BoP are limited to consumables, often just a single brand.

Consumables dominate

The most popular commercial HWTS products among BoP consumers—and often their only option—are fast-moving consumer goods (FMCGs), typically chlorine-based disinfectants. These consumables can be purchased inexpensively in small quantities, making them suitable for households with limited resources.

WaterGuard (sold under the brand name Clorin in Zambia) is the only widely recognized and widely available HWTS product in Nigeria, Tanzania, and Zambia. It also dominates the BoP market in Kenya and Uganda. Although good marketing has boosted WaterGuard's brand recognition, the product is readily available and widely used only in urban areas. In Nigeria, inadequate production capacity has

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A vendor in Ghana sells water in single-use "sachets."

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The WaterGuard brand is well known among BoP households in Nigeria, Tanzania, Zambia (under the brand name Chlorin), Kenya, and Uganda.

restricted its distribution to large commercial centers and curtailed sales. Furthermore, as noted above, households generally do not use WaterGuard on a daily basis, but they turn to it in case of an outbreak of waterborne disease.

The success of WaterGuard demonstrates that African consumers are willing to try commercial HWTS solutions backed by good marketing and the correct product profile. In 2008, for example, a total of 1.6 million bottles of WaterGuard were produced and sold in Kenya through all kinds of outlets, including FMCG stores, pharmacies, supermarkets, micro-entrepreneurs, and mobile vendors. Some 85 percent of the population is aware of the brand, and as many as 16 percent of households use WaterGuard regularly. In Kenya, as in the other countries, distribution and marketing costs are subsidized, and the product is not yet commercially viable.

Other HWTS consumables are on the market in some countries. Examples include Aquatabs and OASIS1000 in Ghana; Aquatabs, AquaGuard, and PUR in Kenya; and AquaSafe in Uganda. Brand awareness and sales of these products are limited. That situation may change as more products enter the market and their distributors engage in promotional activities. For example, since Aquatabs went on sale in Ghana in 2009, the distributor has been advertising the brand on posters, flyers, stickers, radio, and television. It has also begun training volunteers in rural areas to conduct community education on safe water and to sell Aquatabs along with other health products.

In Senegal and South Africa, there is no affordable, special-purpose disinfectant for home water treatment targeted to the BoP on the market. When disease outbreaks occur, the government encourages people to treat their water with generic chlorine bleaches marketed as household detergents.

Durables present an opportunity

In all of the countries studied, commercial distributors generally target durable HWTS products to middle- and upper-income consumers rather than the BoP segment of the market. Many of these durables require piped water and/or electricity. Also, proliferation of fakes on the market particularly in Nigeria and Senegal has made consumers in those countries suspicious of some water filters and purifiers.

NGOs have had some success in distributing ceramic and biosand filters for free or at a subsidized price in Ghana, Kenya, South Africa, Tanzania, and Zambia. The response to these small-scale projects suggests that BoP households may prefer durable over consumable HWTS products when given a choice. Thus, it is possible that making affordable filters available could increase the number of households treating their water.

There are some challenges, however, such as cost. For example, households in South Africa that received ceramic candle filters from the AQUAPOL project liked and continued using the filters, but they

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were only willing to pay US$10 for them—far less than the actual product cost of $50.[1] Support may also be important. Field visits in Zambia as a part of this assessment found that villagers in areas where NGOs had offered free biosand filters were more likely to install the filters if there were enthusiastic local leaders, ongoing community education, and close monitoring of filter installations.

The greater challenge is developing a profitable and sustainable business model for the production and distribution of inexpensive HWTS durables. Some NGOs and commercial firms are working on marketing strategies to ramp up sales and distribution of affordable water filters and purifiers to a national level. In Kenya, for example, the manufacturer of Chujio ceramic pot filters is planning to market them commercially in the Nairobi area. In Uganda, the Diageo Foundation is promoting the CrystalPur, a siphon filter with a ceramic element; the filter is being distributed to schools and commercially marketed in supermarkets. In Nigeria, importers of the Zero-B purifier (an iodized resin filter that costs less than $10) are trying to target BoP consumers. However, Zero-B distributors lack an understanding of the BoP market, and retailers are not targeting the Zero-B to that segment of the market.

1 The AQUAPOL project supplied ceramic candle filters to 60 households in South Africa. Households reported that they liked the taste and color of the treated water, appreciated the filters' stainless steel design, and continued to use the filters over the next 1.5 years despite their relatively slow flow rate.

Cost is key

Cost poses a major obstacle to home water treatment because BoP consumers live a subsistence lifestyle and may lack the means to purchase a HWTS product, especially a durable. In Tanzania, for example, one-third of the population lives below the poverty line, and almost two-thirds of household income is spent on food. With so little discretionary income, consumers cannot afford to buy a water filter or purifier. Even disinfectants may not be affordable on a daily basis, so they are used only when the perceived risk of consuming contaminated water is high.

It is also important to note that some low-income households compare the cost of commercial HWTS products against traditional approaches to water treatment, notably boiling. For example, study participants in Uganda reported that fuel is among the basic household cooking expenses. Boiling water on an existing fire is not seen as an additional cost, so many people consider boiling the most affordable way to treat water. In contrast, many consumers perceive commercial disinfectants and filters as costly.

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The Chujio ceramic pot is one of a handful of commercially sold filters that may be suitable for BoP markets in Africa.

In a cash economy such as Nigeria's, lack of credit exacerbates affordability issues for HWTS durables. In this setting, upfront

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costs may be a deciding factor in consumer decisions. Some study participants said they would rather spend a small amount each month on FMCGs than buy durable products that require saving the purchase price over a lengthy period.

Distribution channels

Making HWTS products readily available is essential if they are to become broadly accepted and gain traction in the market. However, most of the commercial HWTS products in these eight countries are available only in urban areas, and even there they may be found only in select outlets, such as supermarkets and home appliance stores serving affluent households. As a result, BoP households have to search for a HWTS product if they wish to purchase one.

Reaching rural areas is difficult

Reaching rural markets is challenging in all eight countries because of poor roads, long distances, and a lack of rural retail outlets. The cost of distribution may seem prohibitive, given both the slim profit margins on low-value consumable HWTS products that must be transported and stocked in high volumes and the substantial transportation costs for durable HWTS products. As a result, the ability to buy water treatment products dwindles rapidly with distance from cities.

The findings suggest, however, that generating demand for a HWTS product may overcome rural distribution challenges in some countries. In Kenya, for example, strong communication campaigns by community-based organizations (CBOs) have created enough demand for WaterGuard to guarantee its presence in some rural retail stores. In South Africa the presence—even in the most remote areas—of a popular brand of household bleach used to treat water during disease outbreaks suggests that rural distribution is feasible. While WaterGuard is not yet available in rural areas of Nigeria, the nation's distribution system works fairly well in most instances; experience shows that goods do reach their target market if there is sufficient demand.

It may be more difficult to use conventional distribution chains to reach vulnerable communities in remote rural areas in Ghana, Tanzania, Uganda, and Zambia. Alternative distribution channels—such as rural micro-entrepreneurs—are proving successful in distributing health products to this segment of the market.

Micro-entrepreneurs have a proven track record

Certain CBOs and NGOs in several of the countries studied operate a "basket of goods" (BoG) business model to reach low-income consumers. Examples include the Safe Water & AIDS Project (SWAP) in western Kenya, Microbusiness for Health (MBH) in Ghana, Living Goods in Uganda, and the AFFORD/Uganda Health Marketing Initiative (UHMG). These enterprises recruit and train trusted community members to sell a basket of health-related goods from door to door. Products include mosquito nets, condoms, soap, sanitary pads, and HWTS consumables (not HWTS durables). These micro-entrepreneurs also conduct health education at schools, community meetings, and other local venues to generate demand. The BoG model is proving very successful in distributing health products to low-income consumers in underserved rural areas as well as in towns and cities.

Researchers examined the feasibility of adding a water filter to the products sold by SWAP in Kenya and UHMG in Uganda. Both organizations expressed interest in selling water filters but described some challenges:

1. **Cost.** The filter must be priced low enough to be affordable to the low-income target market. Achieving this low price requires careful consideration of transportation costs, which could significantly drive up the end price of a water filter.
2. **Quality.** These organizations rely on a strong reputation, so any product they sell must be effective, easy to use, and sturdy.

3. **Distribution.** Distribution poses a challenge for SWAP, but UHMG already has a well-established distribution network with access to mainstream commercial channels as well as rural micro-entrepreneurs.

Although water filters are too large and heavy to be sold door-to-door, a different sales model is possible: one that capitalizes on the established position of BoG micro-entrepreneurs as a credible source of information on health and hygiene practices and products. These salespeople could hold community meetings to educate people about the filtration process, demonstrate how to use a water filter, and take orders. Later they could deliver the filters directly to each household and offer further instructions on their use and maintenance. Water filters are an unfamiliar and relatively expensive product for these consumers, so the endorsement of the BoG salespeople and the product demonstrations could help overcome consumers' reluctance to make such a purchase. Involving village chiefs and health staff could also help persuade households to invest in a filter.

The Chujio ceramic pot filter may be the best choice for a BoG pilot study because it is effective in treating water from non-piped as well as piped sources, easy to use and maintain, and well-liked by consumers in Kenya, where it is produced. Although the ceramic filter needs careful handling during transport, it is not prone to breakage thereafter as long as it is used correctly. The one drawback is its current factory price of $19, which does not include transportation costs or a mark-up for distribution profit margins. Collaborating with a micro-finance institution (MFI) to arrange consumer loans for the filter could make it more affordable for consumers.

Working with water vendors may be challenging

The feasibility study confirmed that water kiosks and mobile vendors who sell water door-to-door are common in Kenya, Tanzania, and Uganda. If mobile water vendors were to sell HWTS products along with water, they could create a new income stream for themselves while making home water treatment more convenient for customers.

There is considerable potential for working with mobile water vendors. Many customers are aware of the poor quality of the water sold by the vendors, and many mobile water vendors say they are willing to sell consumable-type HWTS products to their customers. Water kiosks operated by CBOs are especially sensitive to health issues in the community and interested in selling HWTS products. (In contrast, private water kiosk operators tend to be defensive about the quality of water they sell.)

It may be difficult and time-consuming to design, implement, and manage a system to distribute chemical disinfectants through water vendors, as most are not organized into any form of association. The greatest challenge likely would be supplying the product. The most feasible approach would be for water vendors to purchase bulk supplies of a disinfectant from nearby retail outlets at a discounted price, but this approach assumes such outlets exist. Providing merchandising materials and training for the vendors on the benefits of treating water, how to use the disinfectant, and safe storage practices would also be essential to success. An alternative approach to working with water vendors is to provide them with affordable, easy-to-use tools to ensure safe water is offered to their customers. This approach may complement the use of HWTS to make safe water available to more of the people who need it.

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A water vendor in Kenya sells treated water at a village kiosk.

Research in Uganda uncovered another option: working with the Uganda Association of Private Water Operators (UAPWO). The members of this umbrella organization operate piped water supply systems in small towns and rural centers under contract with the government. The association is already working to promote water quality and safety—for example, by encouraging consumers to boil water at home before drinking. UAPWO expressed interest in selling consumable HWTS products through its members' local offices, meter readers, and water kiosks. However, UAPWO members do not serve the BoP populations most in need of HWTS: low-income households in urban and rural areas that have no access to piped water. Also, consumers may be reluctant to treat water if they feel the piped water supply is already safe.

Promotional strategies

Only by changing consumer attitudes toward water treatment can HWTS initiatives in Africa overcome the biggest immediate barrier to success: lack of demand for the products. Communities need to take responsibility for their own well-being, and households need to commit to treating water daily—not just when money is available, the water looks dirty, or someone is sick. This means overcoming entrenched attitudes about the safety of the water supply, the need for treatment, and the relative cost and effectiveness of modern versus traditional treatment methods.

Social marketing can generate demand

Experience in Kenya demonstrates a balance needed between general communication on safe water and

Case Study: Successful promotional strategy in Malwai warrants replication

In 2007 the US Centers for Disease Control and Prevention (CDC) reported remarkable uptake of WaterGuard when the product was provided and marketed by Population Services International (PSI) as part of a free hygiene kit at antenatal clinics in Malawi. At baseline, only 2% of the program participants had used WaterGuard. Nine months later, 61% of the participants were using WaterGuard and 55% reported having purchased the product. Among friends and relatives of program participants, confirmed water treatment increased from 2% at baseline to 25% at follow-up.

CDC

PSI's antenatal hygiene kits included WaterGuard, a bar of soap, two packets of ORS (oral rehydration salts) and a clean bucket with a tap for treating water at home.

PATH recently supported the CDC to learn whether women from the original study were still treating their water, three years after the intervention. The CDC found that 26% of the original participants had confirmed use of WaterGuard and 54% used either WaterGuard and/or a chlorine solution distributed for free by the Ministry of Health. These encouraging results suggest that pregnant women and new mothers may be excellent targets for ongoing and future efforts to increase household water treatment behavior in developing countries.

brand-specific advertising. Extensive advertising on television and radio dramatically raised brand awareness of WaterGuard, but product use plateaued at a relatively low level. In response, brand marketing is being reduced in favor of general safe water and behavior change communication designed to grow the HWTS market as a whole.

Although the need for social marketing is broadly recognized, efforts to date have been limited. For example, regular television and radio campaigns on water and sanitation issues are held in Nigeria, but communication on safe water is piecemeal, and the message is not being spread uniformly across the country. In Ghana, the government stopped promoting boiling because of the scarcity of fuel; recently brand-specific advertising accompanied the entrance of Aquatabs onto the market.

The challenges are significant. Governments generally lack the resources to mount extensive and ongoing safe water campaigns, and low sales volumes and/or low profit margins for HWTS products targeted to the BoP do not generate enough profit for business firms to invest in advertising. For example, a number of commercial models for marketing and distributing HWTS products are used in Uganda, but they do not cover the cost of educating consumers on the benefits of commercial water treatment options. The government also lacks an effective program to get the message out, so social marketing has been left to donors and NGOs. The most widely promoted HWTS product for the BoP in Africa—WaterGuard—has relied on outside subsidies to pay for promotion.

The National Hand Washing Campaign in Uganda offers an example of a public-private partnership that draws on the resources of government, donors, NGOs, CBOs, and private business to overcome these issues. Participants include government ministries, development partners,

NGOs, CBOs, and private-sector partners. Private firms have contributed marketing expertise and product samples to the behavior change campaign, with the expectation that they will benefit from rising soap sales as people become more aware of the need for hand washing.

Community education is essential

The findings indicate that face-to-face communication and community education are especially credible and effective ways to change water-related attitudes and behavior and should be used to complement media advertising. Many study participants suggested involving influential local leaders and entities—such as village headmen, clinics, and other CBOs—in the effort to educate people on safe water practices. School-based activities, community theater, and local radio were also good options identified by study participants.

Certain communication channels have more credibility and influence in some countries than in others. For example, many Nigerians place great trust in the advice given to them at clinics and by health professionals. Most Nigerian women in the study said they learned about water safety and treatment solutions through friends and family, often after these people had visited clinics. In Tanzania, many people view the government as the custodian of good health and consider government agencies to be a particularly reliable source of information on these matters.

Discussion and conclusions

This final section discusses the implications of this research and suggests next steps for future work on HWTS in sub-Saharan Africa.

Implications

The household safe water market is more promising in some countries than in others

Of the eight countries studied, Senegal and South Africa seemed to have lower potential for promotion and commercial sales of HWTS products. Both countries have advanced water sectors that are rapidly extending access to safe water to all of their citizens.

The remaining six countries—Kenya, Ghana, Nigeria, Tanzania, Uganda, and Zambia—have a demonstrated need for HWTS. Some offer more promising environments than others for developing a viable commercial market for HWTS products targeted to the BoP. Tanzania stands out because its government, as a matter of policy, is explicitly promoting the commercial provision of HWTS products to meet the need for safe water in the near- to mid-term. This government's support may facilitate the entry of new commercial HWTS products. Ghana, Kenya, and Uganda also offer good potential for commercial HWTS ventures. In contrast, Nigeria is a far more challenging place to work because of its many layers of government, the diversity of its population, and the high prevalence of sachet water and fakes on the market.

Changing perceptions can help generate demand

Widespread perceptions—for example, that clear water is clean and safe, that tap water and sachet water are safe, and that local water sources are safe because they have been used for generations—contribute to the belief that it is not necessary to treat water at home on a regular basis. Familiarity with and trust in traditional purification methods, such as boiling, also pose an obstacle to commercial HWTS sales. Addressing these misconceptions is essential to changing consumers' attitudes and behavior, generating demand for HWTS products among the BoP, and creating a market.

Generating demand for HWTS products requires a large-scale, ongoing social marketing effort that combines:

- General communication on the importance of safe water.
- Education about the range of HWTS products available.
- Brand-specific advertising.

Good models include the social marketing campaigns that have made WaterGuard and Clorin such widely recognized brands. Funding this type of campaign presents a serious challenge, however. Slim profit margins for HWTS products limit the amount that manufacturers are willing or able to spend on marketing, and government does not have the resources to make up the difference. Developing a public-private partnership that draws on the resources of all stakeholders involved, including

government, donors, NGOs, CBOs, and private business, offers a promising approach. In particular, partnering with NGOs and CBOs may give HWTS manufacturers and distributors a way to work at the community level on a face-to-face basis, which is the most effective way to change behavior.

More and different products are needed

The few HWTS products targeted to the BoP that have been brought to scale in the study countries are consumables. Evidence suggests that making more and different HWTS products available—especially durables—could increase the number of households that treat their water.

Given the choice, many people say they prefer filters over disinfectants, but no commercial water filters or purifiers on the market are targeted to the BoP. The research identified at least three viable durable products entering the HWTS market in the countries studied: the Chujio ceramic pot filter in Kenya, the CrystalPur ceramic candle filter in Uganda, and the Zero-B purifier in Nigeria. Unfortunately, their manufacturers and distributors have not yet succeeded in building a market for these products among the BoP.

The Zero-B purifier currently available in Nigeria provides one example of how firms could go about developing a sustainable business model to market HWTS durables to low-income consumers. While cost can be a barrier for the BoP, the Zero-B has a treatment capacity of approximately 7,500 liters, is priced less than US$10, and can treat 25 liters of water for about US$0.03. Lack of awareness of the product among the BoP is the greater obstacle. Importers want to target low-income consumers, but they are relying on word-of-mouth and on distributors with little knowledge of the BoP to market the Zero-B. As a result, retailers are targeting the product to the usual customers for water filters: middle- and upper-income households. A more effective strategy might be to seek out NGO partners and invest in promotional activities to build brand awareness among the BoP, establish the product's competitive advantages for low-income consumers, and increase its availability through NGO distribution channels.

Cost issues should be anticipated

When pricing and promoting commercial HWTS products, manufacturers must remember that they are competing against sachet water and traditional methods such as boiling. Consumers may believe that either or both of these approaches offer cheaper solutions. Educating consumers about the long-term cost savings of commercial HWTS products is therefore essential.

It is especially hard to market durable products to the BoP because they require a lump-sum, up-front payment. Working with MFIs to offer consumer loans or installment plans for water filters and purifiers may help make them more affordable. Further research on pricing and willingness-to-pay for HWTS products is also needed.

Alternative distribution channels can help reach the BoP

HWTS products are mostly available in urban centers, but the need is greatest in rural areas, where far fewer households have access to improved sources of drinking water. Even in cities, low-income consumers may find it difficult to locate HWTS products at stores in their own neighborhoods.

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Employing alternative distribution channels can help firms reach the BoP households most in need of HWTS products. Both of the approaches investigated—adding a water filter to the basket of goods sold by rural micro-entrepreneurs and selling consumable-type HWTS products through mobile water vendors—have potential. Both BoG micro-entrepreneurs and water vendors are well placed to promote safe water, raise brand awareness, and teach consumers how to use HWTS products. They have an established position in the community, which would make them an effective communication channel. BoG enterprises are largely commercially sustainable, and their distribution channels could provide an excellent vehicle to launch new products, such as a water filter. In contrast, water vendors would be far less easy to organize and work with than BoG micro-entrepreneurs, so it may be best to test this approach on a small scale in a location where water vendors seem especially receptive to the idea. Regardless, water vendors serve a key customer base for HWTS.

Moving ahead in Africa

The research reported here, together with conversations with potential partners, has led to a few distinct opportunities for PATH's Safe Water Project in Africa:

- In Kenya, the team is pursuing a pilot activity that will incorporate a ceramic pot filter into the BoG offered by a local health care education and sales group. Discussions about the design and implementation of the pilot are under way, with the aim of launching commercial sales of the filter through this distribution channel by the fall of 2010.
- In Zimbabwe and Kenya, PATH is working with a variety of partners to evaluate a community-level safe water solution using a prototype smart electrochlorinator device. This device may provide a low-cost and simple way for small entrepreneurs or community water providers to treat and sell water using liquid hypochlorite they make themselves at very low cost.
- In Malawi, PATH is working with the CDC and PSI to better understand the reasons for high uptake and sustained use of HWTS when provided free as part of an antenatal hygiene kit during a PSI intervention in 2007. Our research will also explore the extent to which the antenatal water and hygiene kits can be modified and replicated in other settings."

In addition to these efforts, PATH continues to pursue new leads and opportunities to learn more about HWTS and other safe water practices, preferences, and household needs in low-resource settings in Africa and other regions. PATH plans to contribute to consumer research already under way or completed by other organizations with the goal of building a market research and segmentation tool that can help all players in the water sector better understand how to reach households with the greatest need for clean, safe drinking water.

Acknowledgments

PATH is grateful to Adrienne Kols, who prepared this report, and to the many individuals and entities that contributed to its development, including Anne Sheeran, Dimitra Patrikarakou, and Whitehouse & Associates. We would also like to acknowledge the support of the Bill & Melinda Gates Foundation for this work.

This issue was written by Adrienne Kols and designed by Dave Simpson and Melanie Wang.

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