

The Market for Water Treatment and Vending Enterprises in Kenya



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BACKGROUND

Governments, development agencies and nonprofit organizations have made significant investments in water infrastructure, yet water scarcity and contamination remain widespread in developing countries. This contributes to both socioeconomic and health burdens. Globally, waterborne diseases are a leading cause of death among children under five, killing more infants than HIV/AIDS, malaria, and tuberculosis combined (Black, 2003).

A flourishing industry of independent, small-scale water providers is filling the gap in traditional water services in most developing countries (Kariuki & Schwartz, 2005). Despite a common perception that this sector exploits low-income consumers, studies in Asia, Africa, and Latin America suggest that, in many instances, these businesses provide essential and equitable services (McIntosh, 2004, Collignon & Vezina, 2000, and Solo, 2003).

In Southeast Asia, for example, a small-scale water treatment and vending industry has emerged to provide safe drinking water to consumers who cannot obtain clean water from network sources. This business model

originally developed in response to demand for cheaper bottled water among middle- and upper-income urban households. The industry's rapid growth over the last decade, which is estimated to have reached over 3,000 businesses in metropolitan Manila and about 2,500 in Jakarta and surrounding areas, suggests that demand for purified drinking water in the region is extending into lower-income groups (Aquaya, 2009). According to a recent consumer study in Indonesian cities, the percentage of poor households that rely on non-branded purified drinking water ranges from 20 percent in Jakarta to 60 percent in Palembang (WASPOLA, 2007).

In Kenya, water-treatment kiosks targeting middle- and high-income consumers are emerging. This market brief provides an overview of the Kenyan market, and reviews evidence on the potential for such business models to deliver safe, affordable drinking water to low-income segments. This research was conducted by the Aquaya Institute for its Water Business Kits™ program (see box below), which is being developed in partnership with IFC's Sanitation and Safe Water for All program.

CONSUMER DEMAND

Populations needing treated water should not be confused with populations demanding treated water. The key to the sustainability and scalability of small-scale water treatment and vending businesses is that, by definition, they are for-profit entities: the profits earned align the business owners' interests with the community's health interests (and with nongovernmental organizations or governments promoting the growth of this industry). To be successful, these businesses must reach a critical mass of customers. In an environment in which there is a need for treated water, but little consumer demand, small-scale water treatment businesses will fail.

All consumers care about the quality of water, although to varying degrees. Influencing factors include income, which may determine how much they value good health or lost wages from sick days; education (their awareness of waterborne diseases); and cultural norms.

In modeling consumer demand, it seems logical to assume that because high-income or well-informed consumers are likely to perceive higher losses from getting sick and missing work, they also attribute a higher cost to unsafe water. Low-income or poorly informed consumers may not feel compelled, or may be unable, to pay a premium for safe drinking water.

Yet the experience of Southeast Asia, where low-income consumers support water-purification businesses, shows that poor households are also well-informed and perceive a high cost associated with drinking unsafe water. This suggests that well-informed, low-income consumers would also favor low-cost household water treatment products. However, sustained use of household water treatment products among poor households has been difficult to achieve in a range of settings, including Indonesia, due to low demand.

Aquaya Water Business Kits™ program

Since 2009, the Aquaya Institute (www.aquaya.org) has been developing its Water Business Kits™ program in Kenya to promote the development of the small-scale water treatment and vending industry, particularly for low-income market segments.

Aquaya works with local entrepreneurs to establish demonstration vended water businesses, which will illustrate the business opportunity to the market. Technical support addresses market barriers, such as a lack of information and finance. Aquaya is also monitoring performance and generating data on the commercial viability of such business models, which will inform the development of a replicable Water Business Kit. If successful, the kits will provide a basis for rapid scaling-up of the model through local financial intermediaries.

IFC has provided technical and financial support to the Aquaya program since 2010.

The question is why, in areas with small-scale water treatment businesses, poor consumers would rather buy purified water than use a commercial water treatment product? A filter, for example, may have a higher up-front cost, but it is more economical in the long term.

Part of the answer is in the convenience of unbranded, purified water. This is supported in findings presented by Conan (2004), who reports that in Cebu City, Philippines, residents of areas

reliant on water vendors and standpipes rated accessibility and quality over affordability in satisfaction surveys. These results suggest that, "even among the poor, the top criteria is not affordability but a compromise between accessibility and quality."

DEMAND EXPERIMENTS

There is a growing small-scale water treatment and vending industry in Kenya, with at least 14 water refill outlets operated under a variety of brand names. Consumer demand research indicates that this industry will grow significantly in the years ahead.

To test the demand for treated drinking water within low-income rural and peri-urban populations in Kenya, Aquaya worked with two small businesses in the greater Kisumu area. Kisumu, the country's third-largest city, is situated on the shores of Lake Victoria.

Mama Meg's Kiosk

Mama Meg's Kiosk is owned and operated by Carolyn Otieno (also known as Mama Meg). The shop is about 5 kilometers from central Kisumu and sells eggs, mobile phone credits, and other sundry goods, as well as water from a private, hand-dug well. In 2009, Aquaya provided Otieno with a prototype mixed oxidant device – designed by Cascade Designs and PATH – to produce doses of disinfectant for water from her well. Following the introduction of treatment services, Mama Meg's water sales increased significantly, even after Otieno raised prices by 50 percent (see Figure 1 below).

The blue line in the chart shows water sales in liters per day at the kiosk. The black trend line shows a 10-day moving



average of sales in liters per day. Sales show a high inverse correlation with rainfall events (marked by the orange points at the bottom of the chart). During a traditionally high demand period (dry season) in January/February of 2009, the kiosk sold untreated water at 2 Kenyan shillings* (\$0.03) per 20-liter jerry can, and averaged sales of 879.6 liters per day. From May 2009 to March 2010, the kiosk sold treated water at 3 shillings (\$0.04) per 20-liter jerry can, and averaged sales of 1,554.5 liters per day.

This suggests that peri-urban consumers are willing to pay a premium for safe drinking water.

* 80 Kenyan Shillings (KES) per 1 US Dollar (USD) is the exchange rate used throughout this document.

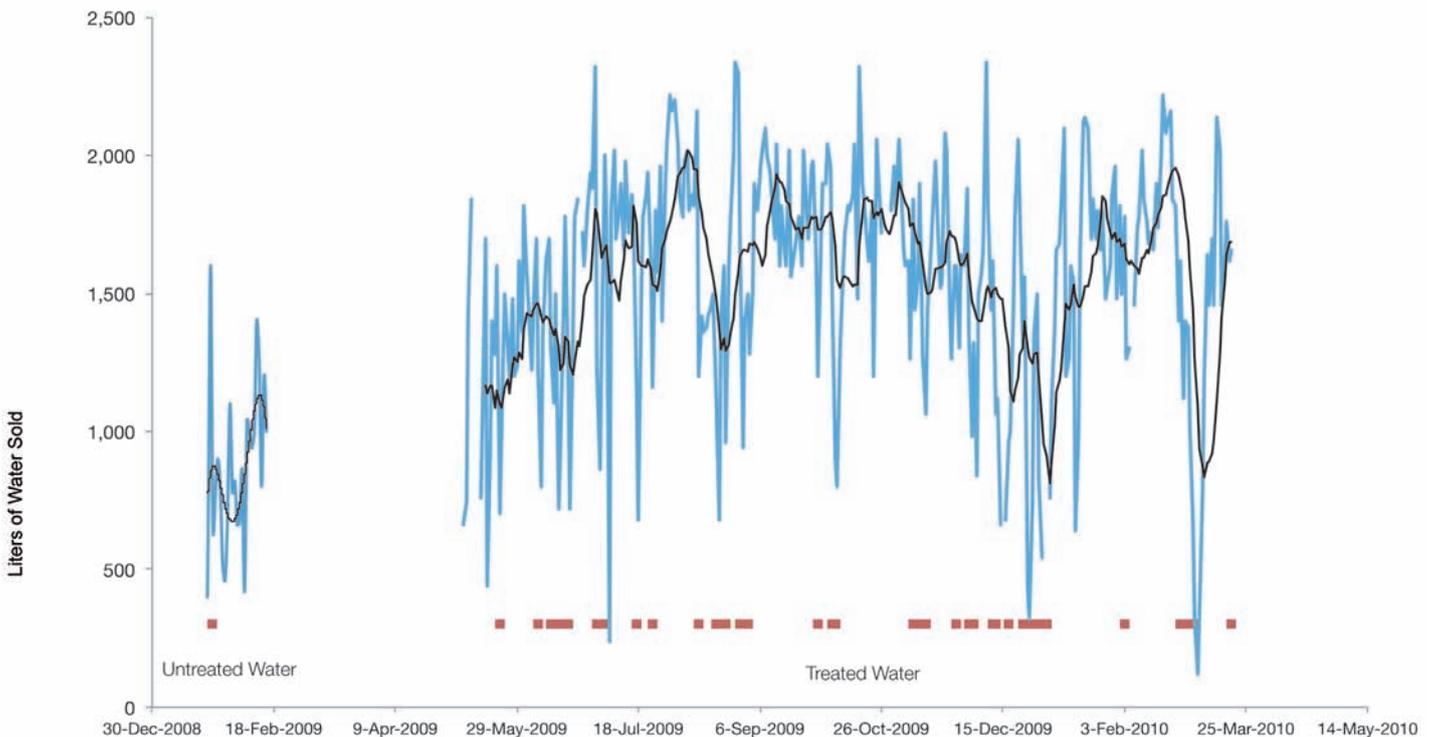


Figure 1: Treated vs. untreated water sales at Mama Meg's Kiosk

SWAP PUReactor

Working with the Safe Water and AIDS Project (SWAP), a nongovernmental organization, Aquaya set up the PUReactor business on the banks of the Nyando River in the town of Ahero, which lies about 25 kilometers southeast of Kisumu. Operated by microentrepreneurs from a local women's group, the business produced treated water in 100-300 liter increments using Procter and Gamble's PUR product. The business substantially reduced both the labor and financial costs of water by selling treated water at 2 Kenyan shillings (\$0.03) per 20-liter jerry can. PUR sachets capable of treating 10 liters of water typically have a retail price of 7 shillings (\$0.09). Because sales took place next to the Nyando River, customers had a clear choice between free, untreated water

and buying treated water.

Between August 2008 and November 2009, sales averaged about 900 liters per day. Figure 2 depicts 15 months of sales data from the PUReactor.

Sales volumes at Ahero have been constrained by limited capacity, long production cycle time, and low water pressure of the PUReactor. Much of the market for water in the area is in sales to *mkokoteni*¹ water vendors who deliver and sell

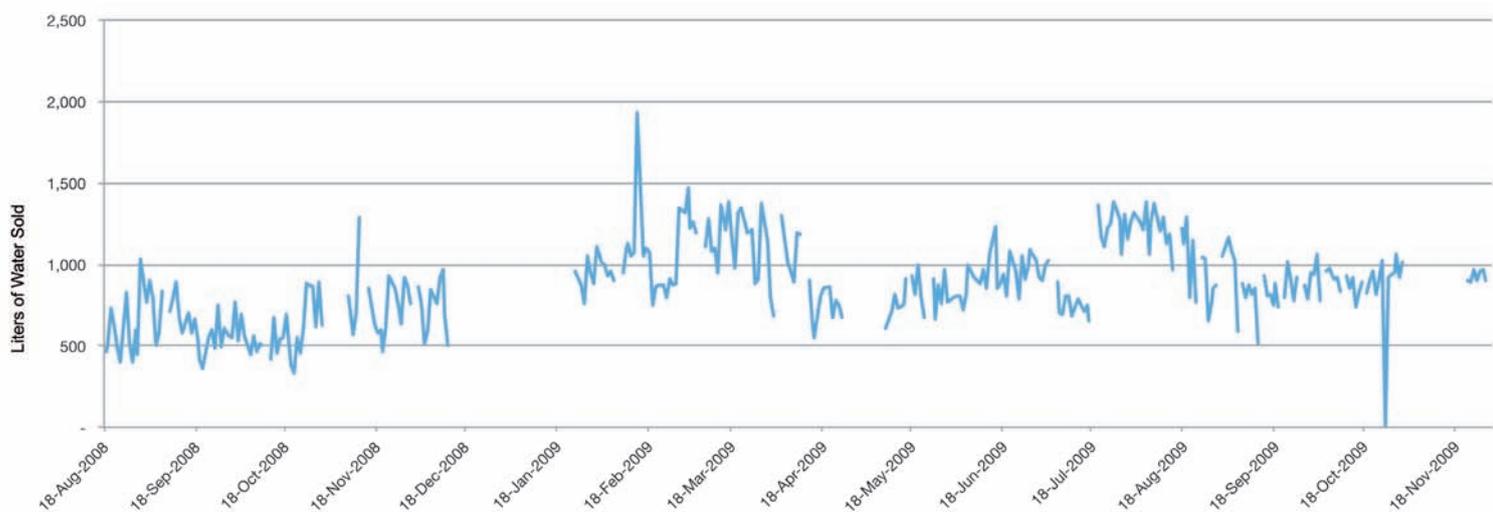


Figure 2: Daily water sales from the SWAP PUReactor in Ahero, August 2008 - November 2009

Note: Breaks in the line are due to gaps in the sales data records maintained by SWAP.



water directly to households. *Mkokoteni* operators' profits are determined by the number of trips that they can make in a day and, as a result, they need to fill up their jerry cans quickly. A typical *mkokoteni* carries between 12 and 14 jerry cans (at 20 liters each: 240–280 liters) of water, which is roughly equivalent to an entire batch of treated water from the PUReactor. Because the PUReactor production cycle took about 30 minutes and water was dispensed through two low-flow taps, selling water to *mkokoteni* operators was not practical.

The data offers insight into the behavior of rural consumers confronted with the choice of collecting free, low-quality water from the Nyando River, or paying a small price premium to obtain high-quality drinking water. Despite the production limits described above, the sales data supports the view that rural consumers are willing to pay a premium price for safe drinking water.

1. *Mkokoteni* is a Kiswahili word for a handcart.

CONSUMER DEMAND SURVEYS

Aquaya conducted initial consumer demand research to support sales projections of treated water produced by small-scale water treatment businesses. The analysis formulated demand functions for hypothetical water-treatment kiosks at suitable locations. The survey presented respondents with a series of choices between their existing water supply and a hypothetical treated water option, modifying the treated water price over successive options.

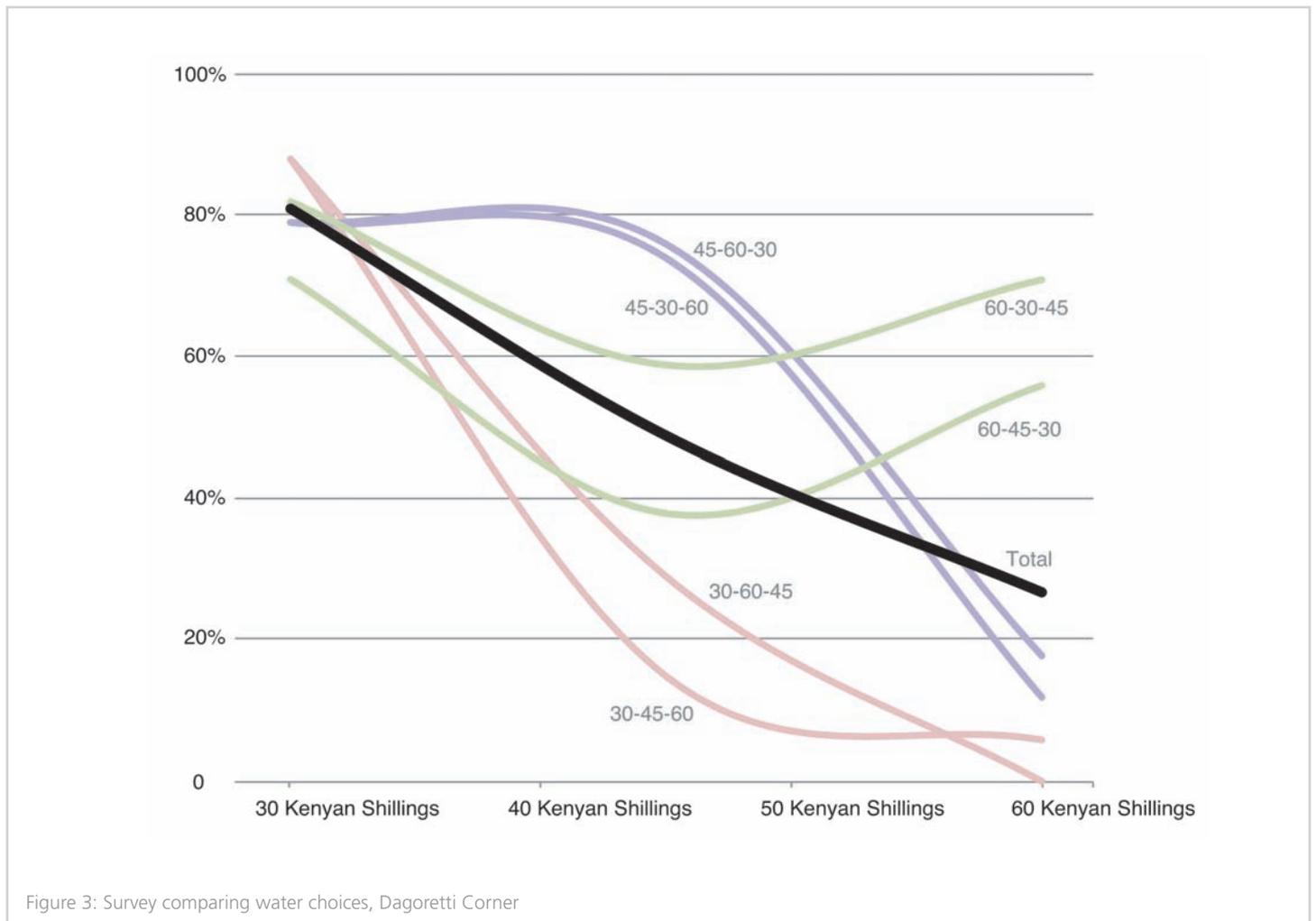
Figure 3 presents the results of the survey, which received responses from 204 people in and around Dagoretti Corner, a lower-middle income area of Nairobi.

The Y-axis represents the percentage of respondents choosing the hypothetical treated water product over the existing alternatives at various prices per 20-liter jerry can. The

black curve shows the cumulative results, and each color corresponds to the price of the first alternative offered.

This is an initial approximation of demand as a function of price in one Nairobi neighborhood. Although these are stated preferences in response to survey questions, rather than revealed preferences gauged experimentally, the negatively sloped curve is encouraging. Because price choices were randomized, the obvious order effects of the survey are clear (manifested in the irrational choice decisions of the green and purple curves).

The results suggest that consumers in peri-urban areas of Nairobi are willing to pay a premium price for high-quality drinking water, and that there is significant latent demand for treated water if retail prices decrease substantially.



DEMAND DATA FROM BUSINESSES

Actual data from small-scale water treatment and vending businesses in Kenya provides the clearest evidence of consumer demand for high-quality, treated drinking water. Although the data set is limited, early figures from three entrepreneurs supported by Aquaya suggest the potential for market growth.

PureWater shop in Buru Buru

The PureWater business in Buru Buru Estate, a middle-class area of Nairobi, opened in December 2010. It is on the ground floor of a hotel next to a large shopping plaza. It sells water in 10-liter and 18.9-liter refillable containers for 100 and 200 Kenyan shillings (\$1.10 and \$2.20) respectively.

The business sources municipal tap water, which it treats using ultraviolet irradiation. The Kenyan Bureau of Standards has validated the quality of the treated water. Sales at the

shop have improved off a low base to grow by 60 percent over the first five months of operations.

David Maina, the entrepreneur behind the business, is the owner of PureFlow Water Solutions, which sells and services water treatment equipment. Aquaya worked with Maina to develop a business plan and cash-flow model, conducting consumer demand analysis, working through the regulatory process, and securing a business loan of 1.2 million Kenyan shillings (\$15,000) from the Kenya Commercial Bank, with a repayment period of three years. To facilitate the loan, Aquaya provided 50 percent of the loan principal amount as a guarantee.



PureFresh Water Shop in Naivasha

Antony Kamotho learned about water treatment equipment and systems while working in the cut flowers industry in the growing Rift Valley town of Naivasha. Recognizing that many residents valued clean drinking water, but were unable to afford the existing, expensive bottled water options on the market, Kamotho established his first PureFresh Water Shop in the heart of Naivasha in early 2010. His shop sells bottles of water ranging from 500 milliliters to 18.9 liters. He refills all bottles over 1 liter for about 10 Kenyan shillings (\$0.11) per liter, a price point far below retail prices for new bottles of water.

Within months of opening, Kamotho's operations had achieved a positive cash flow. Since the shop opened, sales growth has averaged over 20 percent a month. The business now sells about 2,000 liters of water a day. Buoyed



by the profitability of the first location, Kamotho is working with Aquaya to establish a second shop in another part of Naivasha, and plans to open other locations in the near future.

The Naivasha shop demonstrates that an entrepreneur can sell safe drinking water profitably at a price point significantly below existing bottled water options on the market.





SWAP SkyHydrant

Aquaya designed the SWAP SkyHydrant business to serve a low-income population. It is part of SWAP's "model village", which includes a kiosk, improved pit latrines, and a community meeting space. The facility is located within 200 meters of the former site of the SWAP PUReactor pilot project, which was relocated to make way for the SkyHydrant.

Water from the Nyando River is treated using Memcor, hollow-fiber ultra-filtration technology produced by Siemens AF (the SkyHydrant). Donor agencies have provided the start-up costs and initial working capital required for this business – it is unlikely that a private enterprise based on this business model would be able to obtain commercial financing.

The SWAP SkyHydrant started selling low volumes of water

on a test basis in March 2011, and formally opened to the public on May 31, 2011. Despite not being officially open for business and no serious marketing efforts, trial sales volumes were comparable with PUReactor sales. This suggests that there is lasting demand for treated drinking water in the area. Over the period ahead, the SkyHydrant's substantially greater capacity relative to the PUReactor should allow Aquaya to determine the extent of demand for treated drinking water in the area.

Figure 5 shows two months worth of pre-opening sales by the SWAP SkyHydrant – the blue line representing liters sold per day, and the black line a seven-day moving average.

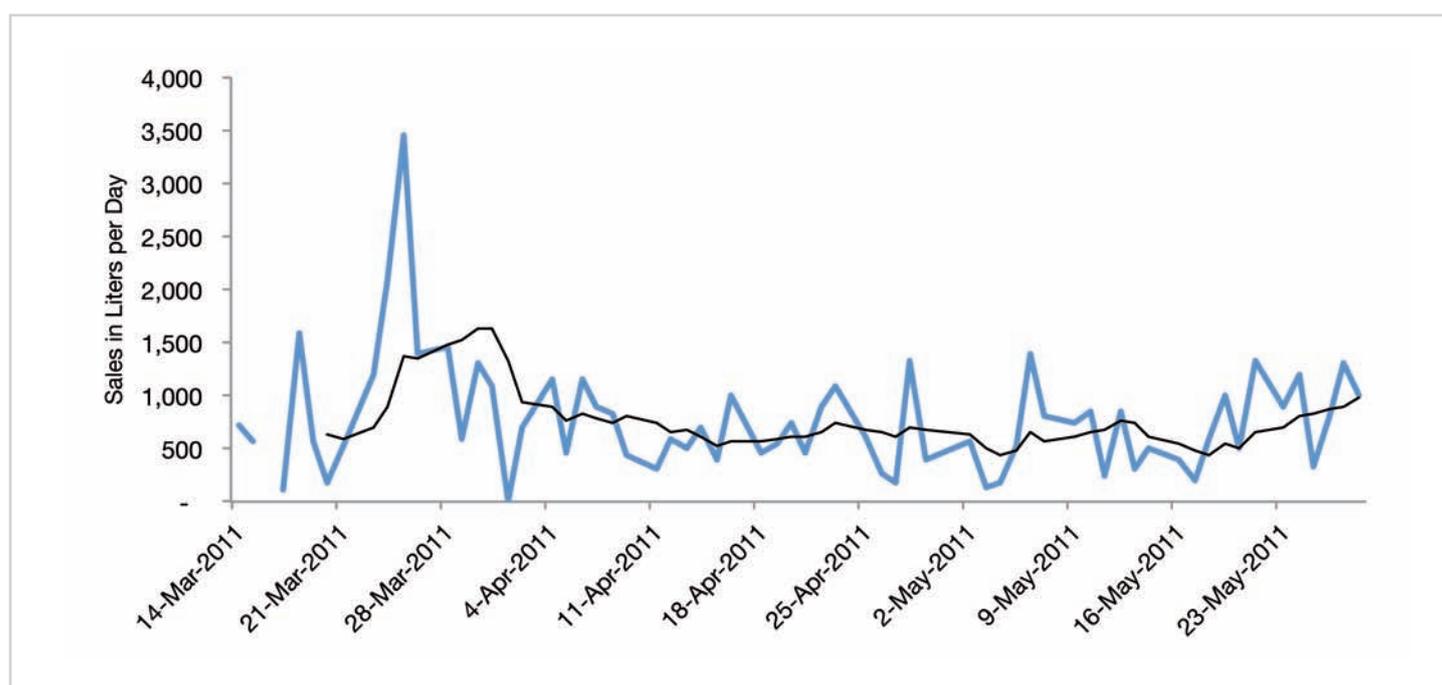


Figure 4: Trial sales at SWAP SkyHydrant, Ahero, March – May 2011

Other data collected

Data observed from two other businesses also supports the view that there is a growth market for small-scale water treatment and vending in Kenya. These businesses mirror the business model of the water refill industry in Southeast Asia.

They have forged partnerships with two large Kenyan supermarket chains, which receive a portion of the water sales proceeds. Both businesses plan to expand their retail locations.

Evidence suggests that businesses of this type can profitably sell water at price points that are significantly lower than the current sales prices of 260-330 Kenyan Shillings (\$3.25 - 4.13) for an 18.9-liter refill – a price that is approximately 10 times higher than prices in Southeast Asia.

If our hypothesis that the water refill industry in Southeast Asia began by targeting elite consumers before reaching lower-income groups is correct, the recent data observed suggests similar industry growth in Kenya. However, a much more active small-scale water treatment market will be needed before prices in Kenya reach affordable levels for the poor.

Traditional bottled water market size

Kenya's bottled water industry is worth about 12 billion Kenyan shillings per year (\$160 million). In 2009, the industry sold 314 million liters of water under more than 100 brands (Githinji, 2010). This is an average price of 38.22 shillings (\$0.48) per liter, which is far too costly for most Kenyans. Nevertheless, the traditional bottled water industry is booming.

An article in *The Standard* attributes this growth to “lifestyle changes [that] fueled the perception that tap water was unclean” (Githinji, 2010). Robert Gakubia, CEO of the Kenyan Water Services Regulatory Board, is quoted in the same article saying that the traditional bottled water business is growing because consumers lack confidence in the quality of water they drink directly from taps.

Several bottled water companies distribute their products in 18.9-liter containers through retail and direct delivery outlets to well-off households throughout Kenya, with a price range of 295 to 449 shillings (\$3.69 to \$5.61) per container.

To gain insight into the overall market size for high-end water, Aquaya monitored sales of 18.9-liter containers of bottled water from supermarkets in the wealthier areas of Kisumu. Field workers were positioned near the entrances to several stores over the course of a week. The resulting data shows a sales rate of just under two containers per hour leaving these outlets – about 60,000 liters sold per month.

The study's authors also interviewed a distributor of one of Kenya's leading traditional bottled water brands in the country's western region. He reported monthly sales of 140,000 – 80,000 liters per month more than estimated by the supermarket observations. This shows the presence of additional high-volume retailers. The majority of sales are directly delivered. The distributor projected growth in the overall market would continue at about 10 percent per year based on recent trends.

CONCLUSION

Evidence from Kenya suggests that consumers across income groups recognize the value of high-quality drinking water, and the costs associated with consuming unsafe water. This awareness extends to consumers in rural, peri-urban, and urban areas.

The challenge is for businesses to profitably provide this water to consumers at an affordable price. Businesses in Kenya are beginning to respond to this demand, although to date commercial businesses are still primarily targeting high- and middle-income consumers.

In the small-scale water and treatment vending industry in Southeast Asia, affordable prices were reached only after competition, driven by the replication of the business model, drove down profit margins and consumer prices.

This business model has not yet become widespread in Kenya, partly because of the lack of information, and partly owing to a lack of start-up capital.

The Aquaya program is responding to these needs. By increasing the performance and visibility of the business model, microentrepreneurs can start the replication process. By generating additional momentum, a sustainable water treatment and vending industry can emerge. This will push



prices down, so that clean drinking water becomes affordable for many more low-income communities throughout Kenya.

In addition to the SWAP SkyHydrant, a number of other business models are being tested in Kenya, and elsewhere, that integrate market-based operations with subsidized capital costs, and are thereby able to operate at prices more immediately accessible for low-income consumers. This topic will be explored further in a forthcoming market brief under the IFC Sanitation and Safe Water for All program.

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About Aquaya

Aquaya is dedicated to improving global child health by increasing access to safe drinking water. It focuses on research and technology development in the areas of water quality management, service delivery, and impact assessment. It also provides consulting services to support public and private safe water efforts. For more information, visit www.aquaya.org

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