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Urban Water Partners (A)

Introduction

Early in August 2010, Dr. Porter Jones (MBA '11) and his Harvard Business School (HBS) classmate Aaron Matto were on the ground in Dar es Salaam, the largest city in the Republic of Tanzania. They were there to assess the progress of the first slowsand water filter their company—Urban Water Partners (UWP)—had installed. Four months earlier, Jones and Matto, along with Ajay Kori (MBA '11), partnered with Justin Iwasaki and Jason Young, two MD candidates at the University of Utah, to win HBS's 2010 Social Venture Track Business Plan Contest. Their idea was to bring clean water to several African nations using a network of existing water vendors, readily available water-purification technology, and mobile-banking technology. If they were successful in Dar es Salaam, the team planned to expand operations into several other African urban centers where water quality was poor.

UWP's seed money, the prize winnings from the HBS competition, would be gone at the end of the month, and the team had a meeting scheduled in late August with an HBS alumnus who was interested in investing in the company. At the meeting, they intended to present their business plan, updating their original financial analysis with experience gained from two months of work getting UWP started. Of particular importance was to show UWP's path to profitability: the team knew there was considerable skepticism among investors that clean water could be delivered profitably in an emerging African economy like Tanzania.

Origins of UWP

On the first day of HBS's fall Required Curriculum (RC) semester in 2009, Jones and Matto walked into Aldrich Hall anticipating their first MBA class. Initially, Jones, a medical doctor with a deep interest in public health, and Matto, with a private equity and investment banking background, would seem to have had little in common. But Jones quickly learned that Matto had an interest in economic growth in disadvantaged communities. In fact, for the last five years, Matto had spent several weeks in Mexico building homes for the poor and was on the board of a nonprofit involved in child literacy.

Professors Karthik Ramanna and George Serafeim and Senior Researcher Aldo Sesia of the Global Research Group prepared this case. HBS cases are developed solely as the basis for class discussion. Cases are not intended to serve as endorsements, sources of primary data, or illustrations of effective or ineffective management.

Not long after the semester commenced, Jones received a phone call from his friend Jason Young. The two had met at the University of Utah's School of Medicine. Young talked about a business idea he and Iwasaki had been working on to bring clean water to Tanzania. Iwasaki had worked for the Program for Appropriate Technology in Health's (PATH) safe water project, a program funded by the Bill & Melinda Gates Foundation, which took him to Tanzania. Of that experience, he said:

> Part of my responsibility was to go door to door to ask Tanzanians how much water they used, where they got it, and how they used it. Only 10% of the people in Dar es Salaam were connected to the city's water authority. This meant that the other 90% of the population—the lower and middle classes—had to rely on private vendors to get their water, which was unsafe to drink without treatment. They would have to purify the water at home or buy bottled water, which was often unaffordable.

Consequently, Iwasaki and Young put together a business plan. They were heartened by how well it was received in several national contests, but it did not get the traction they had hoped for. "In addition we quickly learned that the academic medical establishment for the most part did not trust business; rather they thought of business as something evil," commented Young.

Jones was intrigued and mentioned the idea to Matto. "It was right up my alley," Matto said. "I was thrilled to join the team." The two looked over Iwasaki and Young's last version of the business plan. Meanwhile, both were deeply involved in their RC experience and used it to leverage their assessment of the business plan. "I had primarily focused on finance prior to HBS," Matto explained, "but the courses exposed me to new and different management skills, which I used to test whether Justin and Jason's business plan was viable." Jones added, "RC prepared me to think critically about business decisions, not something doctors are necessarily trained to do. I began to look at the business plan in a more analytical way." Ultimately, the four, plus HBS classmate Kori, revised the business plan and entered it in HBS's Social Venture Track Business Plan Contest in the spring of 2010, where it took first place. (See **Exhibit 1** for a photograph of the team presenting.)

On winning the contest, Young said, "Justin and I had been working on the business plan for two years. We had our ups and downs. People told us we would not be able to do it—it was in Africa, we were too busy with our own school work, etc. Winning the HBS contest brought validation." Iwasaki added, "When we won the competition, I had about five seconds of joy and then I thought, 'How are we going to make this happen?'" Jones added:

> Before the competition, we felt that if we could scrape together $5,000 to $7,000, we could get down to Tanzania and try to install one filter to clean water to see if the model we created would even work. It was super exciting that first place came with $25,000 in cash and in-kind consulting and legal support of about $15,000. The day we won, we went out for a celebratory dinner. We felt empowered, and soon the discussion turned to strategizing how to put the plan into action.

Water Situation in Tanzania

Between 1950 and 2000, Dar es Salaam grew from a town of about 50,000 inhabitants to a sprawling metropolis of over three million. By the early 2000s, about one in ten Tanzanians lived in Dar es Salaam, the country's commercial center and capital.[1] Tanzania, however, was in the bottom 10% of the world's economies in terms of per capita income in 2010.[2] According to the U.S. State Department, in 2008, annual per capita income was US$440.[3] Even so, Tanzania was one of the more politically stable nations in Sub-Saharan Africa.

On the advice of the World Bank and the International Monetary Fund (IMF), the Tanzanian government privatized the water service in Dar es Salaam in 2003, hiring a consortium known as City Water to operate the utility. At the time, leakage and illegal connections meant that only 25% of the water being sourced from the Ruvu River—Dar es Salaam's primary water source—was reaching legally connected consumers.[4] After complaints that City Water was slow in making progress, to ease water shortages, improve revenue collection, and stamp out illegal connections, the government canceled the contract in 2005. The state-run Dar es Salaam Water and Sewerage Corporation (DAWASCO) replaced City Water.[5]

WaterAid, an international nongovernmental organization (NGO) with a mission to improve access to safe water, reported that water connections in Dar es Salaam were mainly available to middle- and upper-income households, industry, and government institutions.[6] Dar es Salaam's urban poor lived in 55 unplanned settlements that had sprouted along road networks and in between housing and business estates where water was not easily available. Illegal tapping of the water system was widespread among both middle-income earners and the urban poor. An informal array of entrepreneurs made a living by distributing water to those without water access, obtaining water from their own taps, neighbors' taps, or the few public sources.[7] Those without direct water connections had to rely on these vendors, who had either legal or illegal access to the city's water supply or had a borewell.[a]

Residents with piped water could sell water at a premium to more than cover their flat DAWASCO monthly fee (US$15 to $22).[8] Individuals with piped water sometimes leased water pushcarts to water vendors. Pushcart vendors could bring in US$3.00 to $4.40 per day, selling the DAWASCO water for just over a half-cent per liter. Although new piped-water connections were available from DAWASCO, the monthly fee was prohibitive for most residents.

A PATH survey found that nearly every household in Dar es Salaam believed that water from both DAWASCO and borewells was unsafe to drink.[9] Boiling with charcoal heat was the common home water-purification method in Dar es Salaam. Boiling was recommended for drinking water; for most other purposes, people believed that DAWASCO water was of acceptable quality. The team estimated that 80% of the people living in Dar es Salaam spent as much as US$0.50 a day on charcoal to boil drinking water. Households that did not boil their drinking water gave the high cost of charcoal as the main reason. Because DAWASCO supplied water during limited hours, even households with piped connections had to store large quantities of water for later use, thus further exposing it to contaminants.

Many commercial companies sold purified bottled water in Dar es Salaam at prices ranging from US$0.12 to US$0.43 per liter. These companies had also sold treated water in plastic bags until 2006, when the government banned the sale of sachet water to reduce litter. Despite the government's ban, a cottage industry continued to sell water advertised as boiled in unlabeled bags in many unplanned areas of Dar es Salaam. Sometimes, such unbranded water could sell for as little as US$0.08 per liter.

Untreated Water and Health[10]

In 2010, untreated drinking water remained a considerable health issue and a likely contributing factor to premature deaths, especially in developing countries. In Sub-Saharan Africa, malnutrition, the lack of safe drinking water, and poor sanitation contributed to half of all children's deaths. According to the team's research, diarrhea was the second leading cause of death worldwide in

[a] A well of 12 inches or so in diameter, anywhere from 50 to 3,000 feet deep, to access groundwater.

children under five years old. Waterborne pathogens accounted for many of the estimated 4 billion cases of endemic diarrheal disease (and 1.7 million deaths) each year.[11] More children died every day from diarrheal diseases associated with unsafe water than from AIDS, malaria, and measles combined.[12]

The UWP Business Plan

Wanting to use business as a force to do good, the team developed what it believed was an economically viable and sustainable strategy to provide clean drinking water to Dar es Salaam. The commercial nature of their operation was important to the team. "Most other efforts to bring clean water to the underserved citizens of Dar es Salaam had relied on volunteerism and had ultimately failed. Those efforts were not market-based and proved to be unsustainable," Iwasaki said. UWP planned to distribute slowsand water filters to a select network of water vendors so that the vendors could add the capability of selling clean drinking water to their existing product line. According to the team, this partnership between UWP and the vendors would create a mutually profitable enterprise that brought affordable clean water to people who otherwise did not have access.

Objectives of the Company

1. **Public health:** Create a sustained reduction in the prevalence of severe diarrhea in children under five within three months of initiating business in any given city block.

2. **Profitability**: Create a social business[b] that would generate revenues sufficient to cover operating costs, while financing future growth. Develop a recognizable brand that represented quality, success, and dignity to the water vendor and end consumer.

3. **Community building***:* Hire women to serve as the company's water vendor service technicians. The technicians would maintain and service the filters, and articulate and demonstrate clean water testing, after-purchase clean water handling education, and other clean water community education programs developed for water vendors and their customers.

4. **Environment:** Reduce the environmental impact of deforestation associated with boiling water using charcoal (the predominant mode of water treatment). Decrease the demand for bagged and bottled water, which littered and polluted the land in the absence of recycling programs.

The Technology

Slowsand filtration was primarily a biological process that treated water much the way a natural spring did. A column of water slowly passed through a three-foot layer of fine sand. At the top of the sand, an intense layer of micro-organisms naturally developed. As the water passed through the deeper layers, other processes such as sedimentation, mechanical filtration, and electrical attraction removed additional contaminants. The U.S. Environmental Protection Agency (EPA) and the World Health Organization (WHO) recognized slowsand filters as a superior water-purification technology.[13] (See **Exhibit 2** for a photo of a filter.)

[b] Muhammad Yunus, winner of the 2006 Nobel Peace Prize, defined a social business as a business that was cause-driven rather than profit-driven, with the potential to act a change agent for the world. Not a charity, a social business had to recover its full costs while achieving its social objectives.

UWP planned to work with Blue Future Filters, a company that specialized in the manufacture and installation of slowsand filters in developing countries and had negotiated a onetime fee (US$40,000) to have Blue Future oversee the installation of the first filter and provide comprehensive training on the workings of the filter to the local management team in Dar es Salaam. UWP also planned to work with Blue Future for the local manufacture of slowsand filters. The team believed that if made locally, slowsand filters would cost $250, almost halving the regular price Blue Future charged.

Mobile banking, also an important facet of UWP's technology platform, would be the primary means to collect payments from the water vendors and to build community among them. A joint study by the Center for Economic Policy Research and Vodafone found that 97% of Tanzanians had access to a cell phone, most capable of running mobile applications.[14] UWP had contacted an Indian firm to develop a mobile phone application that would allow water vendors to make payments to the company from their bank accounts. The use of mobile technology meant that UWP's technicians would not carry large amounts of cash. Further, it decoupled the vendor service relationship from collections, allowing UWP technicians to work on behalf of the vendors without the sticky issues that surrounded bill collection.

Delivering the Service

UWP expected to provide each water vendor in its network with a slowsand filter (see **Exhibit 3** for a photo of the first filter); the company was to handle installation, maintenance, on-site water quality testing, and after-purchase hygiene education. The selection of water vendors was critical; Iwasaki noted, "We were clear that we were only going to engage with 'legal' vendors, those who paid the city for the access to water which they had." While the team had yet to formally specify the criteria it was looking for in its technicians—those who would maintain the filters, visit with the vendors, and educate the community on good water hygiene—it strongly felt the technicians had to be women. "Women have the knowledge of how the water sector works in their communities," Iwasaki noted. Each technician was expected to support 20 water vendors.

The service plan called for UWP water vendors to use their slowsand filter to produce clean water and sell it, in addition to the untreated water they typically sold. Water customers in Dar es Salaam usually brought water containers from home, filling their containers at the vendor station and carrying them home (see **Exhibit 4** for a typical vendor station). UWP planned to provide end customers with either branded containers or logo stickers to clearly identify containers with UWP-treated water. UWP's technicians would randomly sample water at its vendor stations to ensure it was clean and met UWP's standards. If the treated water were to fail UWP's tests, the company would instruct technicians to disable the filter so that the vendor could not engage in further sales.

In addition, the company planned to monitor the occurrence of diarrhea in its markets via household surveys.

Unit Sales and Projected Costs

Per Iwasaki's observations, water vendors averaged 150 to 350 customers per day. The physicians on the team concluded that each customer needed a minimum of one liter of clean water per day for his or her household. The team planned to have 50 filters operating by the end of its first year of operations, an additional 1,950 filters at the end of year two, and a further 1,000 filters by the end of the third year. Each vendor would have one filter, so the network of vendors was expected to eventually grow to 3,000. After much market research, the company decided to introduce its product, purified water, at a price of US$0.08 per liter. At this price, once all 3,000 slowsand filters were

operational, the projected steady-state unit sale of clean water, assuming 150 customers, was 450,000 liters per day, or about 12% of the clean water market in Dar es Salaam.

Capital costs The major capital costs for the company were the slowsand filters. By using the expertise of water treatment specialists from Blue Future and UWP's own experience during year one, the team predicted that UWP would be able to manufacture filters locally beginning in year two for approximately $250 per filter; filters in year one would have to be imported at $400 per filter.

In addition, the team expected to incur capital costs associated with purchasing the motorcycles and trucks needed to ferry technicians and equipment to the various filter locations. The team planned on purchasing three, 97, and 50 motorcycles, respectively, in years one through three. The cost of each motorcycle was estimated at $2,500. Flatbed trucks were necessary for the distribution of filters and filter servicing equipment. UWP would need to buy one truck in year one, 20 trucks in year two, and nine additional trucks in year three at the price of $12,500 per truck. **Table A** shows budgeted capital costs.

Table A Capital Costs, Years One to Three

	Year			
Capital Investment	**1**	**2**	**3**	**Total**
Slowsand filters				
Number installed	50	1,950	1,000	3,000
Cost of each filter	$400	$250	$250	
Total expenditure	$20,000	$487,500	$250,000	$757,500
Motorcycles for technicians				
Number	3	97	50	150
Cost per motorcycle	$2,500	$2,500	$2,500	
Total expenditure	$7,500	$242,500	$125,000	$375,000
Flatbed trucks				
Number	1	20	9	30
Cost per truck	$12,500	$12,500	$12,500	
Total expenditure	$12,500	$250,000	$112,500	$375,000
Grand total expenditures	$40,000	$980,000	$487,500	$1,507,500

Source: Company.

The team needed to depreciate capital expenditures in order to estimate the per unit cost of water distributed, which in turn was important for the unit pricing of water. The team expected the estimated life of the slowsand filters to be 15 years and the vehicles, 5 years. Also, the team concluded that "straight-line depreciation," allocating an equal amount of depreciated capital in each period, was a reasonable approximation of the use of filters and vehicles.

Operating costs Operating costs included a $100 monthly salary for each water service technician. Since UWP would install 50 filters the first year, the company would need to hire three technicians. Therefore, the annual costs for technicians would amount to $3,600 for year one. With the addition of more filters, the annual costs for technicians would amount to $120,000 and $180,000 for years two and three, respectively.

A local management team consisting of a chief operating officer and several subordinates would draw salaries of $120,000, $325,000, and $400,000 over the first three years. UWP also planned to have a sales staff of 20 in years two and three, with each salesperson earning $150 a month (it planned to

have no sales staff in year one). Thus, the annual costs of salespeople would be $36,000 in years two and three.

The budget also called for weekly testing of each filter at an expense of $2 per filter per week. The estimated annual cost of testing for year one was $5,200, and it was expected to grow to $208,000 and $312,000 by years two and three as more filters were installed.[c] In addition, the team projected a $100 maintenance fee per filter per year, which included replacing the sand in the filter. The annual costs of maintenance for years one, two, and three were estimated at $5,000, $200,000, and $300,000, respectively.

Marketing expenditures were planned to include advertising, logo stickers, and consumer education. Marketing costs would amount to $10,000, $25,000, and $40,000, respectively, for the first three years. In addition, the company planned on retaining a local celebrity to serve as a brand ambassador. Such an ambassador would be necessary to build local trust in the UWP filtration process. UWP would engage the brand ambassador on a three-year contract, entitling her to receive payments of $100,000 for years one and two and one percent of annual revenues in year three.

There were also costs associated with operating the company's fleet of motorcycles and trucks. Vehicle operating expenses were expected to be $2,500, $65,000, and $110,000, respectively, for the first three years.

Other costs There was considerable anxiety among the team about experiences that other entrepreneurs in Tanzania had shared about the "informal cost of doing business" in Dar es Salaam. According to Transparency International, in 2009 Tanzania was the 126th most corrupt country in the world of a total of 180 countries surveyed.[15] The team knew that for UWP to achieve a timely launch of its operations, the company might need to engage with local politicians and other officials. As undesirable as this practice was, the team was struggling with how to balance political realities with its social mission of bringing clean water to the residents of Dar es Salaam. An entrepreneur with experience in Tanzania elaborated:

> In the city there are political blocs, and each bloc has a leader who can help with access to the right people and make important connections. Unfortunately, one has to make a small contribution to engage them. The police also are apt to pull people over without just cause, and, to be honest, one has to give them a few dollars to be free to go. One never knows what these informal costs will be. But one needs to make an estimate and factor that into budgets. On average, one should figure on these costs being as high as 10% to 20% of a business's revenues.

Incentive Structure for Water Vendors

A key challenge for the team was how to motivate, monitor, and compensate its network of water vendors. The water vendors were at the heart of the company: they would be responsible for selling the product and collecting the revenues. They were also the first line of defense on quality control. The team considered several possible incentive contracts with the water vendors, including leasing the use of filters for a flat fee and a profit-sharing agreement. After much deliberating, the team decided to pursue a revenue-sharing agreement. Under this agreement, the water vendors would

[c] New filters in any given year were expected to be installed in a phased manner through the year. Regardless, for simplicity in budgeting, the company accounted for new filters as if they were installed at the beginning of the year. Thus, for example, filter testing costs for year two assumed all 2,000 filters would be operational on day one of the second year and would require weekly testing throughout the year.

receive 20% of the revenues associated with the sale of clean water. UWP, which would receive the other 80% of revenues, would be responsible for all of the costs discussed above. With revenue sharing, UWP retained control over the price that end customers were charged for the clean water. This gave the company better market intelligence and flexibility; moreover, it allowed the partners to ensure that their primary goal of delivering clean water at affordable prices was not a victim to price-gouging vendors.

The key risk with revenue sharing was underreporting: given their informational advantage, vendors would have the means and incentives to underreport revenues to UWP. The company estimated that underreporting would decrease its gross revenue by 10% to 15%. To mitigate this risk, UWP planned to randomly audit the vendors' sales data. Another risk with the revenue-sharing agreement was that it did not create a direct financial incentive for the vendors to care about UWP's costs. The company was particularly concerned about vendors abusing or misusing the filter equipment—UWP's key tangible asset. The founders were debating how to incorporate in their financial projections any contingencies for filter-related losses, given vendor abuse.

Presentation to the HBS Alumnus Investor

The team realized that customers' motivations to purchase clean water went beyond perceived health benefits. It believed the ability of an individual or family to purchase clean water implied a certain social status. According to the team, purchasing clean water brought dignity to individuals and families. These feelings were central to customers' willingness to pay a premium for clean water. Yet, in keeping with its social mission, the team wanted the price of UWP's clean water to be affordable to as broad a section of Dar es Salaam as economically viable.

Jones and Matto sat down to dinner at the Isisi Grill, a local restaurant, to prepare for their upcoming presentation to the alumnus investor. It had been a memorable day. Earlier that morning Jones, Matto, and two of their Tanzanian employees were stopped in their car at the entrance to the Tanzania Bureau of Standards (the local equivalent of the U.S. Food & Drug Administration). The attending police guard would not allow the car to enter the gates without a small "fee." Shortly thereafter, a verbal argument ensued between the police guard and the two Tanzanian employees. Suddenly, the police guard pulled the two Tanzanian employees, who were in the car's front seats, out of the vehicle and arrested them for supposedly having a phony car registration. Jones and Matto looked at one another as the police led their employees away to jail. The car was still running. They were told that paying the guard the equivalent of US$5.00 would free the two men. They refused, opting instead to spend several hours to release their employees through the proper channels.

Trying to set aside their unsettling experience, Jones and Matto turned their focus to UWP's financials. Based on projected capital and operating outlays, they estimated their external financing needs to be about $200,000 for year one and one million dollars for year two (there were no external financing needs in year three because year-three growth was expected to be financed through year-two profits). They planned to raise the year-one funds through a 20% equity investment in UWP and the year-two funds through a one-year loan at a 10% interest charge, to be repaid at the end of the year. In order to attract such a sizable investment in a country with very little foreign capital, the team knew it would need to have very sound financial projections. In anticipation of the meeting, the investor had already requested at least three years of projected financial statements (income statements, balance sheets, and cash flow statements).

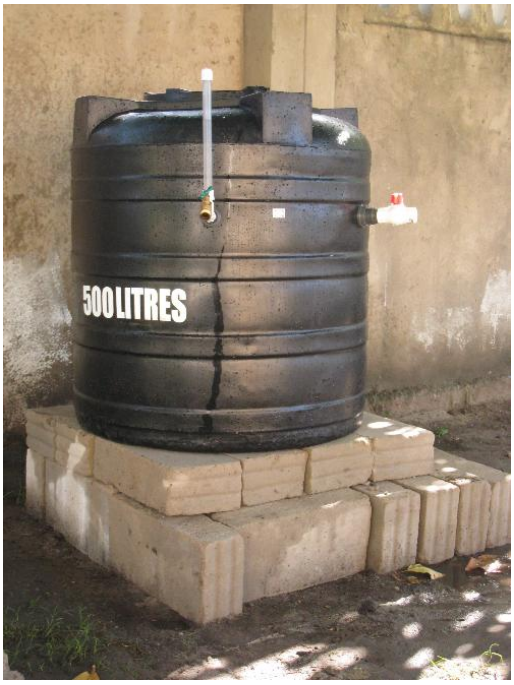
Exhibit 1 Team Presenting during the Competition

Source: Photo courtesy of Evgenia Eliseeva, *Harvard Crimson*, April 28, 2010, via http://www.thecrimson.com/image/2010/ 4/28/urban-partners-business-contest/, accessed August 13, 2010.

Exhibit 2 Slowsand Filters

Source: Company.

Exhibit 3 First UWP Slowsand Filter



Source: Company.

Exhibit 4 Water Vendor Station

Source: Company.

Endnotes

[1] WaterAid, "Why did City Water Fail," May 2008, p. 1, http://www.wateraid.org/documents/plugin_documents/city_water_report_online_version.pdf, accessed July 16, 2010.

[2] https://www.cia.gov/library/publications/the-world-factbook/geos/tz.html, accessed July 20, 2010.

[3] http://www.state.gov/r/pa/ei/bgn/2843.htm June 2008, accessed July 22, 2010.

[4] http://www.wateraid.org/documents/plugin_documents/city_water_report_online_version.pdf, accessed July 16, 2010.

[5] Sarah McGregor, "Running Water Remains a Pipe Dream for Many," http://ipsnews.net/africa/nota.asp?idnews=42537/, accessed July 20, 2010.

[6] Dominick de Waal, "Water reforms and private sector participation in Dar es Salaam, Tanzania," http://www.wateraid.org/documents/prospects_for_the_poor_1.pdf, accessed July 19, 2010.

[7] WaterAid, "Water Reforms and PSP in Dar es Salaam," 2003, pp. 6–7, http://www.wateraid.org/documents/psp_tanzania.pdf, accessed July 20, 2010.

[8] PATH, "Safe Water Situation in Four Countries: 2007 Findings in Brief," Working Draft, PATH Safe Water Project, last edited April 2009, http://www.path.org/files/TS_safe_water_four_countries.pdf, accessed July 19, 2010.

[9] PATH, "Safe Water Situation in Four Countries: 2007 Findings in Brief," p. 10.

[10] http://www.unicef.org/mdg/childmortality.html, accessed July 20, 2010.

[11] WHO, *World Health Report 2005* (Geneva: World Health Organization, 2005), via "Safe Water for All," IFC, http://internationalstudies.uchicago.edu/outreach/summerinstitute/2010/documents/ sti2010-tata-safe-water-for-all.pdf, accessed July 16, 2010.

[12] See World Health Organization, "Diarrhea: Why children are still dying and what can be done," 2009; and http://www.unicef.org/mdg/poverty.html, accessed February 22, 2010.

[13] http://www.bluefuturefilters.com/default.html, accessed February 22, 2010.

[14] See Center for Economic Policy Research/Vodafone, "Africa: The impact of mobile phones," 2005, http://gsmworld.com/documents/vodafone_africa_report05.pdf?PUPOL=VFAFR, accessed July 23, 2010.

[15] http://www.transparency.org/policy_research/surveys_indices/cpi/2009/cpi_2009_table, accessed July 16, 2010.