Prepaid Water in Kampala: Case Study

Overview

Kampala, the capital of Uganda, has a population of about 1.8 million people by night, swelling to about 2.5 million by day as commuters come into the city from neighboring settlements. More than 60 percent of the resident population lives in slums and poor-quality housing. The vast majority are tenants, and many are highly transient. Most of the city has 24/7 water supply, and network coverage is over 70 percent, but access for poor families is far lower. Most rely on communal standpipes and water vendors, who deliver water in jerry cans from taps or public springs, or they buy water from the small minority with private connections.

Uganda’s National Water and Sewerage Corporation (NWSC) began introducing prepaid meters for institutional customers in May 2014 to improve payment levels. Prepaid meters in Kampala serve poor families that do not have their own private connections. The NWSC had introduced prepaid meters on public standpipes in 2007 after ongoing payment problems at conventional standpipes resulted in most being disconnected. Customers with their own prepaid credit can get water cheaply, whenever it suits them, from any prepaid standpipe, without being affected if others do not pay. To date, more than 1,600 prepaid standpipe meters have been installed, with a rapid increase occurring in 2013. NWSC is aiming for 5,000 by 2016. Each prepaid standpipe serves about 15–30 households, and nearly 30,000 households have their own credit token.

Lessons

Prepaid standpipes can offer low-income customers significant benefits, despite high upfront and ongoing costs to the utility. They could provide cheap water at a constant price without mark-ups by intermediaries and 24/7 access. Because they resolve problems over payment to the utility, the utility is more willing to install additional water points, and so prepaid standpipes can also offer closer, more convenient access and shorter queuing times.

A dedicated pro-poor unit with operational responsibilities can be a useful vehicle for coordinating resources and activities around installation, vending, and ongoing support for prepaid metering. Ready access to spares is essential to minimize the time when faulty meters are out of order. Every resident who wants a credit token should be issued (or re-issued) one to avoid new intermediaries emerging who add a mark-up on the utility’s tariff and sell from prepaid meters to people who do not have their own credit token.

Why standpipes were installed with prepaid meters

Private connections remain out of reach for many slum residents. In 2004, NWSC reduced the cost of individual water connections in the hope of expanding access to water services, but even with this subsidy, a private connection remained out of reach for many poor households. The policy favored property owners, not tenants, and settlement density and congestion made individual connections almost impossible in some areas.

There has been a high failure rate among supply-driven public standpipes. NWSC has a firm policy of disconnecting the supply to water points where the bills are in arrears. Even where NWSC has increased coverage by developing new public standpipes, users often have no access because the service is not usable, and revert to unprotected or more expensive sources.

NWSC decided to explore prepaid meters after being unable to resolve ongoing payment problems at standpipes with conventional meters. Usually, the users paid promptly, but the
individual who collected their payments did not necessarily pay the utility. “It is just not worth spending money to pursue payment in this situation,” said a utility manager. “We just disconnect, even though we know we are punishing the compliant and the innocent.” With prepayment, customers without their own connections can pay the utility directly, in advance, and are not penalized if others do not pay.

Following research in the mid-2000s, NWSC concluded that intermediaries who were on-selling water from the utility were compromising supply from conventional public standpipes and kiosks. Urban poor users were paying tap attendants a far higher price than the utility tariff, but often the utility was not being paid. Many tap attendants were not paying the utility, or paying less than they owed. Recognizing the need for better social targeting and closer engagement with the intended users of new services around planning, siting, and management, NWSC put new emphasis on community involvement when installing new conventional standpipes. In 2007, it formalized the new strategy with the establishment of a pro-poor branch to work more effectively with poor households in slum residents to understand and meet their needs better. With support from its German development partners, NWSC began piloting new approaches in the Ndeeba-Kisenyi area. Prepaid meters on standpipes (Photo 1) were a key part of these pilots.

With prepayment, the end user gets the benefit of tariff subsidies directly, so utilities can target subsidies reliably without the usual “leakage” to intermediaries who capture the benefit. With these direct subsidies, the price customers pay has plummeted. Water vendor prices in Kampala are commonly 100 to 200 Ugandan shillings per 20-liter jerry can, but can soar above 500 shillings in times of scarcity. The price per jerry can from a prepaid standpipe is a constant 25 shillings (USD 0.01), which means households can buy at least four times as much water—and often far more—from a prepaid meter for the price they would otherwise pay a vendor. Customers also can get water whenever it suits them, well beyond the hours when vendors and tap attendants work.

NWSC’s approach to implementing prepayment

“Serving the poor is not about putting in infrastructure, but about the mechanisms you use to keep systems working.” This is the view of a senior NWSC manager, who adds that a utility must engage with low-income customers differently from how it serves middle- or high-income customers. “You need to be much more interactive, on an ongoing basis, because many people in low-income areas are transient, and you need to keep reaching the new people who move in. It takes good preparation and explanation of what you are doing, and why, and why that particular area, and you have to show them how it’s in their interests. There has to be a big emphasis on good process—people want to be involved in decision-making, and you can’t be impatient, or you’ll fail. It takes time to change people’s thinking.”
Another difference is that few low-income households have a regular monthly wage or salary, and consequently may struggle to pay a water bill once a month. **Prepaid meters allow people with variable incomes to pay for water in small amounts when they have cash, in line with what they can afford.**

The first pilot program was in Kisenyi and Ndeeba, where 348 prepaid standpipes were installed with funding support from the German government. NWSC began preparations in 2006 by working with local leaders and structures to identify and map areas where new standpipes were needed.

NWSC uses parish development committees (PDCs), the second-tier administration within the urban local government, as its primary entry point when planning local water services upgrades. PDCs oversee local development, working closely with the village committee, known as the ROC1, and identify the areas needing the most urgent intervention.

Every prepaid meter is registered to the owner of the land on which it is situated. Gaining the **support and cooperation of landlords**, who provide the land on which the standpipes are installed, is a crucial part of the preparation phase (Photo 2). Only a small area is required—one square meter for the meter—but installation entails agreeing servitudes\(^1\) and laying pipes, and landlords have to sign an agreement with NWSC stating that they will not bar access to anyone wanting to use the prepaid meter, and are willing to play the role of caretaker on behalf of tenants living on their land and in the vicinity. The landlord gains a water connection to his or her own property at no cost, with benefits including convenience and the ability to attract tenants and perhaps charge slightly higher rents.

**Community mobilization campaigns** led by pro-poor branch staff help to sensitize residents to the importance of good quality water, sanitation, and hygiene and promote proper use of the facilities (Photo 4). Once the standpipes are installed and vendors are in place to sell credit, residents are invited to sign up for a credit token. Once their name, photograph, and contact details have been recorded, their iButtons are initialized, issued and activated.

The success of the first pilot project encouraged NWSC to extend prepayment to other areas with 24/7 water supply and adequate water pressure. In 2008, it began installations in Kagugube, and 38 standpipe meters were installed with African Development Bank support. This was followed the next year by a further 32 meters installed in different areas with Belgian aid, and then 114 standpipe meters in 2011 in Bwaise with support from the Coca Cola Foundation. By far the biggest program to date was funded by the Global Partnership for Output-Based Aid (GPOBA).

\(^1\) Servitudes are rights and obligations to ownership or possession of land that transcend successive owners and occupiers.
The initial GPOBA agreement envisaged 20,000 yard taps (Photo 3) in addition to conventional and prepaid standpipes, but demand for new yard taps proved to be substantially less than the planners anticipated. Affordability remained a concern for many who initially showed interest, and just 6,000 were installed by the end of the program. One reason was that prepaid standpipes were becoming a viable alternative even for those with the means to apply for an individual connection. Per jerry can, water from the prepaid standpipes costs just over half (55 percent) of the yard tap tariff, and prepaid customers can avoid high bills and disconnection altogether. Further, as the number of prepaid standpipes have increased, walking distances and queuing times have fallen. The current average is 200 to 300 meters, and NWSC is aiming for an average below 200 m. A 2014 assessment of the GPOBA initiative found that on average people who fetched water took 3 minutes to reach the standpipe, and frequently less, and that average queuing time was 2 minutes.

From the utility’s perspective, lower demand for yard connections in some areas was met with some relief, because settlement densities often made it difficult to lay lines and fit yard connections in congested areas. Standpipes, conversely, could be situated more centrally to serve a larger number of people (on average 150, compared to the average of 15 that each yard tap served) at a more favorable investment cost per capita than yard taps.

The vast majority of customers surveyed are enthusiastic about the prepaid meters. They highlight the fact that water is far cheaper now, with 24/7 access. They can afford to buy more water, and average water consumption per household has increased, with the average now about five jerry cans per day, depending on the household size. There are enough prepaid meters in place to provide nearby alternatives if a particular meter is faulty. For some, convenience matters just as much as price. Some are willing to pay extra to source water closer to home from a neighbor who resells from a private tap, or a vendor that makes home deliveries. The point is that they now have more choices.

Table 1. Summary of Prepaid Metering Installations, 2007–2013

<table>
<thead>
<tr>
<th>Project Area</th>
<th>Prepaid Standpipes</th>
<th>Year Installation Began</th>
<th>Development Partner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Kisenyi and Ndeeba</td>
<td>348</td>
<td>2007</td>
<td>KfW Pilot</td>
</tr>
<tr>
<td>Kagugebe</td>
<td>38</td>
<td>2008</td>
<td>AfDB</td>
</tr>
<tr>
<td>Katwe, Bwaise II</td>
<td>32</td>
<td>2009</td>
<td>KIEMP</td>
</tr>
<tr>
<td>Bwaise II</td>
<td>135</td>
<td>2011</td>
<td>Coca Cola</td>
</tr>
<tr>
<td>All areas</td>
<td>1,060</td>
<td>2012</td>
<td>OBA/World Bank</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1,613</strong></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The lower tariffs have reduced stresses for women who depend on their husbands or partners to provide money for food and water, as they can now afford to buy the water they need without having to compromise on food (Photo 5). An African Development Bank review of the Kagugube program found that improved access to good quality water had reduced waterborne diseases, including cholera, and that the incidence of diarrhea among children was lower since prepaid meters were introduced.

Six years after NWSC began introducing prepaid meters, there have been just three instances of vandalism, “because we have taken the trouble to ensure everyone understands what we’re doing and why,” claim National Water staff, who run sensitization workshops in each area when prepaid meters are introduced, which leads to users accepting responsibility for caring for them. There are occasional attempts to remove the whole device (meter, standpipe, and all) to sell as scrap metal, but the units are bolted in and anchored firmly in concrete. Before starting installation in a new area, NWSC staff open the metal case and shows residents that there are no metal components inside that can be removed and sold as scrap metal.

Evidence of the degree of acceptance by most residents is that the meter units are kept clean. Often children are assigned to wipe them down daily and sweep around the apron to maintain good hygiene.
Meter performance

When prepaid meters were first introduced in 2007, breakdowns were more frequent than they are now. NWSC initially used two types of prepaid meters. One hundred meters of one type proved unreliable, with a short battery life, problems reading the token and loading credit, jammed valves, faulty seals, and leakage (Photo 6). Some 20 percent failed within the first six months and were not reparable locally. All have been removed or disabled.

The second type is more reliable and more readily reparable, and is used in all NWSC installations, even though the utility would prefer to have more good prepaid meters to choose from. There are nonetheless ongoing problems with batteries failing sooner than expected, valves jamming open or closed, and meters shutting off supply because of software problems. Spares are expensive but can be sourced, and NWSC staff has learned how to undertake most repairs themselves (Photo 7).

With hindsight, NWSC managers acknowledge that the utility under estimated what it would take to support and service prepaid meters. In mid-2013, with more than 1,200 prepaid meters installed, there were still just four technical staff available to maintain and repair the meters, with demand for further training. Managers acknowledge that a staff of 10 would be more appropriate. Routine maintenance and repair of prepaid meters will soon become the responsibility of individual branches. This will relieve the burden on the small staff contingent of the pro-poor branch, and allow them to focus more on other dimensions of service improvement in low-income areas.

Repair times are improving, but even so some customers complain that it can take weeks or even longer to get a fault repaired. Particularly if more than one meter in a neighborhood is out of order, during this time residents may resort to unprotected water sources at wells, or buy water from vendors or neighborhood resellers with yard taps.

It has also taken time for NWSC’s management team as a whole to accept the need to make routine budgetary provision for spares and replacement parts and to carry sufficient stocks of spares to avoid delays. NWSC is now trying to overcome difficulties in importing expensive spares by procuring some components locally (seals, valves, and

Photo 6. Most prepaid meters of this type performed poorly and have been removed or disabled. Here a woman unlocks a tap connected to a yard connection.

Photo 7. An engineer from the pro-poor branch checks the functioning of a prepaid standpipe.
batteries) but has not yet found adequate local substitutes.

New intermediaries
An important reason why NWSC introduced prepaid metering in Kampala’s slums was to allow customers to buy their water directly from the utility, without intermediaries and their mark-ups. **But unless every resident household that wants a token can have their own, the problem of intermediaries persists:** in a context of scarcity, those who have a token can sell water to those who do not, with a mark-up. Conversely, in some areas, the undersupply of tokens and shared appreciation of cheap water has led to increased solidarity among residents, with customers supplying neighbors or sharing tokens at no extra cost.

Some landlords have taken on the role of intermediaries, too, especially if they have lost income where tenants can now buy their water independently, by charging an inflated price as part of their rent. Despite the agreements they sign with National Water, some deny prepaid customers access to “their” meter unless they pay a premium. **Some landlords insist on selling the water themselves, with a mark-up of up to 100 shillings per jerry can.** “Some insist that you buy from them, even if you have your own token,” said one customer. Another said, “Landlords take charge and chase away those they don’t like. If you are on poor terms with your landlord, they won’t let you get water from that prepaid meter.” Landlords say they have to fund minor repairs, such as replacing hose pipes that wear or are stolen, and need to recoup the cost, but charging users a maintenance or access fee of 100 shillings per customer per day generates a substantial surplus beyond the 2,500 shilling cost of fitting a replacement hose.

Vending
**NWSC sells credit through a network of 23 small businesses** well located in each area and open for long hours (typically 6 a.m. to 10 p.m.). Vendors purchase credit in bulk from NWSC and sell it to customers, using a point-of-sale machine that loads credit onto the customer’s credit token (Photo 8). The credit vendors earn a 10 percent commission on what they sell, and vending water credit increases foot traffic to their businesses.

Some customers complain that there are **not enough conveniently located vending sites.** In one area, the NWSC office has relocated, and customers there have to travel to other areas to buy credit. Transport for one trip can cost 2,000 shillings or more, compared to typical monthly purchases of about 4,000 to 5,000 shillings. Some complain further that they spend money on transport and arrive to find the vendor is not there, or has no more credit left to sell, or there is a power cut and they have to pay more to run the generator. Tokens are
supplied free when they are first issued to new customers, but the utility charges 15,000 shillings (USD 5.90) for subsequent replacement.

NWSC’s current proprietary software is not configured to report on the sales and consumption of individual customers, only the collective transactions of its vendors who sell credit to nearly 30,000 token holders. The utility relies on an agent of the meter supplier to configure its software as it does not have the IT capacity in-house to customize it. When the software is upgraded to the latest version and run from a central server, each branch office will be able to track local sales and consumption.

Vendors say that the **average purchase is about 2,000 shillings, enough to buy 100 jerry cans**. There is no minimum credit amount for purchase from vendors (Photo 9), and purchases of as little as 100 shillings are not uncommon.

**Monitoring**

Performance contracts are a prominent feature of the way NWSC manages its staff and operations, but performance issues tracked for prepaid meters currently relate only to the number of new installations, revenue collected, and high-level functionality. NWSC does not analyze the service delivery performance of individual meters closely or the response times of utility staff when problems are reported.

At branch level, pro-poor branch staff visit and read all meters once a month. They maintain that it is necessary to retain a visible presence to keep in contact with their customers and know what is happening on the ground. Basic consumption and performance data is collated in a spreadsheet of 1,227 prepaid standpipes. New entries are being added steadily from the GPOBA program.

Of 1,223 meters for which data was available, 75 percent were functional when the meter was read in February 2014 (Figure 1). Technical faults with the prepaid meter accounted for
half of those not delivering water, whereas the remainder entailed more general problems not specific to prepayment.

Performance was markedly poorer at sites where the meters were more than three years old.

Median consumption over a six-month period at 458 meters that were read and functional throughout this period was 34.08 kls per meter per month, and ranged from less than 10 kls to more than 400 kls in very dense settlements. NWSC expects consumption and sales per meter to increase as more customers get tokens of their own.

**Prepayment for institutional customers**

In May 2014, NWSC began introducing prepaid water for institutional customers, starting with the Ministry of Health. This follows the signing of a memorandum of understanding between the utility and the Ministry of Finance and Economic Development, which focused on measures to control the accumulation of arrears. Government departments currently owe NWSC more than 40 billion shillings (USD 15.78 million), and the Ministry of Finance has made a commitment to ensure that new budget provisions will clear all arrears owed to the company.

NWSC believes that prepaid metering will reduce wastage significantly. At some connections, they believe consumption can be reduced by 70 percent without any negative health impacts, as taps are often left running continuously and broken ball valves are left unattended, particularly at army barracks and prisons. The utility acknowledges that revenue income will be lower, but so too will debt.

**Funding, finance, and revenue**

Kampala’s prepaid meters are heavily subsidized. To date, the capital cost has been funded largely by external development partners, and operating costs are cross-subsidized by the tariffs charged to commercial customers. Most were installed as part of an output-based aid program. NWSC prefincances 100 percent of the cost of each installation, and is then reimbursed 60 percent of the cost—90 percent of the subsidy after the installation has been verified, and 10 percent after 12 months of service.

Under the GBOPA, each meter was funded at a total cost of USD 1,325.50 per unit, including pipeline extensions, construction of the concrete apron, and project costs. This is USD 941 more than the cost of a conventional standpipe.
There are no lifeline tariffs as such in Kampala, but standpipe users pay a lower tariff than those with house connections and are exempt from value-added tax (VAT). The official social tariff of NWSC prepaid meters is 1,236 shillings per kiloliter, compared to 1,912 UGX/kl plus 18 percent VAT for a private connection and 2,882 UGX/kl plus VAT for commercial and industrial connections.

“Prepaid meters are expensive,” says J. B. Otema, former head of Kampala’s pro poor unit and now NWSC’s pro-poor principal sociologist. “But long-term, the cost-benefit ratio is very clear, because they allow National Water to serve the urban poor and meet its equity and social mission objectives.” He outlined the following considerations:

- **What is the cost of a project that fails because there are no funds to cover ongoing costs, let alone capital expenditure?** In his view, prepaid meters reduce this risk of failure substantially, despite high capital and maintenance costs.
- **Do not conflate short-term financial investments with longer-term economic benefits.** NWSC has a social responsibility to serve the urban poor and provide access to clean water at an affordable price. If services fail because they prove unsustainable, people may revert to unsafe sources, with significant public health costs. Prepaid meters, conversely, help to sustain the value of public investment in services that serve the urban poor, and help to keep safe water affordable to poor families.
- **The cost to the utility of bypasses and illegal connections is high where connections are disconnected physically.** Access to free water is not the main problem. The real issue is damage to the network when customers cut into it. Conversely, prepaid meters on standpipes help to keep water relatively cheap and accessible to customers, and the extent of unauthorized connections has fallen sharply in areas served by prepaid meters. Bypasses because of frustration with faulty prepaid meters are rare.
- **Prepaid meters on communal standpipes are far cheaper than a public kiosk.** They do not need a permanent superstructure or a tap attendant, and can be relocated readily to provide services elsewhere if local land uses change and residents have to relocate.

NWSC is confident that it can afford to continue installing prepaid meters, even without donor funding, and that the cost can be cross-subsidized from sales to commercial customers.

**Conclusion**

NWSC aims to have 5,000 prepaid meters installed across Kampala by 2016. Although he recognizes that the rollout of prepaid systems poses some problems of equipment, maintenance, and monitoring, as well as placing considerable demands on the utility’s capacity, Dr. Silver Mugisha, MD of NWSC, says, “We find it a promising technology if we are to reach 100 percent coverage in low-income communities.” The core of this potential lies in resolving the collection of payment from shared standpipes, and it offers customers without their own connection a means of buying water directly from the utility at a social tariff.