

DIGITIZING PAYMENTS FOR HOUSEHOLD WATER CONNECTIONS IN GHANA

Quantifying the Impact of Digital Finance for Household Connections in Ghana

Prepaid, mobile-money-enabled meters for household connections improve station financial viability and consumer satisfaction. However, robust consumer training is needed to realize full financial, operational, and consumer benefits.

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KEY INSIGHTS

- Prepaid meters improve water station financial viability and justify the incremental capital cost (~\$120 per meter). Although household connection (HHC) sales volumes decreased by 27% from prepaid meters, revenue increased by 18% and arrears decreased by 46% due to improved revenue collection mechanisms afforded by the meters. As a result, HHC gross margins increased from -8% to +30%.
- After an initial learning period, HHC consumers and station operators both preferred prepaid meters over the post-paid meters. Consumers reported feeling more control and ownership over their water consumption. Operators reported up to 7 hours per week in time savings on payment collection.
- Though mobile money penetration is high (72%), it accounted for only 14% of total transactions and 10% of revenue received during the pilot period because using mobile money for water bill payment was not top of mind. However, consumers were responsive to awareness campaigns and expressed willingness to learn.

Summary

In May of 2017, Safe Water Network partnered with the Consultative Group to Assist the Poor (CGAP) to pilot digital finance for household connections in an effort to reduce arrears from under-collection and improve the payment experience for both consumers and station operators. Approximately 100 households from two communities in our Ghana portfolio were converted from post-paid meters and cash-only transactions to prepaid meters (to reduce under-collection), with the option to pay using mobile money instead of cash (to allow users to buy water credit without operator assistance). We analyzed the effect on station financials, consumers, and operators during a five-month pilot.

Background

Safe Water Network Ghana's H₂OME! Stations are scalable small water enterprises that produce high-quality water sold at affordable rates. Water access is provided through public standpipes and household connections (HHCs) that pipe treated water from the H₂OME! Station directly to the consumer's premises for on-demand access.

Compared to water collection at the station, HHCs significantly increase convenience and move consumers up the water services ladder, resulting in social and financial benefits. Greater ease of access results in consumers using clean water for more purposes (such as drinking, cooking, and bathing), likely further reducing incidence of waterborne illnesses and the associated healthcare costs and lost school or work days. HHC consumers use approximately four times more water on a per-capita basis compared to those without HHCs (60 LPCD¹ versus 15 LPCD), resulting in higher revenues that strengthen the long-term viability of the water enterprise.

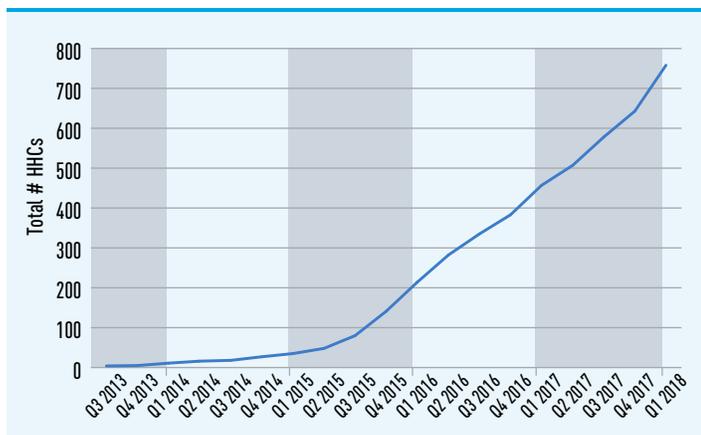
As of the end of 2017, there were ~650 HHCs, representing 20% of total volume sold across our Ghana portfolio. Historical growth trends (see Figure 1) driven by consumer demand indicated considerable potential to expand our HHC program.



A consumer operating her household connection faucet.

¹ LPCD = liters per capita per day

Figure 1. Safe Water Network Ghana Household Connection Growth



However, key barriers needed to be addressed before pursuing further HHC rollout:

- **The post-paid HHC bill collection process was time- and resource-intensive.** Station operators spent up to 25% of their time traveling to households for billing and payment collection. Repeat operator visits were frequently required because consumers were either unavailable to receive the bill or could not pay due to insufficient cash-in-hand.
- **The HHC program suffered from a low collection realization rate.** Consumers, unaccustomed to tracking consumption during the month, were frequently surprised by the timing or amount of the bill. As a result, many HHC accounts were in arrears, and the collection realization rate (the percentage of billed fees actually collected) was below 50%.

To address these issues, Safe Water Network Ghana partnered with CGAP to pilot new meters that would: a) reduce arrears and increase the collection realization rate by requiring prepayment for water, as the new meters only allow for consumption when the HHC account has a balance; and b) reduce operating costs and improve user satisfaction by allowing HHC consumers the option to independently top up account balances via mobile money, instead of relying on the operator to complete cash transactions.

Methodology

1. Community Selection

Two communities from the Western Region (Beyin and Eikwe) and two from the Ashanti Region (Boamang and Tetrem) were selected based on their geographical proximity, community socioeconomic status (SES) characteristics, and number of HHCs.

One community in each region was converted to prepaid, mobile-money-enabled meters, while the other continued on conventional post-paid meters. In total, approximately 100 HHCs were converted to prepaid meters and approximately 50 HHCs served as the control group using post-paid meters.²

2. Baseline Survey

A baseline survey was conducted at all four communities to understand community perception of the prepaid meter payment process and mobile money:

- 50% felt prepaid meters and mobile money would improve their water payment process, primarily due to expectation of improved convenience.
- 72% had mobile money accounts, and 52% had both mobile money and bank accounts

3. Quantitative Analysis

We tested our hypothesis that new meters would improve station financial performance by comparing water volumes, revenues, and arrears for the households in the pilot communities during the period of May-September 2017 to the same period in 2016. To isolate from factors that could have affected year-on-year trends (e.g. rainfall), we conducted a parallel analysis for the control communities.

We also analyzed consumer uptake of the mobile money payment option for water bill payments to assess the potential to integrate mobile money into our operations.

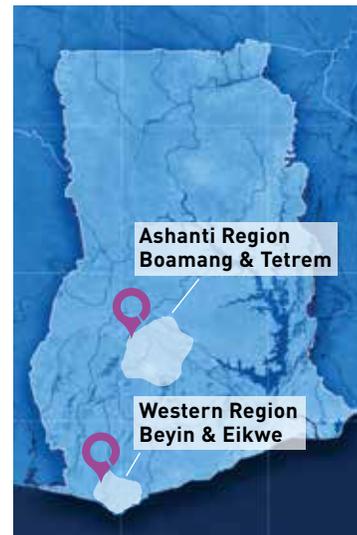
4. Qualitative Assessment

Three visits³ were conducted throughout the course of the pilot to survey consumer and operator satisfaction as a result of the new meters.

Results and Findings

1. Volume

Water volume consumed by households using the new meters decreased by 52% during the five-month pilot period, compared to the same timeframe in 2016. However, control households reduced consumption volumes by 25%, suggesting that factors unrelated to the meters (such as rainfall and local competition) may have contributed to overall volume loss. We concluded that



² Some HHCs were excluded from analysis due to insufficient historical data, as a result the analysis in this report represents data from 76 pilot HHCs and 39 control HHCs

³ Three visits conducted: (1) Pilot start April/May 2017, (2) Mid-Pilot July 2017, (3) Post-Pilot November 2017

about 27% of the total 52% reduction experienced was likely due to the new meters.⁴

A deeper dive into HHC purchasing patterns confirms that households with the new meters were more likely to reduce consumption: 54% of pilot HHCs reduced consumption, compared with only 31% of the control HHCs (see Table 1). Interestingly, the percentage of HHCs with no activity during the pilot period (“dropouts”) was identical for both cohorts, indicating that the new meters did not have a significant effect on dropouts. Instead, it seems that dropouts were driven by arrears, as those households that dropped out had the highest average arrears.

Table 1. HHC Change in Volume Activity

CATEGORY	PILOT HHCs (76 Total)		CONTROL HHCs (39 Total)	
	Volume Trend During Pilot	% of Total HH	Avg. Arrears at Start (GH¢)	% of Total HH
Increased	13%	113	33%	112
Maintained	1%	63	5%	45
Reduced	54%	111	31%	104
No Activity	31%	151	31%	210
Total Avg. Arrears	100%	121	100%	136

Pilot HHC consumers surveyed during our qualitative field assessments indicated that they reduced consumption due to confusion around the new payment process. However, many also responded that the decrease was due to a better understanding of their own water consumption and a reduction of waste.

2. Revenue

Revenue collected for the pilot HHCs increased by 18% compared to the previous year, despite the 52% volume drop (see Table 2).

Table 2. Average Revenue Per HHC

	MAY-SEPT 2016 (GH¢)	MAY-SEPT 2017 (GH¢)	YoY %Δ
Average revenue received per HHC during 5-month period			
Pilot HHCs (76 total)	104	123	+18%
Control HHCs (39 total)	109	99	-9%
Average revenue per 20L collected			
Pilot HHCs (76 total)	0.07	0.16	+128%
Control HHCs (39 total)	0.06	0.07	+17%

Prior to the pilot, HHC consumers were paying GH¢ 0.06-0.07 per 20L on average, compared with a target price of GH¢ 0.10 per 20L—a 60-70% collection realization rate. The collection realization rate at the pilot HHCs increased to 160% (GH¢ 0.16 per 20L) due to the ability of prepaid meters to automatically deduct credit from the HHC balance upon consumption, rendering it impossible to underpay for water consumed. Revenue collection exceeded even the full amount targeted because consumers were

contributing extra money to reduce their arrears (see 3. Arrears). By contrast, collections at control households remained at approximately 0.07 GH¢.

The improvement in collections is critical to a station’s financial sustainability, and justifies the incremental capital expenditure required for the new meters (~\$120 per meter). Previously, HHC revenues collected were insufficient to cover the operating costs, yielding a gross margin of -8% for HHC sales. During the pilot, the prepaid meters improved the gross margin to 56% (or about 30% when discounting for arrears repayments and prepayments for future purchases), resulting in a payback period of 3 years per meter.⁵

3. Arrears

The prepaid meters were calibrated (as part of a policy rollout⁶) to apply 50% of payments toward reducing arrears. This policy significantly improved consumer awareness of arrears, and some households voluntarily paid off their arrears entirely prior to converting to the new meters. Arrears of the pilot HHCs decreased by 46% (see Table 3), and half of the pilot HHCs eliminated their arrears completely by the end of the pilot. Meanwhile, arrears for control HHCs increased by 65% during the same period.

Table 3. Average Arrears Per HHC

	PILOT START (GH¢)	PILOT END (GH¢)	% Δ
Pilot HHCs (76 total)	123	67	-46%
Control HHCs (39 total)	136	225	+65%

4. Mobile Money Use

Households in the pilot communities were given the option to pay their water bills with mobile money—an electronic wallet service that allows users to store, send, and receive money using their mobile phones—or with the traditional method of paying via cash to the operator. The mobile payment process was expected to increase consumer satisfaction by allowing them to top up their accounts at their own convenience, and reduce operating costs by decreasing time spent by operators collecting bills. However, although most consumers had mobile money (72% per the baseline survey), willingness to use it for water bill payment was low: mobile money only accounted for 14% of the total transactions and 10% of the total revenue received during the pilot period.

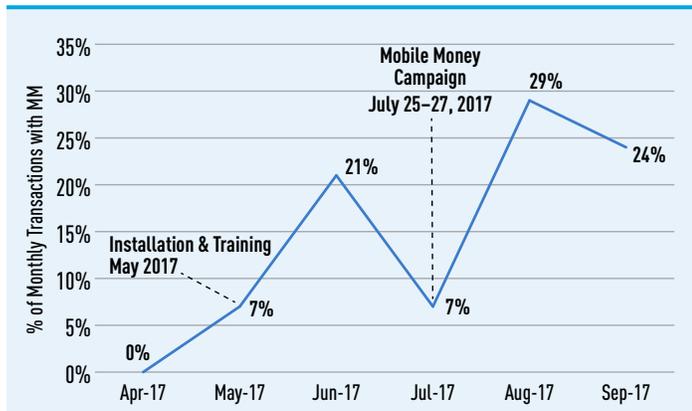
The field assessments found that while many households use mobile money for remittances, using mobile money for bill payment was not top-of-mind. Communities were highly receptive to mobile money awareness and promotion programs conducted during our field visits. Mobile payment utilization spiked in the month immediately following exposure to awareness programs, but tapered off as time passed (see Figure 2).

⁴ Both pilot communities experienced greater reductions in volume than their corresponding control communities

⁵ Based on revenue collection rate during the pilot, the payback period is calculated assuming HHC consumers would be willing to pay up to 0.15 GH¢/20L to include meter cost repayment

⁶ Consumers were informed of the policy change but not asked for consent

Figure 2. Percent of Mobile Money Transactions During Pilot



Consumers interviewed expressed interest in mobile money and a willingness to learn. Future rollout of mobile money processes must be paired with robust consumer training and engagement programs to facilitate adoption.

5. Consumer and Operator Satisfaction



A prepaid meter installed at a user's home.

After an initial adjustment period, pilot HHC consumers reported increased satisfaction with the payment process. Users, impressed by the meters' appearance, were initially enthusiastic but provided mixed feedback during the second visit, with some explaining that it was difficult to anticipate when the meters would cut off water supply. Additionally, users indicated that the time delay between making the payment and receiving the top-up credit on their meter—

the top-up code had to be generated manually by the Safe Water Network Ghana head office—was inconvenient. During the final visit, the majority of consumers interviewed reported that they preferred the new meters. Now accustomed to the new process, they appreciated the visibility into their water bills and felt the new meters gave them more control over household consumption.

Station operators also preferred the new meters, estimating that their time spent managing HHC payments had decreased from 12 hours to five hours per week (seven fewer hours, or 58% time savings). The nature of their consumer interactions also changed: whereas previously they were chasing HHC consumers to resolve billing issues, post-conversion, they were directly approached by consumers to collect payments and assist with account top-up.

Next Steps

The pilot demonstrated that there are tangible financial, operational, and consumer benefits to incorporating prepaid, mobile-money-enabled meters for HHCs. Safe Water Network Ghana is committed to transitioning all HHCs (existing and new) to the new meters. The lessons learned throughout the pilot will inform our next steps as we pursue broad roll-out:

- **Design targeted consumer and operator training programs.**

Consumers will be given a series of trainings (with picture guides) on the basics of using the meters and mobile money to promote user understanding, increase uptake, and ensure retention. Operators will be trained and equipped with materials to assist HHC consumers in managing their prepaid accounts independently. Trainings will be paired with promotions and incentives to encourage adoption.

- **Explore financing opportunities for prepaid meters.** Due to improved cash collections and increased willingness to pay exhibited by pilot HHCs, we are evaluating options to recover the incremental cost of future prepaid meters by applying part of water payments to meter repayment or financing the meter and last-mile connection by connecting the HHC consumer with microfinance institutions.

- **Fully digitize the meter top-up process.** We will fully digitize mobile money payments to streamline and remove friction from the transaction process. The prepaid meter software platform will be integrated such that mobile money payments will be automatically recognized by the prepaid meter.

CONTACT US

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ABOUT SAFE WATER NETWORK

Safe Water Network is committed to enabling water provision to small towns and peri-urban communities globally as a complementary solution to hand pumps and utilities. We're demonstrating at scale the viability of small water enterprises to supply the poor with safe, affordable, reliable water. Building on our operational experience, we're working with implementers, as well as technical and development partners, to replicate the approach—with tools, training materials, improved policies, and additional financing. Together, we're bringing the approach to global scale, capable of reaching the billion in need of safe water around the world.



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