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CAN BRANDED KIOSKS IMPROVE REVENUE COLLECTION AT WATER POINTS IN GHANA?

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SUMMARY

- ➔ In Ghana, most water point revenues are consistently below their estimated potential because vendors do not fully enforce pay-as-you-fetch tariffs. Low revenue collection undermines the ability of water systems to cover all maintenance and operating expenses.
- ➔ Aquaya evaluated whether installing branded kiosks at rural water points could increase revenue collection. The kiosk displayed the logo of the local government or District Assembly along with a "Pay-As-You-Fetch" inscription and included shelf space for the vendor to sell petty goods. Vendors received a seed grant to stock petty goods as well as a one-day training on financial record keeping.
- ➔ In the five months following kiosk installation, daily water point revenues increased by a median of 51% or 1.1 GHS (0.2 USD). We found that these revenue increases were driven by the kiosk's formal District Assembly branding, which gave vendors more authority to enforce tariffs.
- ➔ Revenue increases were very variable across sites, indicating that this intervention is not equally effective in all settings. We identified two sets of favorable conditions that we recommend implementers to prioritize for future kiosk installations depending on site characteristics.

CONTEXT

In Asutifi North district, Ghana, approximately 57% of the population (35,000) is served by a communal handpump, standpipe, or limited mechanized borehole [1]. These water points are usually attended by a vendor reporting to a Water and Sanitation Management Team (WSMT). The vendor is responsible for collecting tariffs from consumers and transferring the proceeds to the WSMT. The vendor retains a 20%-35% commission on water sales, depending on the agreement with the WSMT. WSMTs deposit the funds in dedicated bank accounts and maintain paper-based financial records. They are accountable to the District Assembly, the legal owner of public water infrastructure according to Act 462 – Local Government Act,

1993/Act 936 – Local Governance Act, 2016 [2]. Although these “Pay-As-You-Fetch” tariffs are established and formally mandated by the local government, they are rarely enforced.

Research conducted by The Aquaya Institute (Aquaya) in 2018 found that water point revenues were consistently below their estimated potential [3]. After examining revenue records from 60 standpipes across the four public piped systems in the district, we concluded that they were earning 40%-84% less than would be expected if tariffs were enforced. Revenue collection was even more sporadic at handpumps and mechanized boreholes: only 22% (11/51) had pay-as-you-fetch tariffs in place, while the rest never collected payments or only after breakdowns. Among those handpumps or mechanized boreholes collecting some form of payment, actual revenue was on average only one-fifth of what it would be if tariffs were enforced.

Low revenue collection undermines the ability of water systems to cover all maintenance and operating expenses. For example, we estimated that three out of the four piped systems would struggle to support the cost of an unexpected major repair (>2,500 GHS or 430 USD) [3]. Most communities, therefore, rely on financial support from the District Assembly when their water system breaks down. Additionally, none of the public water systems conducted water quality testing at the frequencies specified by national regulations and none performed water treatment [3].

Interviews with 77 vendors revealed several factors that contributed to insufficient revenue collection: [4]

- **Most vendors reported not staying at the water point all day because they had nowhere comfortable and shaded to sit, and they were unable to perform other income generating activities while at their post.**
- **Many vendors also reported that consumers sometimes refused to pay for water. Some of them felt that this challenge would be alleviated if they had an official kiosk and uniform symbolizing their mandate to collect tariffs.**

Focus-group discussions (7) with community members suggested that dissatisfaction with water systems, particularly regarding their lack of financial accountability and prolonged breakdowns, at least partially explained their low willingness-to-pay.

RESEARCH OBJECTIVE

Aquaya’s research intended to address the following policy question:

How can public water points in rural Ghana increase their revenue collection?

We hypothesized that formalizing water points by providing the following three inputs would improve revenue collection:

1. A District Assembly-branded kiosk with shade, seating, and shelf space to sell petty goods.
2. Training on vendor responsibilities.
3. An in-kind seed grant to stock petty goods.

We also hypothesized that this combined intervention would not be equally effective in all locations and thus aimed to identify the most favorable conditions for future implementation.



Image 1. A technician works to repair a handpump next to a kiosk in a rural community in Asutifi North.

STUDY SITES

In collaboration with the District Assembly, we selected 28 water points that met the following criteria:



They were in a community with more than 1,000 people and were accessible by road for data collection.



They had a formal “pay-as-you-fetch” system in place even if it was not fully enforced.



They had written revenue records.



The vendor was willing to participate in the intervention.

These water points included 9 standpipes, 16 handpumps, and 3 limited mechanized boreholes, and were managed by 14 distinct WSMTs (Table 1). Fifty-seven percent (16/28) of the water points were located in urban areas and 43% (12/28) in rural areas¹. The majority of vendors were women (93%) with primary or junior high school education (53%). Their median age was 46 and they had acted as vendors for an average of three years. WSMTs had a median of seven members who were primarily men, and the majority (69%) had received formal training in water system management. Only a third of WSMTs (31%) had a designated revenue collector responsible for collecting water user payments from vendors (Table 1). A third of water points earned less than 2 GHS/day (0.3 USD/day), and only 25% earned more than 5 GHS/day (0.9 USD/day) (Table 1). Tariffs at handpumps and mechanized boreholes were approximately 0.10 GHS (0.02 USD) per 20L-30L container, and 0.20 GHS (0.03 USD) per 20L-30L container at standpipes.

Table 1. Description of study sites

Water points (n=28)		Vendors (n=28)		WSMTs (n=14)	
Water point type		Gender		Median number of members¹ (min-max)	7 (1-15)
Standpipe	9 (32%)	Female	93%	Median proportion of women members¹ (min-max)	14% (0%-57%)
Handpump	16 (57%)	Male	7%	WSMT received formal training¹	
Mechanized borehole	3 (11%)	Median age (min-max)	46 (30-76)	Yes	69%
Location		Education level		No	31%
Urban	16 (57%)	No primary education	32%	WSMT has a designated revenue collector¹	
Rural	12 (43%)	Primary or junior high school	53%	Yes	31%
Pre-kiosk daily revenue		Secondary education or higher	14%	No	69%
< 2 GHS/day (0.3 USD)	9 (32%)	Median number of years serving as vendor¹ (min-max)	3 (0.2-10)		
2-5 GHS/day (0.3-0.9 USD)	12 (43%)				
>5 GHS/day (0.9 USD)	7 (25%)				

¹ Data missing for 5 vendors and 1 WSMT.

WSMT=Water and Sanitation Management Team

INTERVENTION

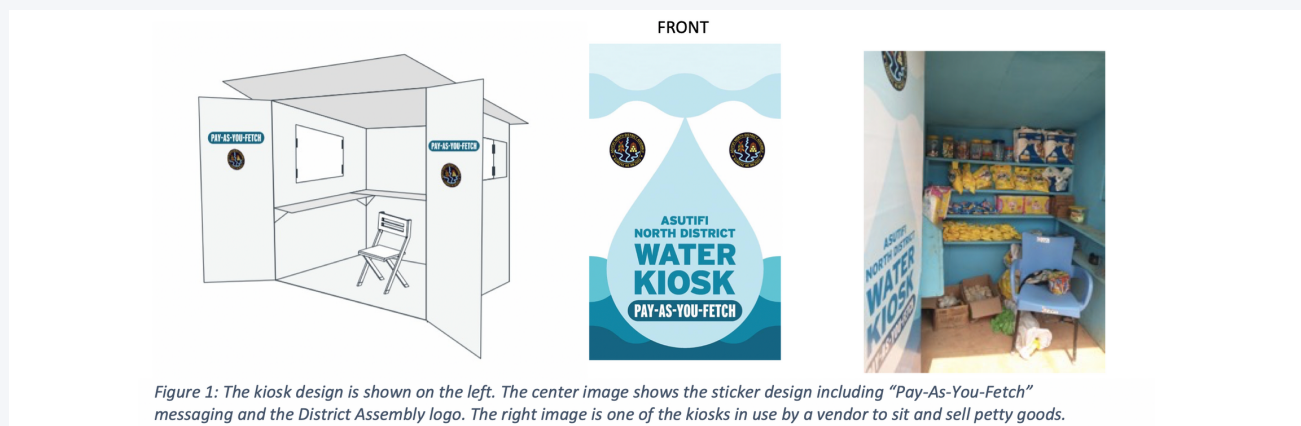
We installed the first four kiosks in May-June 2019 as a pilot and monitored them for three months. After the pilot, we made minor revisions to the program design and installed the remaining 24 in November-December 2019. The intervention included three key elements:

1. The kiosk itself (Figure 1), which included: a shaded place for vendors to sit while attending to the water point, shelf space to sell petty goods, a District Assembly logo and “Pay-As-You-Fetch” inscription giving vendors the authority to collect money from customers, a padlock, a chair, a record book, and a lock box.
2. Vendor and WSMT training on vendor responsibilities.
3. A seed grant of 250 GHS (43 USD) that allowed vendors to buy their first stock of petty goods.

1. We defined as “urban” water points with a population density within a 500-meter radius greater than 1,241 people/km², the median across our 28 study sites. Population estimates were based on Geographic Information System (GIS) analysis of habitation structures and further adjusted according to Aquaya staff observations in two cases.

KIOSK DESIGN

The kiosks were designed by Aquaya and a design firm and constructed locally. They had walls made out of wood and a metal roof. They cost 1,949 GHS (336 USD) each, of which 1,728 GHS (298 USD) was for hardware (kiosk, lock box, padlock, and chair) and the rest for transport and installation.



VENDOR AND WSMT TRAINING

The one-day training led by Aquaya covered vendor responsibilities, including the enforcement of payments, kiosk security, money management and record keeping. The training also included advice for WSMT members, such as recommendations to share information about income, expenditures, and activities to the public, to create a budget for operation and maintenance, and to solicit feedback from community members regarding the performance of water supplies.

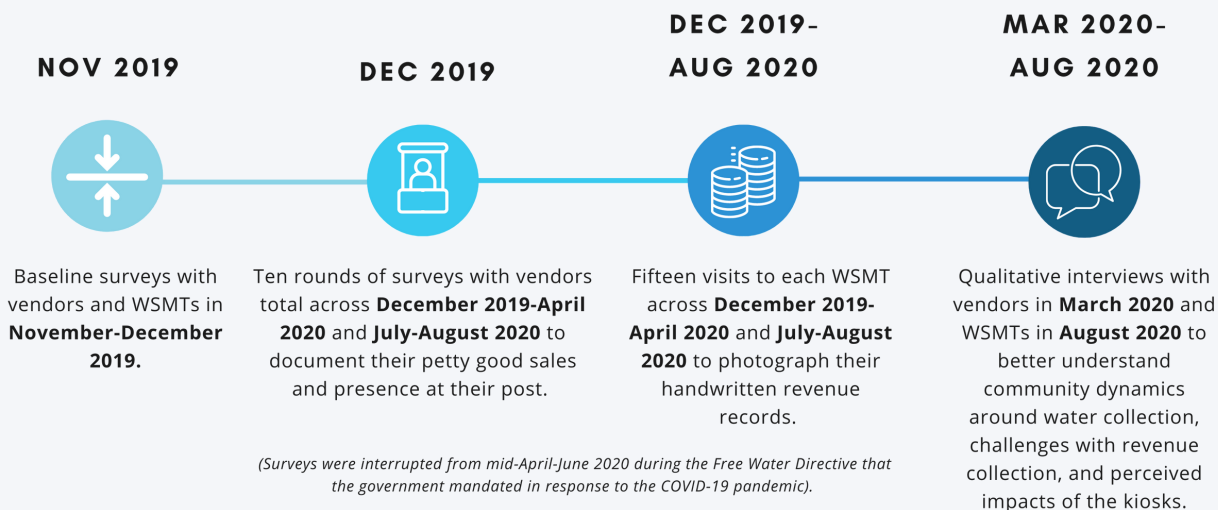
SEED GRANT

Vendors chose items from a list of sales goods provided by Aquaya and made plans for restocking. The most common items sold at kiosks were detergent, hand soap, dish soap, readily edible food (ground nuts, cooked eggs, oil, and sugar), and diapers.

DATA COLLECTION AND ANALYSIS

DATA COLLECTION

To evaluate the effectiveness of the intervention, Aquaya conducted:



DATA ANALYSIS

For each water point, we used the WSMT revenue record to derive a baseline average daily revenue capturing the 2-12 months (10 on average) preceding kiosk installation. We used the same WSMT revenue records to calculate post-kiosk average daily revenues from December 2019-August 2020 excluding the mandated free water period (mid April-June 2020). We then computed changes in average daily revenues, according to two outcome metrics: (i) % of baseline, and (ii) in GHS. We also examined whether these outcomes correlated with vendor presence at their posts and with petty good sales.

To identify contexts conducive to the success of the kiosk intervention, we conducted qualitative comparative analysis (QCA). QCA compares cases (i.e., water points in this study) to determine which factors, or combinations of factors, explain variations in outcomes of interest. We specifically examined six contextual factors (definitions provided in Appendix 1) (Table 2).

Table 2. Contextual Factors

Factor	Data Collection
1 Urban versus rural location	Assessed at baseline
2 Standpipe versus handpump	Assessed at baseline
3 Educated (i.e., completed basic education up to junior high school) versus uneducated vendor (i.e., did not complete basic education)	Assessed at baseline
4 Whether the vendor practices good financial record keeping	Assessed at baseline and midline
5 Whether the WSMT provides close oversight and collects vendor revenue frequently	Assessed at baseline and midline
6 Paying for water is the social norm (versus the community finds it acceptable to fetch water without paying)	Assessed at baseline

For this analysis, we considered a kiosk as successful if the water point's average daily revenue increased by more than the approximate median change in revenue: 50% or 1.1 GHS (0.2 USD).

RESULTS

Water point revenue increased on average following kiosk installation, although there was wide variation. The median increase was 1.1 GHS (0.2 USD). Approximately a third of water points (36%) saw their average daily revenue increase by 2 GHS (0.3 USD) or more, a third (29%) by 1-2 GHS (0.2-0.3 USD), and the remainder (36%) by less than 1 GHS (0.2 USD).

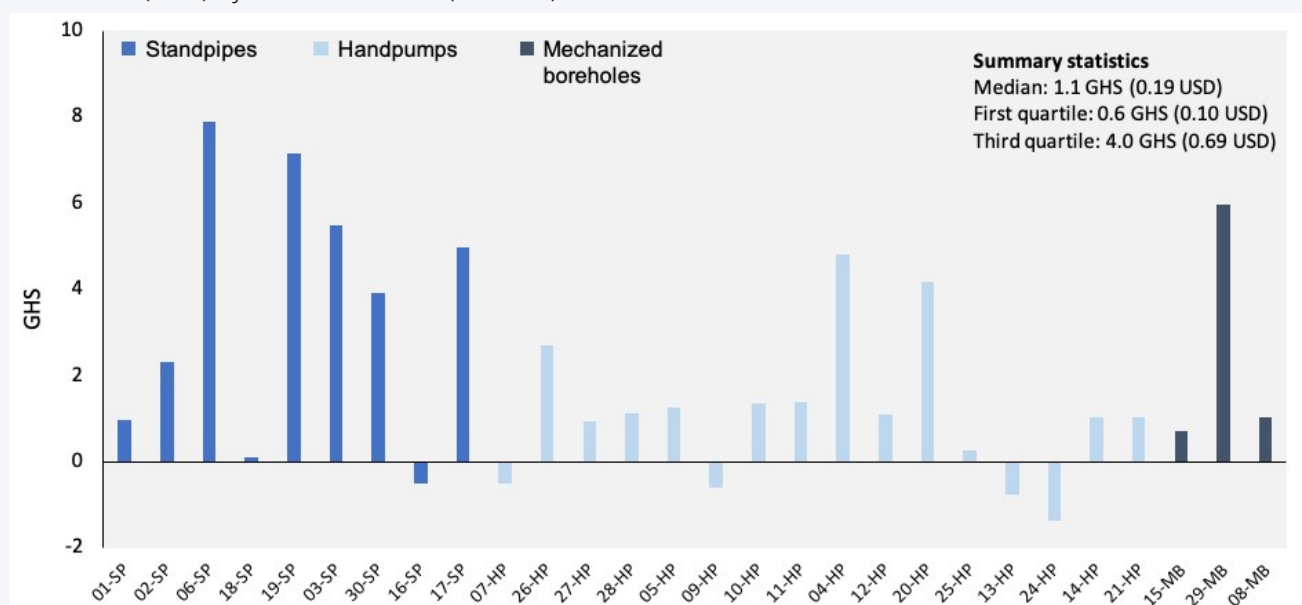


Figure 2a. Change in water points' average daily revenue compared to baseline expressed in GHS. Each bar represents a kiosk at a standpipe (SP), handpump (HP), or mechanized borehole (MB).

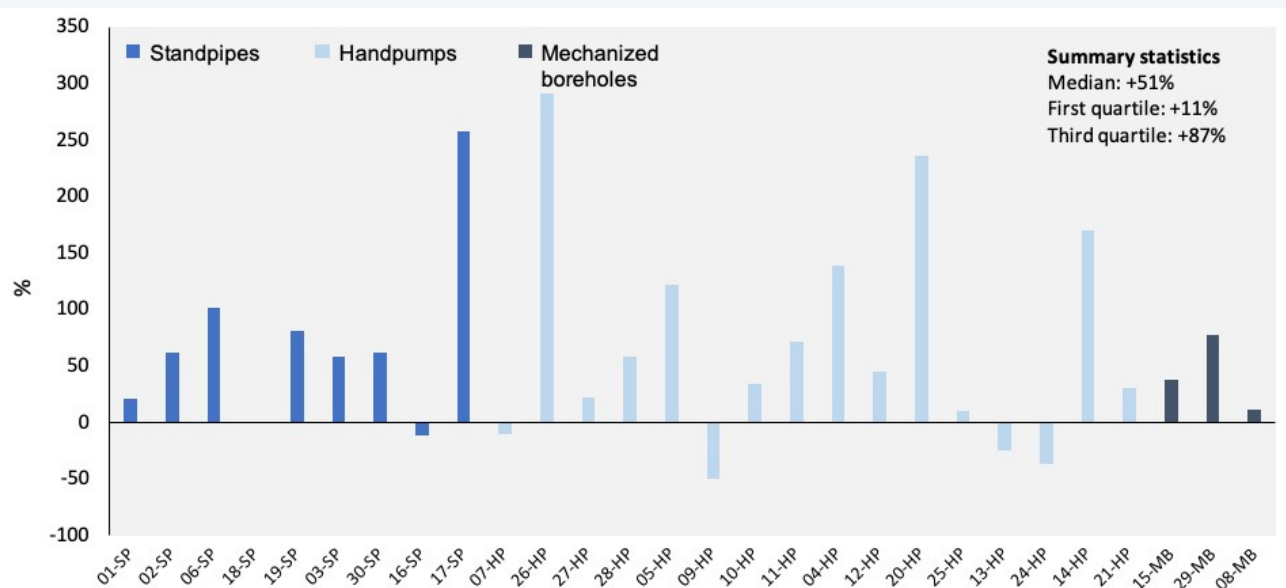


Figure 2b. Change in water points' average daily revenue as a % of baseline revenue. Each bar represents a kiosk at a standpipe (SP), handpump (HP), or mechanized borehole (MB).

Formalization of the water point was the primary factor driving revenue increases.

We found that kiosks improved revenue by increasing the formality of the water point, and making customers feel that they were officially obligated by the government to pay for water. One standpipe vendor stated that after the kiosk was installed, *“Most people appreciated why they have to pay for the water that they fetched... I have been telling them that, am selling the water for the WSMT and that it’s the District Assembly that has given me the authority to be selling the water. Their attitude towards payments for fetching water has changed positively.”* One WSMT member stated that revenue increased *“because of the inscription on the kiosk, ‘pay as you fetch,’ those who were resistant to paying for fetching water have changed.”*

Contrary to our initial hypotheses, we found that changes in revenue was not correlated with vendor presence (either self-reported or as observed by Aquaya staff) or petty good sales (measured by the amounts that vendors spent on restocking). Relatedly, only a few vendors reported that the opportunity to sell petty goods had improved their overall income although this may have also been influenced by the COVID-19 pandemic and associated economic downturn.

We identified specific favorable conditions for implementers to consider when selecting where to install kiosks. Qualitative results pointed to formalization as the main driver of increased revenue at water points. However, as shown in our data, the effects of kiosk installation on revenue collection were variable (Figure 2). We thus identified favorable contexts for implementers to use when choosing specific water points for kiosk installation: we intend these to be used to maximize kiosk success in the event that implementers cannot install kiosks at every water point.

Based on our QCA analysis, we identified two sets of favorable conditions that can guide future kiosk interventions (Table 3). We suggest that these conditions are used by implementers when prioritizing kiosk installation, to attempt to maximize the benefit of the intervention on water revenue sales.

- **In urban areas, kiosks were most successful at improving revenue when installed at water points with an educated vendor and where there are existing social norms to pay for water.** We hypothesize that educated vendors (that had completed basic education, up to junior high school) might be better able to take advantage of the kiosk than uneducated vendors. Similarly, while we found that the kiosk increased revenue sales through formalizing and legitimizing the water point, the kiosk alone might not be enough to compensate for an urban area where it is socially acceptable to fetch water without paying. The favorable conditions for urban areas held at both standpipes² and handpumps.

² Standpipes includes both communal standpipes for piped systems and mechanized boreholes.

- **At rural standpipes, kiosks were most successful where the vendor kept good financial records.** Those vendors might be more likely to take advantage of the kiosk and utilize the training on record keeping provided at the start of the intervention.

In our study, water points located in these favorable contexts experienced a median increase in revenue of 82% or 4.8 GHS (0.8 USD), compared to only 23% or 1.0 GHS (0.2 USD) for water points located in unfavorable conditions (Figure 3). For future implementation, prioritizing water points meeting the favorable conditions listed above may thus help maximize the impact of the kiosk on revenue.

At rural handpumps, we were unable to identify clear favorable conditions. Our study included nine rural handpumps, and we found a median increase in revenue of 45% or 1.1 GHS (0.19 USD). The revenue increase was variable across the rural handpumps, and could not be clearly explained by the conditions that we examined. Implementers may therefore choose where to install kiosks among their rural handpumps using other decision criteria.

Table 3. Summary of favorable conditions identified via QCA

	Standpipe / Mechanized Borehole	Handpump
Urban	Favorable conditions: Educated vendor, paying for water is social norm Median increase in revenue: 86%, 4.5 GHS (0.78 USD) <i>n</i> =5	
Rural	Favorable conditions: Good records Median increase in revenue: 168%, 5.5 GHS (0.95 USD) <i>n</i> =2	<i>No favorable conditions identified.</i> Median increase in revenue: 45%, 1.1 GHS (0.19 USD) <i>n</i> =9

We note that this list of favorable conditions is not exhaustive, as water points located outside of these conditions may be successful as well.

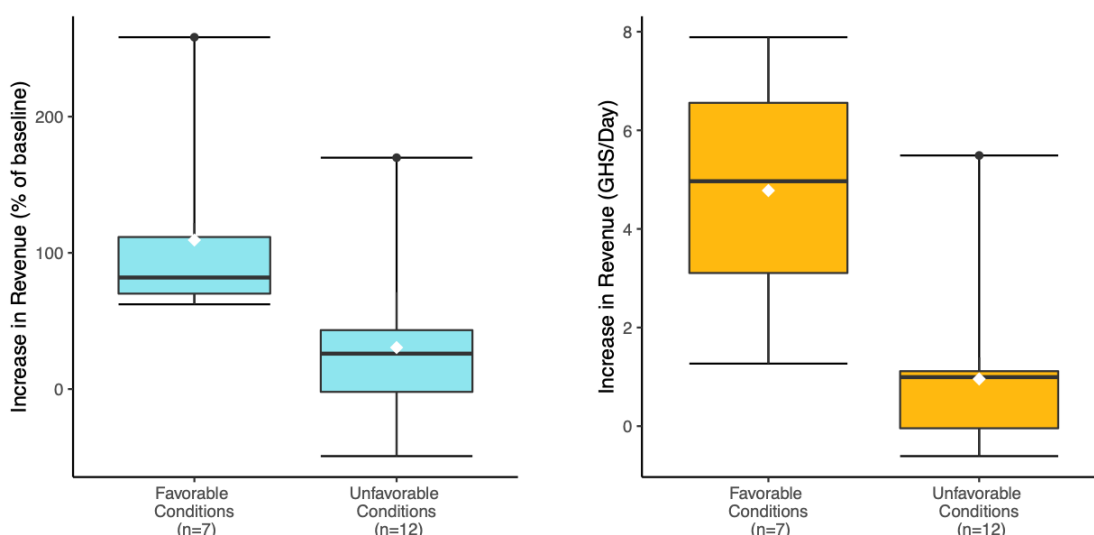


Figure 3: Distribution of outcomes among water points meeting the favorable conditions described in the qualitative comparative analysis (*n*=7) and among water points not meeting favorable conditions (*n*=12). The boxplots display the median, interquartile values and range of the outcomes, and the means are displayed with white dots. The favorable conditions were an urban water point with an educated vendor and strong norms to pay for water, or a rural standpipe where the vendor keeps good records. Rural handpumps (*n*=9) are not included because we could not identify favorable conditions.

RECOMMENDATIONS

The results from this study show that kiosks promoted increased revenue collection at water points, although performance across sites was variable. Based on our results, World Vision installed 26 additional kiosks at water points in Asutifi North in June 2021 to replicate and scale-up the intervention. The median water point revenue increase of 1.1 GHS (0.2 USD) per day that we observed in this study corresponds to a yearly median revenue increase of approximately 400 GHS (69 USD) per water point, which is almost sufficient for covering annual microbial water testing costs (estimated at 466 GHS or 80 USD for two tests annually) [5,6]³. However, this increase in revenue would not be sufficient to address major repairs (over 2,500 GHS or 500 USD). For future implementation, we recommend prioritizing sites meeting the favorable conditions listed in Table 3, as this will help maximize the impact of kiosks.

We found that kiosks gave vendors more authority to enforce tariffs due to the District Assembly logo and “Pay-As-You-Fetch” inscription. In contrast, the opportunity to sell petty goods did not appear to drive revenue increase although our data collection on this was limited due to the COVID-19 pandemic. Future interventions could thus simplify the kiosk design to focus on branding (District Assembly logo, “Pay-As-You-Fetch” inscription) while minimizing shelf space and the sitting area. These adjustments would also help reduce kiosk costs (which were 1,949 GHS or 336 USD in this study). Nevertheless, given the limitations of this study, we suggest that further research would be useful to determine whether the opportunity to sell petty goods is important to promote vendor motivation. Such studies could include smaller seed grants or optional loans for interested vendors.



Image 2: A water vendor and customers at a kiosk in Asutifi North, Ghana.

³. Ghana Standard Authority testing requirements are 2 microbial water tests annually for handpumps.

APPENDIX 1

For the QCA analysis, we initially considered 41 factors that we hypothesized might influence kiosk success. We excluded 16 factors due to insufficient variability, nine due to poor or missing data, eight because we felt they were captured by another factor or combined into a new factor, and two because they were intermediate outcomes. We included the remaining six factors in QCA analysis (Table 4).

Table 4. Final factors and scoring rubric used for QCA.

Factor	Scoring Rubric	Data Sources
1. Urban	0: Population density within a 500-meter radius is less than the median (1,241 people/km ²) 1: Population density within a 500-meter radius is equal to or above the median (1,241 people/km ²)	GIS analysis adjusted according to Aquaya staff observations in 2 cases
2. Standpipe	0: Handpump 1: Standpipe or mechanized borehole	Aquaya staff observations
3. Educated vendor	0: No formal education (has not been to school). 0.33: Went to school but did not complete basic education (junior high school). 0.67: Completed basic education (junior high school) 1: Completed secondary education (senior high school) or a higher degree.	Baseline vendor survey
4. Good financial record keeping	0: Vendor does not keep financial records. 0.33: Vendor keeps financial records but they are not reliable (e.g., vendor does not update records regularly enough or deliberately does not disclose full revenue). 0.67: Vendor keeps reliable financial records but does not share them with the revenue collector or WSMT. 1: Vendor keeps reliable financial records and shares them with the revenue collector or WSMT.	Bi-weekly revenue data, Aquaya staff observations, and mid-line vendor interviews
5. Close WSMT oversight and frequent deposits	0: WSMT provides almost no oversight or collects revenue from vendor less than once a month (or there is no revenue collector). 0.33: WSMT provides little oversight (i.e., checks on vendor(s) approximately once a month) and collects revenue once a month or less. 0.67: WSMT provides regular oversight (i.e. checks on vendor several times per month) and collects revenue once a month or more. 1: WSMT provides very close oversight (i.e. checks on a vendor once a week or more) and collects revenue more frequently than once a month.	Aquaya staff observations, WSMT reporting, vendor reporting, and mid-line qualitative interviews
6. Everyone pays at time of collection	0: It is socially acceptable for many members of the community to fetch water without paying at the time of collection. 0.33: It is socially acceptable for some members of the community (e.g. leaders and vulnerable people) to fetch water without paying, or for people to fetch on credit. 0.67: It is socially acceptable for some members of the community to fetch very small amounts of water without paying (e.g., farmers going to the field, elderly people, or people fetching on credit). 1: It is not socially acceptable for anyone in the community to fetch any water without paying at the time of collection.	Vendor reporting, midline qualitative interviews with vendors, and Aquaya staff observations

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- [6] Press-Williams, J. et al. Water Quality Testing Assurance Fund: Lessons Learned. May 2020. <https://aquaya.org/water-quality-testing-assurance-fund-lessons-learned/>.



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Image 3: Water kiosk in Asutifi North.