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Research Brief

Sustainable WASH Systems Learning Partnership

An Examination of the Causal Conditions to Successful Revenue Collection for Preventive Maintenance Services to Sustain Rural Water Systems

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Introduction

Revenue collection from water users in resource-limited communities is a well-established cornerstone of water systems management and regarded as critical to water service sustainability. However, recent studies point toward the inability of water committees to mobilize resources for water systems operations and maintenance (O&M). In Uganda, an assessment of community-based management of rural water supply facilities found only 53 percent to be fully functional. In light of this finding, a preventive maintenance service model – where user-fee funded maintenance is routinely performed to lessen the likelihood of failure – is viewed as a promising tool for financial sustainability of the rural water sector.

This brief summarizes research by the United States Agency for Interactional Development (USAID) funded Sustainable WASH Systems (SWS) Learning Partnership examining the combination of conditions that can lead to success or failure of regular payments for sustained service delivery in a preventive maintenance model. The study analyzed a preventive maintenance service model led by Whave, a Ugandan-registered company in the Kamuli District and a key partner of the SWS Learning Partnership. The company is developing a public-private partnership to sustain reliable rural water supply. Whave's preventive maintenance model allows communities to opt into a reliability assurance contract that ensures water source functionality in exchange for payment. Technicians receive payments commensurate with the service quality and daily operational reliability of the water sources.

This study held the premise that understanding the combined factors that lead to payment for preventative maintenance can guide the design of water service arrangements in a way that contributes to improved interventions and increases economic sustainability of water systems.

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Method

This study explored the conditions, and combinations of conditions (pathways), present within communities that influence a community's decision to enroll in or suspend preventative maintenance service with Whave by drawing on data from a water source baseline assessment and semi-structured interviews with households and water committees.

An initial list of conditions impacting payment was created from the literature and augmented by themes that emerged from field interviews and observations. This process identified 19 overall conditions that were distilled down to six final conditions, defined in Table 1. To reveal the causal pathways that drive payment compliance or noncompliance, several communities from Bulopa and Wankole sub-counties were selected and looked at to ensure a distribution of outcomes and conditions.

After identifying a primary set of conditions and collecting data on a variety of outcomes, fuzzy set Qualitative Comparative Analysis[1] (fsQCA) was employed to evaluate the evidence and pathways of conditions that lead to successful payment compliance. Using fsQCA, this study was able to measure how consistently a given subset of conditions (a causal pathway) leads to payment for preventative maintenance and how often payment for preventative maintenance could be attributed to a given series of conditions.

Hypothesized Causal Condition	Definition	Source
Water Availability and Quality Perception	Community members experience reliable water supply and perceive their water is of good quality.	Foster and Hope (2016) Kativhu et al. (2017)
Alternative Improved Water Sources	Community members have access to other nearby improved sources that are functioning, cheaper, or free.	Broek and Brown (2015) Koehler et al. (2015) Foster and Hope (2016) Whittington et al. (2009)
Water Point Mismanagement	A community's prior exposure to mismanagement of a water point, specifically exposure to both continuous break-downs of hand pumps and misuse of O&M funds.	Emerged from primary data collection
Water User Committee Organization	Water User Committee is a well-organized active group which takes responsibility for the water source with no significant conflict; Water User Committee has legal status and authority to perform their task.	Broek and Brown (2015) Harvey et al. (2006) Kamruzzaman et al. (2013) Madrigal et al. (2011) Kwangare et al. (2014)
Ongoing Support and Communication	There is an overall understanding of the preventive maintenance model with no significant miscommunication. Water User Committee members feel that they have technical and managerial support for ongoing O&M.	Quin et al. (2011) Terry et al. (2015) Case knowledge
Perception about Water Payments	The general belief among people that water should be free of charge, and/or expectation that payments should be collected only when the handpump is broken.	Broek and Brown (2015) Foster and Hope (2017) Whittington et al. (2009)

Table 1. Hypothesized causal conditions that influence payment compliance

[1] QCA is a mixed-method analytical technique approach to determine causality between conditions and outcomes using Boolean or fuzzy-set logic/theory.

Key Findings

The study produced three compelling observations around conditions associated with successful payment compliance for preventive maintenance programs.

1. **To achieve payment compliance, users must both (1) perceive their water is of good quality and abundant quantity and (2) have a well-organized, active, and local Water User Committee.**
   These conditions appeared consistently enough, and with enough cause for attribution, to infer that the presence of one alone cannot account for payment compliance, but requires the two together.

2. **Communities that pay for preventive maintenance are largely motivated and influenced by (1) prior exposure to poorly managed water points or (2) the absence of other nearby, functioning, and improved water sources.**
   From the study findings, it can be inferred that both of these conditions demonstrate to water users the benefits of paying for preventive maintenance. When either of these conditions are present, users more greatly value the payment for preventative maintenance services and the overall importance of continued functionality of their water services, including a water service structure with more accountability and transparency.

3. **Exposure to poor water point management has a high level of influence on payment compliance, even when alternative water sources are available.**
   This study found that users with previous negative water point management experiences will continue to value and appreciate the importance of regular payments, even when they have access to alternative water sources. In other words, depending on their previous experiences with O&M of water sources, users value a reliable and fast maintenance service over other nearby improved water sources. As one Water User Committee member commented:

   "…while our handpump does not break, a nearby handpump that is not taken care of by Whave breaks all the time. Some members of that community even joined our handpump and started to pay because our handpump is functioning all the time."

Lessons Learned

The findings reflect the multifaceted nature of water point sustainability in rural sub-Saharan Africa. The analysis of causal pathways found that payment for preventative maintenance is influenced by multiple conditions and cannot be attributed to any one condition alone. Additionally, the study supports previous findings on the importance of an active and well-organized Water User Committee. However, while a strong Water User Committee with proper support and training improves the likelihood of success, it cannot solely account for willingness to pay for preventive maintenance programs. Thus, a comprehensive understanding of the combined conditions that lead to payment for preventative maintenance is needed to improve interventions and increase water system sustainability. Future SWS research will focus on gaining further insight into the interconnected combination of conditions that lead to sustainable service delivery outcomes.

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