

Sustainable Village Water Systems Pilot

Baseline Survey Report

Produced by

Global Partners for Development

for

The Global Water Institute

at

The Ohio State University

May 2018

This report provides an analysis of the impacts of the Sustainable Village Water Systems (SVWS) pilot program in Singida, Tanzania (the Pilot). A partnership for this pilot exists between Ohio State University's Global Water Institute (GWI), MajiTech Engineering Ltd., WaterAid Tanzania, BM Farm Africa, and Global Partners for Development, with assistance from the local and federal governments of the United Republic of Tanzania. The SVWS pilot will provide WASH infrastructure and agricultural extension activities in two villages in Singida, Tanzania. This report uses survey data gathered in February 2018 through targeted key informant interviews to monitor the correlational effects of the Pilot on comprehensive WASH and economic development outcomes. Findings suggest that the SVWS pilot program will deliver valuable information that will be useful in the iterative learning process that will support the evolution of the program before it scales.

I. Introduction

Access to potable water and hygiene facilities remains a key public health issue around the globe. An estimated 748 million people lack access to clean water, and 2.7 billion people lack access to improved sanitation facilities. Inadequate access to proper water, sanitation and hygiene (WASH¹) is linked to serious health problems including diarrhea, hepatitis A, cholera, typhoid, dysentery, intestinal helminthes, malaria, and trachoma. In addition to health risks, vulnerable populations are also burdened by the severe economic and social costs associated with lack of access to water. In 2011, the World Health Organization attributed global economic losses of USD\$260 billion to the reduced productivity of disease-affected populations and the opportunity costs of time spent collecting water. Meta-analyses of WASH projects have consistently reported positive effects, particularly in reducing childhood rates of diarrhea.

An estimated 50% of Tanzania's population has access to basic drinking water services (defined as improved drinking water within 30 minutes round-trip). In rural areas, the percentage is even lower than the national average at 37%.

The SVWS program targets villages in Tanzania that have little to no current access to functional clean water infrastructure. Though the program will ultimately support 125 communities, the first two communities will be rolled out as a pilot, jointly cost shared and implemented by the Global Water Institute at Ohio State University, MajiTech Engineering Ltd., WaterAid Tanzania, BM Farm Africa, and Global Partners for Development (the Team).

¹ Defined by the WHO as the provision of safe water for drinking, washing and domestic activities and the safe removal of waste (toilets and waste disposal) in addition to promoting activities to promote protective behavioral practices amongst populations exposed to unsafe water and inadequate sanitation facilities

The SVWS systems will include solar-powered wells, private operations and maintenance, support for improved agriculture, and upgraded water and sanitation facilities at schools and clinics. They are designed to address the interrelated nature of the problem, meet or exceed government requirements for basic human needs, and boost capacity to expand local economic activities. Due to the comprehensive nature of the program, the ultimate goals of the SVWS project are not only related to water and sanitation but also to renewable energy, education, health, women's empowerment, agricultural extension, and economic development.

The main components of the Pilot are as follows:

- Construction of a solar-powered borehole water system to improve access to and consumption of clean water based on community input and needs
- Implement mechanisms that ensure the sustainability of the water systems, such as:
 - Agreements with the Village Council and local government authorities
 - Develop a contract between local authorities and a private operator to operate and maintain the village water system to ensure sustainability, transparency, and accountability
 - Development of an operations and maintenance plan
 - Training of local people to operate and maintain the systems
 - Support for water pump and solar power maintenance for a minimum of three years
- Provision of access to improved sanitation facilities and hygiene trainings through:
 - New primary school latrines and handwashing stations
 - New dispensary latrines and handwashing stations
 - Village-wide sanitation and hygiene education
- Construction of pit latrines and hand washing stations at the school
- Water and sanitation education delivered to community leaders, teachers, and students intended to become ambassadors of hygiene education within the community
- Implementation of improved practices to enhance agricultural productivity and stimulate economic activity through:
 - Establishment of or support for a Farmer's Group in each village
 - Training for the Farmer's Group members in agricultural extension practices such as drip irrigation and obtaining information through mobile phones

To ensure sustainable operations, these core systems will be layered with critical administrative and technological elements such as preferred vendor hardware/warranties, supply/logistics chains for spare parts, technical and women's entrepreneurship training, and private operation of water services. Pre-installation consensus building and local management will facilitate community collaboration.

The Pilot will provide feedback on the SVWS implementation plan, the benefits and potential challenges of a systems model, and the effectiveness of the Team in executing an integrated program. The Pilot is intended to help managers build a system of iterative institutional learning about the internal and external realities facing the SVWS program in order to foster its growth.

II. Description of Pilot Villages

The two selected pilot villages, Ghalunyangu and Mughanga, are located in rural areas of the Singida region of Tanzania. Across the Singida region, districts vary in the percentage of functioning access points from 22 to 77 per cent. Problems accessing water include long distances to water sources, water scarcity during dry seasons, inadequate water storage facilities at the household and institutional levels, and lack of ongoing technical expertise and support to sustain infrastructure over time.

The population of the Singida region has very limited access to formal employment opportunities, and most livelihoods are based on subsistence farming, petty trading, and livestock rearing. Lack of formal economic activities, combined with the health and time burdens of limited access to clean water, contribute to problems such as high unemployment, food insecurity, poor health and sanitation, and low school enrollment rates.

Teams from MajiTech and Global Partners assessed nine villages in Singida that were identified by the government as being most in need of improved water infrastructure. Following this assessment, GWI selected the two pilot sites, Ghalunyangu and Mughanga, due to their distinct situations, which was deemed important to facilitate learning under the Pilot, as well as their water infrastructure requirements. The Pilot villages have unique needs that will be described in detail in the following paragraphs, though they both exhibit extreme levels of poverty and have tangible water needs.

Ghalunyangu

At the time of the assessment in January 2017, the village of Ghalunyangu had one borehole serving its six sub-villages as well as a primary school and six additional villages across the border in the Manyara region. Due to lack of electricity, the borehole was run on a very old generator that required frequent repairs. The borehole also lacked a functional tank, so users must fill a small dozer by hand using a rubber pipe. Across Ghalunyangu's sub-villages, access points were either poorly distributed and/or dysfunctional. One sub-village had four access points, all of which were broken, while other sub-villages were as far as four to seven kilometers from existing water points. When factoring in transportation expenses as well as

fuel and repairs for the generator, households were forced to pay a very high cost for water.

Regardless of the cost, most people used this borehole during the dry season because there were no other options for water across this vast area. During the rainy season, use dropped by about 25%, with some choosing to use water directly from a lake in the village.

The local primary school served 647 students, and the nearest access to water was the borehole, which was located two kilometers away. The school was built in 1982 and had serious infrastructure problems, including eight classrooms that need replacement, in addition to a need for latrines and teacher houses. Ghalunyangu had one small dispensary to serve the basic health needs of the large community.

In terms of financial sustainability, the community was willing to contribute funds to a WASH project and had a proven record of paying to repair infrastructure. The borehole operator did not have on-site records of water sales, but, at 50 TSh per 20-liter bucket charged by the village, it is estimated that 600,00 TSh per month was generated in revenue.

Mughanga

The village of Mughanga is also made up of six sub-villages. As of January 2017, these sub-villages were served by five shallow wells with hand pumps, and each household paid 3,000 TSh per year to use them. Three of these shallow wells were dry from August to November, during which time open wells were used. Mughanga also had a borehole, but it had not been used since 2016 because its yield was very low. When the borehole was in service, only 50% of villagers used it because it was inconvenient and lacked water.

As with Ghalunyangu, Mughanga borehole users paid 50 TSh per 20-liter bucket. The village leaders reported that they would like to develop a new borehole and that 80% of the village would pay to use it in addition to using the existing shallow wells. Community members noted the 'salty' taste of the water from the shallow wells and a desire to use clean water from the borehole to make and sell local brew.

The village primary school served 797 students in 12 classrooms and retrieves water from one of the shallow wells that produced throughout the year. The school's infrastructure was in good condition, but they needed some assistance to build latrines and teacher houses. Mughanga did not have its own health facility, so community members traveled to the nearest dispensary, which is in the village of Mpambaa, for basic medical care.

With respect to governance, Ghalunyangu and Mughanga both relied on their district water department for guidance on issues pertaining to water, and water committees were respected as the managers of public sources of water. The

members of the water committees were elected by the community, sanctioned by the central government, and trusted with all local water issues by the local government.

III. Indicators of Success

In fall of 2017, Global Partners developed a Monitoring and Evaluation Plan for GWI. This plan is intended to standardize SVWS data collection, analysis, and reporting such that data collection is efficient, data analysis is robust, and data reporting has accuracy, validity, and integrity.

The plan lays out monitoring indicators, which measure activities and outputs for the Pilot, as follows:

- The percentage of households regularly using water through SVWS mobile payment accounts;
- The percentage of days that each water system is operational at the designed flow rate;
- Monthly revenue from water sales and water sales made using mobile payments;
- Quantity of water sold in liters;
- The number of people with access to improved sanitation facilities at schools and dispensaries.

The plan also includes evaluation indicators, which measure the outcomes and ultimate impacts of the Pilot:

- Incidence of water-related illness and death related to water-borne disease reported at health facilities;
- Number of new women-owned businesses;
- School attendance rates;
- Yield of high nutrition crops for smallholder farmer groups
- The number of members of Farmer's Field Groups or other agricultural groups;
- The percentage of crops sold versus the percentage of crops consumed by households;
- The average sales of crops over the past six months for Farmer's Field Groups or other agricultural groups;
- The average number of times the average member of a business group uses their mobile phone for purposes related to business in a week.

All of these indicators are described in detail in the Indicator Protocol section of the Monitoring and Evaluation Plan.

It should also be noted that the Monitoring and Evaluation Plan, specifically the timeline for implementation of monitoring and evaluation activities, is a living document and is subject to change.

IV. Data Collection Methods

The Monitoring and Evaluation Plan also provided detailed information on the methods to be used to gather information on these indicators.

Global Partners' staff developed four questionnaires to evaluate changes in the village overall, local schools, local health facilities, and local businesses. The surveys were administered in February 2018 to key informants related to each of the above categories.

Global Partners' staff trained two enumerators in best practices for administering the questionnaires and used input from trusted local sources to make any necessary cultural and language-based adjustments to the survey. Using local enumerators was considered essential to making the questionnaire relevant to local conditions, overcoming language barriers, creating a comfortable environment for respondents, and respecting cultural norms. The questionnaire was translated from its original form and administered in Swahili.

Respondents to the questionnaire included village leadership, school headteachers, health facility leadership, women's groups, smallholder farmer groups, and other business-oriented groups. Village, school, health facility, and water system records were also used to triangulate information received from interviews.

Respondents were informed that their answers would be kept confidential and that their answers would not affect the likelihood of SVWS implementing projects in their community. Enumerators were asked to note anything that might affect the quality of the data recorded, such as respondent confusion or discrepancies between information reported and information noted in records.

Responses were recorded on paper by the enumerator and then entered into Excel for cleaning and analysis. A simple before-and-after analysis will be completed after subsequent rounds of surveys following the baseline to track changes.

V. Baseline Findings

Findings for baseline characteristics at each village are presented in Tables 1–4.

Monitoring Indicators

In terms of access to clean water, 31% of households and 70% of individuals in Ghalunyangu were reported to have access to a clean source of water (defined as having been tested for water quality in accordance with Tanzanian water standards). In Mughanga, 66% of households and 36% of individuals were reported to have access to a clean source of water. The discrepancies between the households and individuals could be explained by variations in the number of people living in households with and without access to water. It is also possible that village leadership was guessing at the numbers of people with access to clean water. In addition, “access” was not defined in terms of distance to the water source, so individuals in Ghalunyangu are likely to be reporting access to a clean water source even if that water source is transported by truck to their location. A specific definition of what access means should be clarified (defined as improved drinking water within a 30-minute walk round-trip).

In both villages, there were no farms that had access to water for agriculture and no households used mobile payment accounts to pay for water. None of the existing water infrastructure in the villages was operational at the flow rate it was designed for, which further increases the likelihood that people with access to water were getting it from great distances. Neither village was bringing in money for water at their local source, and the quantity of water used was unknown in both villages.

In both villages, there was no access to improved sanitation facilities (defined as facilities likely to ensure hygienic separation of human excreta from human contact such as pour flush toilets (to piped sewer system, septic tank and pit latrine); ventilated improved pit latrine; or pit latrine with slab and composting toilet) at schools. In Ghalunyangu, there was no access to improved sanitation facilities at the dispensary either.

Mughanga did not have its own health facility, so enumerators gathered information from the nearest health facility, which was in the village of Mpambaa. This dispensary was reported to serve 1,105 people per year with their improved sanitation facilities.

In Ghalunyangu, only two business associations exist, and neither of these were related to agriculture. In Mughanga, 8 of the 13 business groups were for farmers.

Table 1 – Baseline Characteristics for Ghalunyangu (Monitoring Indicators)

Monitoring Indicators - Ghalunyangu	
Number of households/people with access to a clean source of water	130/410 (31%); 2100/2978 (70%)
The percentage of farms that have access to water for agriculture	0%

The percentage of households regularly using water through SVWS mobile payment accounts	0%
The percentage of days that each water system is operational at the designed flow rate	0%
Monthly revenue from water sales and water sales made using mobile payments	\$0
Quantity of water sold in liters	Unknown
The number of people with access to improved sanitation facilities at schools and dispensaries	0
Number of business groups (related to agriculture)	2 (0)

Table 2 – Baseline Characteristics for Mughanga (Monitoring Indicators)

Monitoring Indicators - Mughanga	
Number of households/people with access to a clean source of water	320/485 (66%) ;1280/3520 (36%)
The percentage of farms that have access to water for agriculture	0%
The percentage of households regularly using water through SVWS mobile payment accounts	0%
The percentage of days that each water system is operational at the designed flow rate	0%
Monthly revenue from water sales and water sales made using mobile payments	0
Quantity of water sold in liters	Unknown
The number of people with access to improved sanitation facilities at dispensaries (Mpambaa)	1105
The number of people with access to improved sanitation facilities at schools	0
Number of business groups (related to agriculture)	13 (8)

Evaluation Indicators

While monitoring indicators provide ongoing information about the activities taking place in the communities, the evaluation indicators provide a more in-depth understanding of the impacts those activities may be having on health, education, and economic development.

The dispensaries in both Ghalunyangu and Mpambaa were not equipped to support patients with parasitic infection, typhoid, cholera, or other waterborne diseases besides diarrhea. Therefore, responses about the number of people treated for waterborne disease in the six months before the survey (from August 2017 to February 2018) related only to incidence of diarrhea. Initially, Ghalunyangu reported no waterborne disease, so the enumerators called the dispensary again to confirm. After defining diarrhea as a waterborne disease, the respondent reported 310 patients suffering from waterborne disease. The number of incidence of diarrhea reported at Mpambaa was also confirmed at 162. No deaths were reported at either dispensary.

There were no women-owned businesses in either village as of February 2018. Local primary school attendance rates were 593 and 772 at Ghalunyangu and Mughanga, respectively, and these rates were confirmed through school records.

Ghalunyangu reported that they had no Farmer’s Groups, which corroborates monitoring indicator reports on business groups related to agriculture and makes many of the evaluation indicators related to economic development not applicable. In addition, no members of any business group used their phones for business purposes.

The eight business groups associated with agriculture in Mughanga were supporting 172 members. The percentage of crops sold versus consumed by member households was high at approximately 79 per cent on average, but these sales brought in only about 77 USD per month per group on average. Members used their mobile phones on average almost twice a week for business purposes.

Table 3 – Baseline Characteristics for Ghalunyangu (Evaluation Indicators)

Evaluation Indicators - Ghalunyangu	
Incidence of water-related illness and death related to water-borne disease reported at health facilities	310 (diarrhea)/0
Number of women-owned businesses	0
School attendance rate	593
Yield of high nutrition crops for smallholder farmer groups	0
The number of members of Farmer’s Field Groups or other agricultural groups	0
The percentage of crops sold versus the percentage of crops consumed by households in Farmer’s Groups	0
The average monthly sales of crops for Farmer’s Field Groups or other agricultural groups on average	0

The average number of times the average member of a business group uses their mobile phone for purposes related to business in a week	0
---	---

Table 4 – Baseline Characteristics for Mughanga (Evaluation Indicators)

Evaluation Indicators - Mughanga	
Incidence of water-related illness/death related to water-borne disease reported at health facilities (Mpambaa)	162 (diarrhea)/0
Number of women-owned businesses	0
School attendance rate	772
Yield of high nutrition crops for smallholder farmer groups	158 bags, tins, or buckets per acre
The number of members of Farmer's Field Groups or other agricultural groups	172
The percentage of crops sold versus the percentage of crops consumed by households in Farmer's Groups on average	78.9%
The average monthly sales of crops for Farmer's Field Groups or other agricultural groups	171,042 TSh
The average number of times the average member of a business group uses their mobile phone for purposes related to business in a week	1.77

VI. Limitations

This evaluation process has several limitations. For the SVWS pilot project, Global Partners and GWI acknowledge that a before-and-after analysis will not provide attribution of impact to SVWS. Instead, it is designed to provide correlational data for the implementation team to inform and improve future projects. Global Partner's team will be diligent in making note of any and all changes within the communities outside of the influence of SVWS that may also contribute to changes reflected in the evaluation. GWI is committed to securing more robust evaluation methods when there is a larger sample size following the Pilot.

Many respondents also had limited access to medical care for specific diagnoses of symptoms, so incidence of waterborne diseases besides diarrhea is likely under-reported. Without biomedical validation of claims, data on health outcomes will always be vulnerable to differing understandings of health terminology and records of symptom classification.

An additional threat to data accuracy was key informant knowledge or lack thereof. Especially in response to questions that asked for specific numbers of individuals and households with access to water, respondents may have made educated guesses without access to exact figures. Even when records were available to triangulate information, the accuracy of these records can be suspect.

Though the evaluation put considerable effort into making the questionnaire culturally relevant through extensive consultation with local contacts, enumerator feedback, and training, it is also not possible to rule out data inaccuracies in enumerator recording and/or misinterpretations of questions by respondents.

VII. Conclusion

Inadequate access to clean water and restricted economic opportunity plague rural communities across East Africa. The SVWS program is designed to increase access to improved water and sanitation infrastructure, advance health and education outcomes, and bolster economic development and local sustainability over time for communities in Tanzania.

The results of this report suggest that the SVWS pilot identified communities that are have unique characteristics and that will reveal the effectiveness of the program in different ways. Therefore, the Pilot is likely to be successful as a tool for learning. Given the need for improved WASH infrastructure and economic and technological innovation within the communities, the Pilot is also likely to be successful in its goals of improving the lives of people living in Ghalunyangu and Mughanga. Though there were some limitations to this study, the baseline results will provide an important starting point for comparison as the Team embarks on the SVWS pilot.

Bibliography

- Hutton, Guy. *Global costs and benefits of drinking-water supply and sanitation interventions to reach the MDG target and universal coverage*. New York: World Health Organization, 2011.
- Ministry of Education, Science and Technology. *National Guideline for Water, Sanitation, and Hygiene for Tanzania Schools*. United Republic of Tanzania, July 2016.
- Ministry of Health, Community Development, Gender, Elderly and Children. *The National Guidelines for Water, Sanitation and Hygiene in Health Care Facilities*. United Republic of Tanzania, October 2017.
- World Health Organization. *Working towards better hygiene and better health in the absence of improved facilities*. New Delhi: WHO, 1993.
- World Health Organization and The United Nations Children's Fund. *Progress on Drinking Water and Sanitation: 2014 Update*. New York: WHO and UNICEF, 2014.
- White, Howard. *Challenges in evaluating development effectiveness*. Brighton, Sussex: Institute of Development Studies, 2005.
- WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. *A Snapshot of Drinking Water, Sanitation, and Hygiene in Africa*, 2017.
- WHO/UNICEF Joint Monitoring Programme for Water Supply, Sanitation and Hygiene. *JMP Methodology: 2017 Update & SDG Baselines*, 2018.
- World Bank. *Reaching for the SDGs: The Untapped Potential of Tanzania's Water Supply, Sanitation, and Hygiene Sector. WASH Poverty Diagnostic*. World Bank, Washington, DC., 2018.