

Sustainable Village Water Systems Pilot

Follow-Up Survey Report

Produced by

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for

The Global Water Institute

at

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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 and July 2019 through targeted key informant interviews to monitor the before-and-after effects of the Pilot on comprehensive WASH and economic development outcomes. Findings suggest that the SVWS pilot program delivers valuable water and agricultural extension services that may continue to grow in correlational impact as all of the components of the program are realized. Changes between baseline and follow-up surveys show a 93 percent increase in sales of high-nutrition crops and a rise in both the number of existing farmer's groups and the number of people or households that have access to a clean source of water, as well as a decrease in the percentage of patients reporting diarrhea in both communities.

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 percent 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 percent.

The SVWS program targeted two villages in Tanzania that had little to no access to functional clean water infrastructure. Though the program will ultimately support 125 communities, the first two communities were rolled out as a pilot, jointly cost

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

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).

SVWS systems 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: 1) address the interrelated nature of human development sectors such as WASH, education, and health; 2) meet or exceed government requirements for basic human needs; and 3) 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
- Implementation of mechanisms that ensure the sustainability of the water systems, such as:
 - Agreements with the Village Council and local government authorities;
 - 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 water to schools and health facilities via a piping scheme
- 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.
- 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 are 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 facilitate community collaboration.

The Pilot provides 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 percent. 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 attendance 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 extreme poverty and tangible water needs. The Pilot villages also have unique requirements that will be conducive to learning during the Pilot and will be described in detail in the following paragraphs.

Ghalunyangu

At the time of the initial 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 would 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 percent, 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 needed 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 600,000 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 percent 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 percent 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. Implementation Phase at Time of Follow Up

Due to delays in project funding, some of the components of the project had not yet been carried out at the time of follow up in July 2019. *Table 1* provides an overview of the items that were accomplished and the items that were yet to be completed at the time of data collection.

In July 2019, the central component of SVWS, its solar-powered boreholes, were functional in both communities, and water was piped to the school, health facility, and village center in Ghalunyangu. BM Farm Africa also implemented a significant agricultural support program in the form of training members of farmer’s groups, establishing demonstration plots, holding agricultural training workshops, etc. Trainings focused on best agronomic practices and the use of improved inputs such as insecticides, seed, and fertilizers. The demonstration plots mainly contained four crops – maize, beans, onion, and sunflower. High nutrition crops included cucumber, Chinese cabbage, amaranth, squash, and sweet potatoes.

At the time of follow up, neither village had a final private operator in place, though procurement advertisements had been circulated, and the systems were being operated by two local technicians. When water payments were made, they were received in cash as mobile payment mechanisms were not yet implemented. In addition, an operations and maintenance plan and sanitation and hygiene programming had not yet been completed. In Mughanga, the water tap is in use alongside the borehole, but the water has not yet been piped to the village center, school, or health facility.

Table 1 – Items Completed at Time of Follow Up

Action Item	Completion	Notes
Agreements with the Village Council and local government authorities	YES	
Construction/renovation of solar-powered boreholes	YES	
Training of local people to operate and maintain the systems; creation of operations and maintenance plan	YES; NO	
Development of a contract with a private operator and an operations & maintenance plan	NO	A private operator has not yet been identified; local operators are in place
Piping of water to schools and health facilities	YES/NO	Ghalunyangu received piped water to the school and health clinic, but Mughanga has not

Provision of improved sanitation facilities and hygiene trainings	NO	
Establishment or support of farmer's groups	YES	
Training of farmer's group members in agricultural extension practices	YES	

IV. Indicators of Success

In fall of 2017, Global Partners developed a Monitoring and Evaluation Plan for the Pilot. This plan was 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 laid 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 included 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's groups
- The number of members of farmer's 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 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.

V. Data Collection Methods

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

Global Partners' staff developed four questionnaires to evaluate changes at the village, school, dispensary, and business levels. 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 English and administered in Swahili.

Respondents to the questionnaire included village leadership, school headteachers, dispensary leadership and, smallholder farmer's groups. Village, school, dispensary, agriculture, and water system records were 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. Data were evaluated using a simple before-and-after analysis comparing baseline data to data gathered at follow up.

VI. Findings

Findings for baseline and follow-up data in each village are presented in Tables 2–5. All findings are correlational because control groups were not used in this study.

Monitoring Indicators

Water

In terms of access to clean water, 31 percent of households and 70 percent 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) at baseline, and this rose to 71 percent and 77 percent, respectively, at

follow up. In Mughanga, 66 percent of households and 36 percent of individuals were reported to have access to a clean source of water at baseline, and this remained the same for households but rose to 50 percent for individuals at follow up.

The explanation for the discrepancies between village and household numbers is likely that village leadership was unsure about the numbers of people with access to clean water. The enumerators spoke with village leadership several times, and each time they shared different information. They confirmed the information reported at baseline and said that the numbers had not changed since then. When pushed about likely births and deaths in the village, they said they had not conducted a census since the baseline. Much of this problem stems from inadequate record-keeping at the village level. The numbers on the walls of the village offices often differ from those in record books and those kept by each balozi (individual responsible for 10 households each in the village). These discrepancies imply that the ultimate addition of a private operator who keeps trusted records will be supportive in ensuring accurate data for long-term evaluation.

In addition, ‘access’ was not clearly 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) for the next round of baseline surveys.

The percentage of days that the system was reported to be open was 94.2 percent at Ghalunyangu (closed for 7/122 days) and 97.8 percent at Mughanga (closed for 4/180 days). These data reveal that the new and renovated systems are much more consistent sources of water for the communities than were available in the past.

At baseline, none of the existing water infrastructure in the villages were operational at the flow rate for which they were designed. At follow up, operators were unsure how to determine the flow rate of the systems because water meters were not yet installed, but this will be one of the metrics tracked by remote monitoring systems in the future. At Ghalunyangu, operators reported that the pump was of “inadequate horsepower” and that the “pumping capacity is not proportional to tank capacity” and “inefficiency is encountered” during system use. Technical teams may want to follow up on these reports in order to troubleshoot whether the system is truly working at a low capacity or if further training is needed for the local technicians. These potential concerns are likely to be mitigated when the private operators are in place.

At baseline, neither village was bringing in money for water at their local source, and the quantity of water used was unknown in both villages. At follow up in Ghalunyangu, 448,000 liters of water was sold over four months at the new borehole site, bringing in 1,120,000 TShs in cash. The operators charged 50 TSh for every 20 liters. At Mughanga, water is not yet being sold, and the amount of water used by the community was unknown to the operators because water meters had not yet been installed.

Sanitation

In both villages, there was no change in 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 systems, septic tanks and pit latrines; ventilated improved pit latrines; or pit latrines with slabs and composting toilets) at schools or dispensaries as no work was begun in this area at the time of follow up. 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 reported that they continued to serve approximately 1,100 people per year with their improved sanitation facilities from baseline to follow up.

Agriculture & Business Development

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 at baseline or follow up. Farmers decided not to pay for water for irrigation from the borehole because a payment system for agricultural use is not yet finalized, so they have used water from a nearby pond that has the appropriate pH for watering their crops.

At baseline in Ghalunyangu, only two business associations existed, and neither of these were related to agriculture. However, at follow up, 13 agricultural groups and one more non-agricultural business group had been formed. In Mughanga, 4 of the 7 business groups were for farmers at baseline. The number of farmer's groups rose to 13 at follow up in Mughanga due to the work of BM Africa.

Table 2 – Characteristics for Ghalunyangu (Monitoring Indicators)

	Baseline	Follow up	Difference
Number of households/people with access to a clean source of water	130/410 (31%); 2100/2978 (70%)	302/425 (71%); 2,288/2978 (77%)	172 households; 188 people
The percentage of farms that have access to water for agriculture	0%	0%	0%
The percentage of households regularly using water through SVWS mobile payment accounts	0%	0%	0%
The percentage of days that each water system is operational at the designed flow rate	Unknown	94.2% operational; flow rate unknown	Unknown
Monthly revenue from water sales and water sales made using mobile payments	0; 0	480,000 TSh; 0 Tsh	480,000 TSh; 0 TSh

Quantity of water sold in liters	Unknown	448,000 L in 4 months	Unknown
The number of people with access to improved sanitation facilities at schools and dispensaries	0	0	0
Number of business groups (related to agriculture)	2 (0)	16 (13)	14 (13)

Table 3 – Characteristics for Mughanga (Monitoring Indicators)

	Baseline	Follow up	Difference
Number of households/people with access to a clean source of water	320/485 (66%); 1280/3520 (36%)	322/486 (66%); 1758/3520 (50%)	2 households; 478 people
The percentage of farms that have access to water for agriculture	0%	0%	0%
The percentage of households regularly using water through SVWS mobile payment accounts	0%	0%	0%
The percentage of days that each water system is operational at the designed flow rate	Unknown	97.8% operational; flow rate unknown	Unknown
Monthly revenue from water sales and water sales made using mobile payments	\$0	\$0	\$0
Quantity of water sold in liters	Unknown	0	Unknown
The number of people with access to improved sanitation facilities at dispensaries (Mpambaa)	1105	1105	0
The number of people with access to improved sanitation facilities at schools	0	0	0
Number of business groups (related to agriculture)	7 (4)	16 (13)	9 (9)

Evaluation Indicators

While monitoring indicators provide ongoing information about the activities taking place in the communities, evaluation indicators provide a more in-depth

understanding of the impacts those activities may be having on health, education, and economic development.

Health

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 surveys (from August 2017 to February 2018 and February to July 2019) related only to incidence of diarrhea. At baseline, 310 patients were reported to have suffered from diarrhea, and this number rose to 486 at follow up.

However, the dispensary had seen 1,426 patients in the six months before baseline and had seen 2,860 in the same time period before follow up. Therefore, the percentage of cases of waterborne disease actually went down from 21.7 percent at baseline to 17 percent at follow up. This increase in the number of patients seen may be due to the fact that the medical lead at the dispensary built a home next to the clinic due to the presence of the new source of piped water and is therefore more available to patients. The rise in number of patients and number of patients reporting diarrhea could also be explained by the fact that the surveys were conducted during the dry season and the fact that the water system was only operational for four of the six months included in the time period in question.

The number of incidents of diarrhea reported at Mpambaa near Mughanga was reported at 162 and fell to 123 at follow up even though the number of patients seen rose from 1,105 to 1,479, respectively. Therefore, the percentage of cases of diarrhea fell from 14.6 percent to 8 percent from baseline to follow up. This result occurred without piping water directly to the dispensary. No deaths due to waterborne disease were reported at either dispensary at baseline or follow up.

Education

Local primary school attendance rates were 593 and 772 at Ghalunyangu and Mughanga, respectively, and rose to 607 and 1,099, respectively, at follow up. These rates were confirmed through school records. It is unclear whether or not the new water systems are related to an increase in attendance rates since water was piped to the school at Ghalunyangu but not Mughanga, and both schools saw an increase in attendance from baseline to follow up.

Agriculture & Economic Development

There were no women-owned businesses in either village as of February 2018. Three were reported in Ghalunyangu and one in Mughanga in July 2019. BM Africa encourages groups to welcome both men and women, so developing women's only farmer's groups is not a focus of their work at this stage.

At baseline, Ghalunyangu had no existing farmer's groups. In addition, no members of any business group used their phones for business purposes. At follow up,

Ghalunyangu had 13 farmer’s groups with a total of 153 individuals participating. However, at the time of follow up, Ghalunyangu groups had not yet begun to sell their products since they had not yet experienced a harvest. In Ghalunyangu, the demo plots have only planted 13 acres so far compared to 124 acres in Mughanga.

At baseline, the four 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 percent 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.

At follow up, BM Africa reported 198 farmer’s group members in Mughanga, while the village leadership reported 200 people total. The village leadership was unaware of some of the groups that had been formed by BM Africa, so it is possible that some of the 198 people reported by BM Africa were in addition to those reported by the village leadership in groups that were formed before BM Africa arrived.

At follow up, there was noticeable improvement in farmer productivity. There was a 93 percent increase in the average monthly sales of crops for farmer’s groups up to 330,000 TSh (about \$150) per month per group for cucumber, Chinese cabbage, amaranth, and squash. BM Africa shared that during the August 2019 harvest of onion, maize, beans, and sunflower, the farmers expect to bring in an additional 1,150,000 from the demonstration plots in Mughanga.

It is also important to note that the trainings that take place at the demonstration plots result in farmers learning strategies that they then use at their own homes. Many farmers don’t disclose their personal sales. For example, there are likely to be many sales of sunflower seeds, which is a major cash crop in the region, but the sales reported here are underestimated because these crops sold from farmer’s homes are not included. Village leadership reported that farmers sold 76 percent of their crops versus consuming them, while BM Africa estimated that farmers sold approximately 50 percent of their crops. Crops that farmers were likely to consume at home included maize, beans, and sorghum.

BM Africa also reported that mobile communication is not yet a part of their programming and that farmers currently get market information from a BM Farm Africa Limited Agronomist stationed in Mughanga village. The agronomist receives market information via TAHA mobile phone application from market officers in Singida.

Table 4 – Characteristics for Ghalunyangu (Evaluation Indicators)

	Baseline	Follow up	Difference
Incidence of water-related illness/death related to	310 (21.7%)/0	486 (17%)/0	-4.7%

water-borne disease reported at health facilities			
Number of women-owned businesses	0	3	3
School attendance rate	593	607	14
Yield of high nutrition crops for smallholder farmer's groups	0	Unknown	Unknown
The number of members of farmer's groups or other agricultural groups	0	153	153
The percentage of crops sold versus the percentage of crops consumed by households in farmer's groups	0%	0%	0%
The average monthly sales of crops for farmer's groups or other agricultural groups on average	\$0	\$0	\$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	0	0

Table 5 – Characteristics for Mughanga (Evaluation Indicators)

	Baseline	Follow up	Difference
Incidence of water-related illness/death related to water-borne disease reported at health facilities (Mpambaa)	162 (14.6%)/0	123 (8%)/0	-6.6%
Number of women-owned businesses	0	1	1
School attendance rate (2 schools)	772	1,099	327
Yield of high nutrition crops for smallholder farmer's groups	158 bags, tins, or buckets per acre	479 bags, tins, or buckets per acre	321 bags, tins, or buckets per acre
The number of members of farmer's groups or other agricultural groups	172	198	26

The percentage of crops sold versus the percentage of crops consumed by households in farmer's groups on average	78.9%	75.7% (village leaders); 50% (BM Africa)	3.2%
The average monthly sales of crops for farmer's groups or other agricultural groups	171,042 TSh	330,000 TSh	158,958 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	1	-0.77

VII. Limitations

This evaluation process has several limitations. For the SVWS pilot project, Global Partners and GWI acknowledge that a before-and-after analysis does 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. GWI is committed to securing more robust evaluation methods when there is a larger sample size following the Pilot.

Many respondents 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 made educated guesses without access to exact figures. Even when records were available to triangulate information, the accuracy of these records were unfortunately 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.

In addition, the baseline surveys were conducted during the rainy season when water is more accessible, and follow-up surveys were conducted during the dry season when water is less accessible. Therefore, outcomes mentioned in this report should

be read as potentially underestimated and may be even more important to sustainable health and livelihoods than the data suggest.

Finally, it is important to note that many of the components of SVWS had yet to be implemented at the time of the follow-up surveys, so additional outcomes are likely to be forthcoming once the projects are complete.

VIII. 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.

This report revealed that from baseline (February 2018) to follow up (July 2019), communities where SVWS programming took place experienced:

- Increased numbers of people/households with access to a consistent source of clean water;
- Higher numbers of students attending primary schools;
- Lower percentages of patients reporting diarrhea at local dispensaries;
- Increased numbers of farmer's groups; and
- Improved crop yields and sales.

This report provides information on community outcomes before some of the inputs from planned programming were implemented. When the private operators are in place, there is potential that water and village data will be more accurately managed, stored, and disseminated for future evaluations. Though there were limitations to this study, the results show positive improvements in the health and wellbeing of citizens living in the Ghalunyangu and Mughanga communities.

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.