

Maji Safi Group

2019 Health Screening Report

Executive Summary

Maji Safi Group (MSG) provides comprehensive water, sanitation, and hygiene (WASH) education and programming to rural, underserved individuals and families in the Mara Region of Tanzania. MSG's model for promoting community-driven WASH education and disease prevention focuses on behavioral change; however, measuring such changes in the community is a challenge. In 2019, Maji Safi Group conducted its fifth annual health screening campaign to test and treat community members and MSG's current and past program participants for schistosomiasis, amoebiasis, intestinal worms, malaria, and ringworm. The purpose of the health screening campaign is to alleviate the burden of the diseases, while also gathering data to establish a longitudinal study on disease prevalence rates in the Rorya District. Since 2015, MSG has been able to provide this health screening service to 26,501 community members in the Rorya District.

This year, MSG tested 8,299 community members – some had received no MSG education, others were current or past program participants. This was MSG's largest health screening initiative to date. For the fifth year in a row, disease rates showed that MSG program participants have lower disease incidence rates for schistosomiasis, amoebiasis, intestinal worms, malaria, and ringworm than non-program participants with no exposure to MSG programs.

Background Information on WASH Diseases

Waterborne and water-related diseases can be transmitted through four different transmission routes (Choffnes & Mack, 2009). These four transmission routes are classified as waterborne, water-washed, water-based, and water-related vectors (Choffnes & Mack, 2009). Waterborne disease transmission occurs through ingestion of water that contains disease pathogens (Choffnes & Mack, 2009). The water-washed transmission route is through improper hygiene that results in oral contact with feces on hands or body (Choffnes & Mack, 2009). Skin contact with unsanitary water that contains aquatic hosts carrying pathogens is a water-based transmission path. Lastly, transmission through water-related insect vectors involves being bitten by an insect that breeds and lives near water (Choffnes & Mack, 2009, p. 16). The diseases that were tested during the health screening were: schistosomiasis, amoebiasis, intestinal worms, and malaria, and ringworm.

Schistosomiasis

Schistosomiasis is a water-based parasitic disease that is transmitted through skin contact with freshwater that has been infested with snails that hold the eggs of the *Schistosoma* blood fluke (Madinga, Linsuke, Mpabanzi, Meurs, Kanobana, Speybroeck, Lutumba, & Polman, 2015). This Neglected Topical Disease (NTD) is common in tropical and sub-tropical regions that have widespread unsanitary conditions and unsafe water sources (Madinga et al., 2015). These unsanitary conditions are typically caused by the open defecation and urination of infected individuals into water sources in the region (Madinga et al., 2015). While there are five types of schistosomiasis (CDC, 2012), the two that are most common in East Africa are *S. mansoni* and *S. haematobium* (Madinga et al., 2015). *S. mansoni* eggs are excreted and diagnosed through examining fecal samples, while *S. haematobium* eggs are excreted and diagnosed through examining urine samples (CDC, 2012). Individuals infected with schistosomiasis can experience acute symptoms, such as rashes, blood in urine or stool, headaches, and diarrhea (CDC, 2012). Without treatment, schistosomiasis can also result in anemia (Friedman J.F., Kanzaria, H.K., & McGarvey, S.T., 2005), cognitive delays (Jukes, Nokes, Alcock, Lambo, Kihamia,

Ngorosho, Mbise, Lorri, Yona, Mwanri, Baddeley, Hall, Bundy & Partnership for Child Development, 2002), and stunting (Stephenson, Latham, & Ottesen, 2000).

Amoebiasis

Amoebiasis is classified as a water-washed disease caused by the parasite *Entamoeba histolytica* (Stanley, 2003). Amoebiasis is common in underdeveloped countries located in the tropics that have poor sanitation and hygiene practices (“Amoebiasis”, 2015). The disease is spread by ingesting fecal matter in food or water (“Amoebiasis”, 2015). Many individuals with amoebiasis do not experience any symptoms of the disease, and their bodies are able to resolve the illness (Stanley, 2003). However, 10%-20% of infected individuals (“General Information”, 2015) develop symptoms, including watery or bloody diarrhea or tenderness and pain in their abdomen (Stanley, 2003). More severe cases of amoebiasis may cause an amoebic liver abscess, which can rupture through the diaphragm causing respiratory distress as well as urinary tract problems, genital diseases, and even amoebic brain abscesses (Stanley, 2003).

Intestinal Worms

Intestinal worms or parasites, like amoebas, are common water-washed parasitic infections found in “hot and humid environments” among poor communities with low access to sanitation facilities, clean water, and adequate housing (Oliveira, Ferreira, Atouguia, Fortes, Guerra, & Centeno-Lima, 2015). Once again, many infected people are asymptomatic; however, of those that are not, the clinical symptoms are wide-ranging (Rice, Skull, Pearce, Mulholland, Davie & Carapetis, 2003). Symptoms range from mild gastrointestinal discomfort and weakness (Rice et al., 2003) to iron deficiency anemia, stunting, and even death (Oliveira et al., 2015).

Malaria

Malaria is a water-related disease spread through insect vectors. It is responsible for an “estimated 216 million cases and 655,000 deaths” globally per year (21. White, Pukrittayakamee, Hien, Faiz, Mokuolu, & Dondorp, 2014, pp. 723). Although severe malaria mortality has been reduced by 22% in Africa, 90% of malaria-related deaths in children under five are in sub-Saharan Africa (White et al., 2014). Only anopheles mosquitos transmit malaria. They are resilient and known to live in “high densities in tropical climates, breed readily, and preferentially bite humans” (White et al., 2014). Typical symptoms of malaria include, but are not limited to, fever, sweating, weakness, and enlargement of the liver or spleen (“Disease”, 2015). Symptoms may include severe anemia, impairment of consciousness, seizures, and abnormal blood coagulation, which, if left untreated, all contribute to high rates of mortality (“Disease”, 2015). Malaria Rapid Strip Tests are a more cost-effective tool in diagnosing infected individuals than standard methods (White et al., 2014). MSG uses this cost-effective testing method.

Ringworm

Ringworm is a contagious skin disease that can affect the scalp (tinea capitis), nails (tinea unguium), feet (tinea pedis or “athlete's foot”), or whole body (tinea corporis). Despite its name, ringworm is caused by a fungus. On the scalp, ringworm begins as a pimple or sore that spreads into a ring shape. Hair becomes brittle, breaking easily and falling out, leaving bald spots on the scalp. On the body, ringworm may first appear as red or pink, flat or slightly raised, patches on the skin. The circular sores may be dry, scaly, crusted, or moist. As the sores become larger, the central area clears, leaving a ring of infected tissue around the clear area. Infection in the nails usually begins at the site of an injured nail and may spread to the other nails. Infected nails become thick, pitted, grooved, and abnormal in shape and color. Ringworm of the feet and body are more frequent in men than women. Adults are more likely than children to get ringworm of the feet, which occurs more frequently in hot weather (WHO 2001). Ringworm is the most common type of

fungal infection adversely affecting the quality of life of individuals across all age groups, estimated to affect 20-25% of the global population (Gupta AK et al., 2005 & Havilickova B et al., 2008).

Ringworm is caused by various types of fungi known as the dermatophytes. It is spread by direct contact with an infected person or animal (dogs, cats, guinea-pigs, and cattle), contact with soil, or indirect contact with items contaminated by the fungus, for example clothing, towels, bedclothes, chairs, and toilet articles handled by people with the infection. The link with water is via poor personal domestic hygiene and shortage of water for cleaning and washing (WHO 2001).

Background Information on Partners

Maji Safi Group: Health Screening Program

Maji Safi Group Facts	
Country	Tanzania
Region	Mara
Approximate population of the Mara Region	1,700,000 Residents
Districts MSG works in and their approximate populations	Rorya District = 265,000 Residents Musoma Rural = 208,000 Residents Musoma Town = 135,000 Residents
Year established	2012
Organization type	INGO
“Maji Safi” is Swahili for	“Clean Water”
MSG Mission Statement	To promote health and disease prevention in underserved and impoverished areas through holistic community empowerment and by working predominantly with local women and youth.
Number of programs	14 Programs
Approximate number of residents reached through MSG programs (2012-2018)	1,281,127 Mara Region Residents

Maji Safi Group (MSG) is dedicated to sustainable community development through water, sanitation, and hygiene (WASH) education and health promotion in the Mara Region, Tanzania. MSG hires local Tanzanians to be Community Health Educators (CHEs), who implement MSG’s 14 programs in culturally relevant and creative ways. Since May 2012, CHEs have taught more than 860,253 Mara Region residents WASH lessons (including repeat participants) and the importance of improving personal and community WASH behaviors. In addition, MSG has helped local authorities fight cholera outbreaks. MSG’s model promotes behavioral change; however, measuring changes in the community is a challenge. Thus, MSG developed a Health Screening Program in 2015 that tests and treats Rorya District community members – some with and some without exposure to MSG education. Comparing the two groups’ disease rates affords a way to evaluate the longitudinal impact of our programs.

During health screening campaigns in 2015, 2016, 2017, and 2018, MSG partnered with the Rorya District Government through the District Medical Office (DMO), District Health Office (DHO) and District Education Office (DEO) to plan and conduct the screenings according to Tanzanian government policies and laws. Each year, MSG hired government nurses, clinical officers, and lab technicians to screen, diagnose, and prescribe medicine, while the MSG staff organized and ran the program. Health screenings were conducted through blood, urine, and stool samples to determine if the participants

had one or more of the following WASH diseases: schistosomiasis, amoebiasis, intestinal worms, malaria, and ringworm. If the participant tested positive for one or more diseases, medicine was distributed free of charge, and every participant received disease prevention education.

While our Health Screening Program does provide valuable statistics longitudinally, it is important to note that this program is not a “perfect research model”, but over time, our results do indicate a common trend among program participants vs. non-program participants. Although we do not follow the same schools, program participants and non-program participants each year, we do aim to reach the same type of program participants and non-program participants by visiting schools that have partnered with MSG in similar time frames and communities living in similar conditions. However, there will be a degree of error in our results due to the change in program participants from year to year, which causes sampling bias. This is specifically evident when looking at the different schools we have screened over the years; some years have focused on primary schools, other years on secondary schools.

MSG’s 7-Year Overall Programmatic Impact (2012-2019)

Program/ Activity	Number Reached August 2012 – August 2013	Number Reached September 2013 – December 2014	Number Reached January 2015 – December 2015	Number Reached January 2016 – December 2016	Number Reached January 2017 – December 2017	Number Reached January 2018 – December 2018	Number Reached January 2019 – December 2019	Total Number Reached Per Program
Home Visit	1,699 Family Members	1,025 Family Members	2,464 Family Members	1,207 Family Members	2,755 Family Members	1,323 Family Members	885 Family Members	11,358 Family Members
After School	3,808 Students	1,243 Students	931 Students	1,588 Students	2,575 Students	405 Students	262 Students	10,812 Students
Disease Prevention Center (DPC)	791 Visitors to DPC	802 Visitors to DPC	1,210 Visitors to DPC	1,032 Visitors to DPC	1,445 Visitors to DPC	1,193 Visitors to DPC	645 Visitors to DPC	7,118 Visitors to DPC
Singing and Dance Group (including performan- ces)	756 Community Members	1,048 Community Members	1,746 Community Members	3,250 Community Members	7,858 Community Members	4,015 Community Members	4,221 Community Members	22,894 Community Members
Maji Safi Cup	2,032 Participants	1,697 Participants	4,170 Participants	6,936 Participants	8,054 Participants	3,822 Participants		26,711 Participants
Outreach (events, market visits, stores and salons, restaurants)	1,907 Community Members	6,521 Community Members	8,827 Community Members	7,699 Community Members	7,278 Community Members	13,022 Community Members	24,540 Community Members	69,794 Community Members
Female Hygiene	-	1,282 Participants	7,890 Participants	2,342 Participants	2,502 Participants	4,876 Participants	7,558 Participants	26,450 Participants
Hotline*	-	1,326 Participants	4,603 Participants	1,467 Participants	1,830 Participants	1,513 Participants	1,305 Participants	12,044 Participants

Radio Show Listeners	-	31,500 Listeners	49,000 Listeners	98,000 Listeners	231,000 Listeners	185,200 Listeners	371,200 Listeners	965,900 Listeners
Radio Show Callers				206 Direct Callers	254 Direct Callers	144 Direct Callers	158 Direct Callers	762 Direct Callers
Radio Show SMS Messages	-	-	-	-	-	372 SMS Messages	753 SMS Messages	1,125 SMS Messages
Health Screenings	-	-	3,060 Screened	5,160 Screened	3,071 Screened	6,911 Screened	8,299 Screened	26,501 Screened
Cholera Outreach	-	-	53,237 Participants	41,593 Participants	-	-	-	94,830 Participants
Male Hygiene	-	-	-	348 Participants	772 Participants	2,485 Participants	1,048	4,653 Participants
Arborloo Toilet	-	-	-	-	175 Users	-	-	175 Users
Total reached each year (excluding Radio Show, but including callers)	10,993 Community Members	14,944 Community Members	88,138 Community Members	72,828 Community Members	38,569 Community Members	40,081 Community Members	49,674 Community Members	315,227 Community Members
Total reached each year (including Radio Show)	10,993 Community Members	46,444 Community Members	137,138 Community Members	170,828 Community Members	269,569 Community Members	225,281 Community Members	420,874 Community Members	1,281,127 Community Members

Note: *Hotline numbers indicate number of SMS messages sent/received and number of incoming and outgoing calls made.
****Radio Show** started in October 2014 and is estimated to reach approximately 3,500 per show. This number may indicate repeat listeners as well.

Rorya District Government and Malaria Focal Person

In 2019, MSG collaborated with the Rorya District Government offices, working directly with the District Development Office (DDO), District Education Office (DEO), District Medical Office (DMO), and the Malaria Focal Person. The DDO provided MSG with a letter of support to continue health screenings. The DEO provided letters of support to continue health screenings in government schools. The DMO provided a letter of support and the following medicines for those who were diagnosed with WASH-related diseases: 400 malaria rapid tests, 800 doses of Praziquantel to treat schistosomiasis, and 900 doses of Albendazole for worms. The DMO also approved MSG to work with government lab technicians, nurses, and clinicians.

2015, 2016, 2017, and 2018 Health Screening Results

2015 Health Screenings Summary

The first health screening campaign, conducted in 2015, was a means of detecting and treating WASH-related diseases in the different stages of MSG's WASH-education intervention. During the pilot year, we found that many students and health screening participants were sick – 55% of those screened tested positive for one or more water-related diseases (schistosomiasis, amoebiasis, intestinal worms, and malaria). MSG tested and educated 3,060 community members (including approximately 900 program participants) and treated 5,604 cases of water-related diseases. The screenings provided the health screening participants with an understanding of their WASH health situation, needed treatment, and education to prevent future WASH-related diseases. Additionally, following the World Health Organization and Tanzanian Ministry of Health's guidelines, all health screening participants received treatment for intestinal worms regardless of whether they tested positive or not. This mass treatment was conducted because the Rorya District is endemic for intestinal worms. Figure 1 indicates the disease rates for each water-related disease we tested for in 2015.

Figure 1: 2015 Health Screening Disease Rates

2015 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine
Overall percentage of health screening participants who tested positive	20%	18%	2%	31%
New MSG program participants who tested positive	28%	12%	17%	4%
MSG program participants	18%	16%	4%	14%
Non-program participants	22%	30%	3%	16%

2016 Health Screening Summary

In 2016, Maji Safi Group (MSG) conducted its second annual health screening campaign, testing 5,060 people. The participant sample included MSG program participants, their guardians, local non-program participants, students, and fishermen as a means of evaluating the effectiveness of our programs and the overall health situation in the Rorya District. It was found that 56% of the 2016 health screening participants tested positive for one or more water-related diseases. Overall, disease rates showed that MSG program participants who had been exposed to MSG education typically had lower WASH-related disease prevalence rates than non-program participants with no exposure to MSG programs. Data also suggested that MSG should add malaria lessons to its education. Figure 2 indicates the disease rates for each water-related disease we tested for in 2016.

Figure 2: 2016 Health Screening Disease Rates

2016 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria
Overall percentage of health screening participants who tested positive	14%	24%	7%	13%	22%
Percentage of current program participants who tested positive	10%	9%	5%	8%	23%
Percentage of past program participants who tested positive	9%	9%	5%	6%	16%
Percentage of family members of program participants who tested positive	11%	14%	3%	7%	21%
Percentage of staff members who tested positive	12%	6%	0%	3%	11%
Percentage of non-program participants who tested positive	18%	41%	10%	21%	23%

2017 Health Screening Summary

In 2017, MSG screened and treated 3,071 program and non-program participants. However, five forms were missing from the final count, so analysis was only conducted for 3,066 participants. The screenings took place over 11 days between July 29, 2017 and November 11, 2017. On average, MSG screened and treated 279 people per day with a range of 187 to 379 participants per day. Of those tested, 49% were female, and 51% were male.

The participant sample included MSG program participants, their guardians, non-program participants, and secondary school students. Primary school students were not screened this year due to a concurrent mass treatment campaign implemented by the Tanzanian government at all primary schools. MSG chose not to screen and treat primary school students to avoid double treatment. It was found that 51% of the 2017 health screening participants tested positive for one or more water-related diseases. Compared to the 2015 and 2016 health screening results, this is a 4% and 5% decrease, respectively. When looking at program participants' disease rates in comparison to non-program participants, the results continued to indicate that those exposed to MSG's education typically had lower disease prevalence rates than those not yet exposed to MSG's education. Data also suggested that MSG should add malaria lessons to its education. Figure 3 indicates the disease rates for each water-related disease we tested for in 2017.

Figure 3: 2017 Health Screening Disease Rates

2017 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria*
Overall percentage of health screening participants who tested positive	14%	38%	23%	12%	6%
Percentage of current program participants who tested positive	11%	12%	8%	6%	4%
Percentage of past program participants who tested positive	7%	12%	7%	8%	4%
Percentage of family members of program participants who tested positive	7%	5%	8%	4%	2%
Percentage of staff members who tested positive	13%	0%	4%	0%	7%
Percentage of non-program participants who tested positive	20%	74%	44%	20%	6%

*Note: Only selected community members and Singing and Dance participants and their family members were tested for malaria. Only 400 malaria tests were given.

2018 Health Screening Summary

In 2018, the MSG Health Screening Program was once again very well received among participants and community members. Overall, MSG screened and treated 6,911 program and non-program participants. The screenings took place over 19 days between March 16, 2018 and April 27, 2018. On average, MSG screened and treated 364 people per day with a range of 144 to 559 participants per day. Of those tested, 49% were male, and 51% were female.

For the 2018 health screening campaign, MSG used the same health screening questionnaire that was used in 2016 and 2017 to ensure rates could be compared longitudinally. It was found that 54% of the 2018 health screening participants tested positive for one or more water-related diseases (amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, and malaria). Compared to the 2015 health screening results, this is a 1% decrease in overall disease rates, but an increase in overall disease rates between 2017 and 2018. This is to be expected, as MSG expanded the Health Screening Campaign into new communities and schools that had not yet received any MSG education or intervention (i.e. participants in these new areas had not received MSG's WASH lessons prior to being screened).

When looking at program participants' disease rates in comparison to those of non-program participants, the results continually indicated that those exposed to MSG's education typically had a lower disease prevalence rate. Participant status was categorized in five ways: current program participant (involved in an MSG program within the year), past program participant (involved in an MSG program a year or longer ago), family member (a current or past program participant's family member), staff (an MSG staff member), and non-program participant (= community member in pie chart).

Figure 4: 2018 Health Screening Disease Rates

2018 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria
Overall percentage of health screening participants who tested positive	9%	41%	26%	17%	28%
Percentage of current program participants who tested positive	4%	9%	7%	6%	14%
Percentage of past program participants who tested positive	4%	10%	5%	8%	14%
Percentage of family members of program participants who tested positive	8%	15%	13%	6%	14%
Percentage of staff members who tested positive	5%	14%	14%	6%	6%
Percentage of non-program participants who tested positive	13%	72%	44%	26%	42%

2019 Health Screening Results

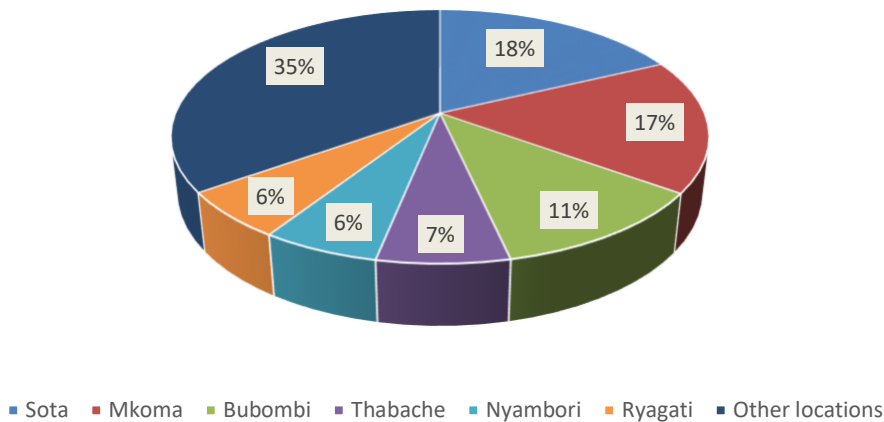
2019 Demographics

In 2019, the MSG Health Screening Program was once again very well received among participants and community members. Overall, MSG screened and treated 8,299 program and non-program participants. The screenings took place over 18 days between April 11, 2019 and May 22, 2019. On average, MSG screened and treated 461 people per day.

50% of 2019 health screening participants were male and 50% were female. The youngest person tested was two and half years old, and the oldest person tested was 95 years old. The screenings took place in several different locations: the MSG office, Tina's Pre and Primary School, Masonga Maalum, Sota Primary School, Majengo Primary School, Nyamagongo Primary School, Downhill Primary School, Shirati Primary School, Leaders Academy, Nyambori Primary School, Katuru Secondary School, Raranya Secondary School, Tai Secondary School, Bukura Secondary School, Masonga Secondary School, and the Ryagati, Nyambori, and Thabache communities. The majority of those screened came from the village of Sota (18%), Mkoma (17%), Bubombi (12%), Thabache (7%), Nyambori and Ryagati (6%), Masonga, Bwiri, Manyanyi, and Kyariko (5%), Raranya and Nyamagongo (4%), Nyahera and Kirongwe (2%), and other locations in the Mara Region (35%) as indicated in Figure 5.

Figure 5: 2019 Percentage Breakdown of Health Screening Program Participants' Home Locations

Percentage of Health Screening Program Participants' Home Locations



Overall 2019 Results

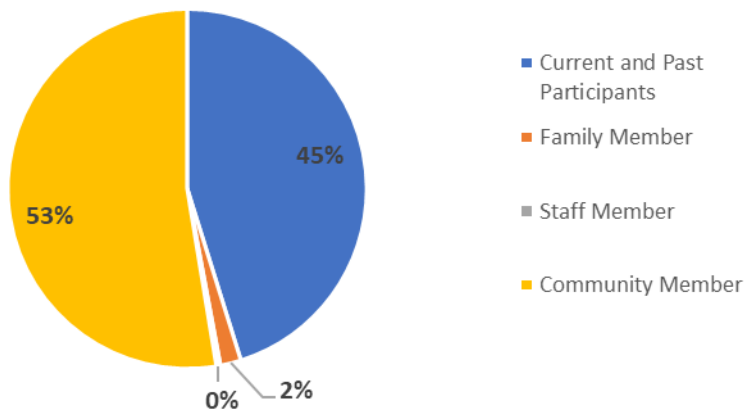
For the 2019 health screening campaign, MSG used the same health screening questionnaire that was used in 2016, 2017, and 2018 to ensure data could be compared longitudinally. It was found that 42% of the 2019 health screening participants tested positive for one or more water-related diseases (amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, malaria, or ringworm). These results indicate a decline in overall disease rates for all five years of the health screening program 55%, 56%, 51%, and 54% in 2015, 2016, 2017, and 2018, respectively. When looking at program participants' disease rates in comparison to those of non-program participants, the results continually indicate that those exposed to MSG's education on average have lower disease prevalence rates. Participant status was categorized in five ways: current program participant (involved in an MSG program within the year), past program participant (involved in an MSG program a year or longer ago), family member (a current or past program participant's family member), staff (MSG staff member), and non-program participant (labeled as community members in Figure 7). The breakdown of the health screenings participants' status is indicated in Figure 6 and Figure 7.

Figure 6: 2019 Health Screening Participant Status

Participant Status	Current and Past Participants	Family Member	Staff Member	Community Member	Overall Total
Number of Health Screening Participants	3,740	155	30	4,356	8,281

Figure 7: 2019 Percentage Breakdown of Type of Health Screening Participants

Number of Health Screening Participants



As indicated in Figure 8, there is a significant difference between disease rates among MSG program participants (current and past) and non-program participants. These percentages indicate that community members with no exposure to MSG programs or education have a higher percentage of amoebiasis (3%-8% higher), intestinal worms (31%-43% higher), schistosomiasis in stool (13%-19% higher), schistosomiasis in urine (15%-24% higher), malaria (20%-23% higher) and ringworm (1%-2% higher) than current and past MSG program participants respectively.

These results lead us to believe that those who participate in Maji Safi Group’s programs (currently or in the past) have a better understanding of WASH knowledge and can better prevent WASH-related diseases, such as amoebiasis, intestinal worms, schistosomiasis, malaria, and ringworm, than community members who have not had access to MSG education via programs.

The disease trends of those who have been exposed to MSG programs compared to those of non-program participants also hold for family members of MSG program participants and staff members. There are higher intestinal worm, schistosomiasis, and malaria rates among non-program participants than among family members of program participants and MSG staff. We believe that staff and family members have lower WASH-disease rates because they are exposed to MSG education. As Figure 8 indicates, exposure to MSG education has a significant impact on disease rates.

Figure 8: 2019 Health Screening Disease Rates

2019 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria	Ringworm
Overall percentage of health screening participants who tested positive	9%	31%	15%	18%	29%	3%
Percentage of current participants who tested positive	10%	19%	10%	14%	20%	3%
Percentage of past participants who tested positive	5%	7%	4%	5%	17%	2%
Percentage of family members of program participants who tested positive	16%	22%	10%	13%	19%	7%
Percentage of staff members who tested positive	13%	13%	13%	3%	4%	0%
Percentage of community members who tested positive	13%	50%	23%	29%	40%	4%

We also assessed if the frequency of MSG lessons had an impact on disease rates. Therefore, we asked health screening participants how many times they had participated in an MSG WASH lesson. Categories to choose from included: never (they had never had a direct WASH lesson from MSG), 1-3 times (they had had 1-3 WASH lessons from MSG), four times (they had had four WASH lessons from MSG) and 5+ (they had had five or more WASH lessons from MSG). We chose these frequencies because in many programs we aim to give at least four lessons (i.e. Home Visit, Female Hygiene, Male Hygiene, Singing and Dance, Maji Safi Cup, and After School). Figure 9 and Figure 10 show the breakdown and percentages of the health screening participants who had received MSG's education. The figures also show that only a small number of participants had received 4 lessons compared to the other categories. This discrepancy is a result of participants not remembering the exact number of lessons that they had received, making them less likely to indicate having received 4 lessons. Figure 11 indicates that never having had an MSG lesson contributes to the highest disease rates.

Figure 9: 2019 Number of MSG Lessons Received by Health Screening Participants

Number of Lessons Received	No Lessons	1-3 Lessons	4 Lessons	5+ Lessons	Total
Number of Health Screening Participants	5017	2114	94	1074	8299

Figure 10: 2019 Percentage of MSG Lessons Received by Health Screening Participants

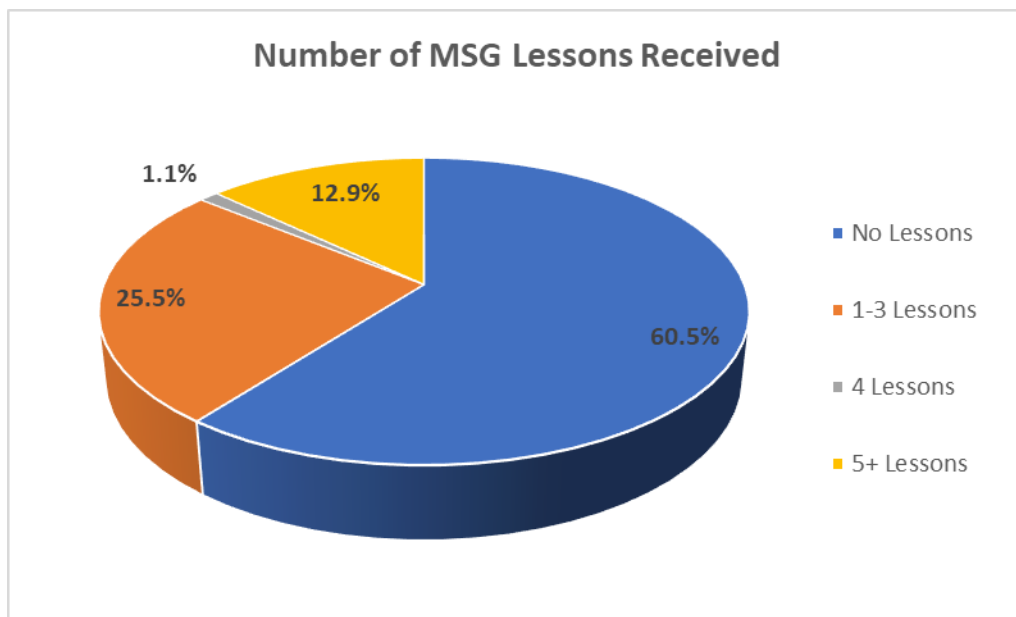


Figure 11: 2019 Health Screening Disease Rates as They Relate to Level of MSG Participation

2019 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria	Ringworm
Overall percentage of health screening participants who tested positive	9%	31%	15%	18%	29%	3%
Percentage of health screening participants who received no MSG lessons and tested positive	10%	30%	14%	17%	29%	3%
Percentage of health screening participants who had received 1-3 MSG lessons and tested positive	9%	33%	15%	19%	30%	3%
Percentage of health screening participants who had received 4 MSG lessons and tested positive	16%	32%	23%	16%	23%	4%
Percentage of health screening participants who had received 5+ MSG lessons and tested positive	9%	29%	14%	17%	31%	2%

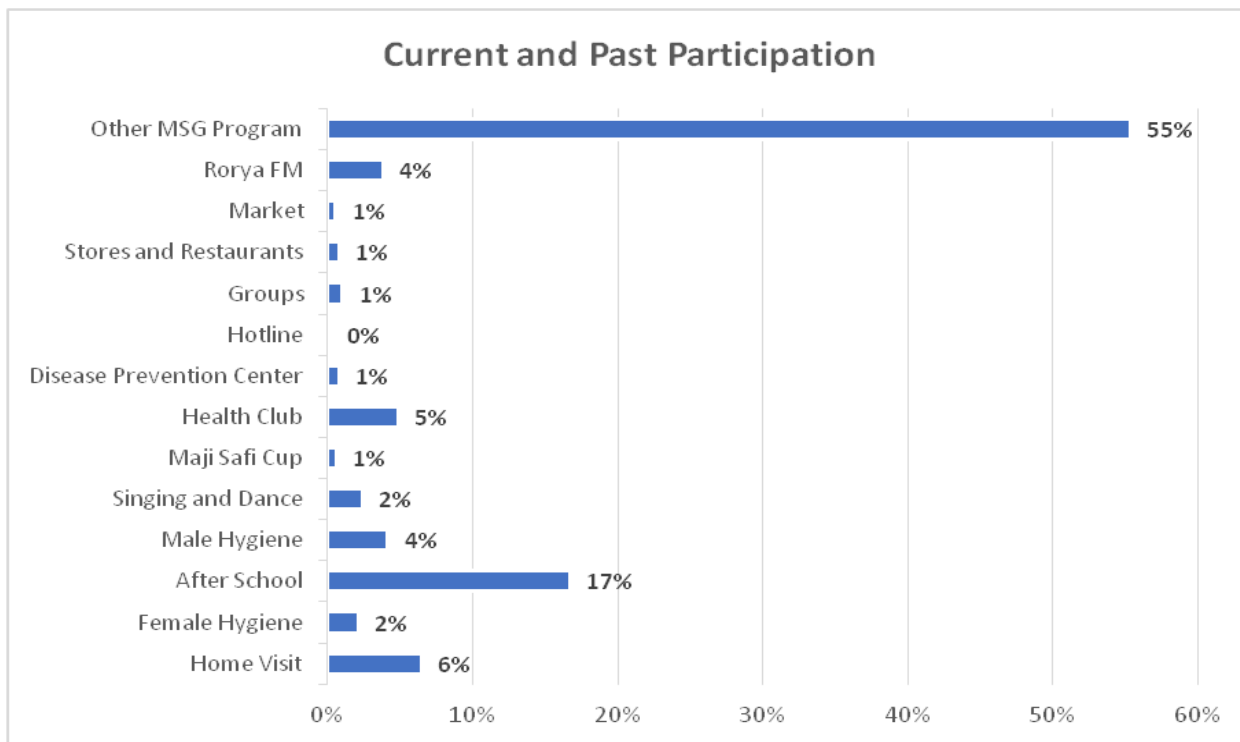
Maji Safi Group Program Disease Rates

In 2019, MSG tested 3,740 current and past program participants, who made up 45% of all those tested. MSG programs in which participants engaged included After School, Female Hygiene, Male Hygiene, Singing and Dance, Home Visit, Maji Safi Cup, Disease Prevention Center, Hotline, Outreach with groups, Outreach with stores and salons, Market outreach, Radio show, School Health Clubs, and Other, such as Emergency Outreach or Health Screenings. The 3,740 participants were currently in more than one MSG program or had participated in a program in the past and were currently participating in another program. As indicated in Figure 12 and Figure 13, the majority of program participants (past and current) came from Outreach Programs, including Groups, Stores and Salons, Market, Rorya FM and Other MSG Programs (55%), After School (17%), Home Visit (6%), Health Club (5%), Male Hygiene (4%), then Female Hygiene and Singing and Dance (2%), followed by Maji Safi Cup and Disease Prevention Center (1%), and Hotline (0%).

Figure 12: 2019 Number of Current and Past MSG Program Participants

Program	Number of Current and Past Participation	Percentage
Home Visit	269	6%
Female Hygiene	88	2%
After School	696	17%
Male Hygiene	173	4%
Singing and Dance	99	2%
Maji Safi Cup	26	1%
Health Club	203	5%
Disease Prevention Center	33	1%
Hotline	9	0%
Vikundi (Groups)	43	1%
Stores and Restaurants	34	1%
Market	23	1%
Rorya FM	159	4%
Other MSG Programs	2300	55%
Total	4,155	100%

Figure 13: 2019 Percentage of MSG Program Participation



According to Figure 14, nearly all MSG program participants had lower WASH disease prevalence rates than community members who had not had any exposure to MSG programs: amoebiasis (no infections - 13% lower), intestinal worms (36% - 50% lower), schistosomiasis in stool (10% - 23% lower), schistosomiasis in urine (23% - 29% lower), malaria (15% - 40% lower) and ringworm (no infections - 4% lower). Disease rates among program participants also varied. It should be noted that while the first column of Figure 13 indicates the number of non-program participants and individuals from each program that participated in the 2019 Health Screening Campaign, not all of these individuals were able to produce a urine, stool, or blood sample during the screening. Thus, the percentages in Figure 14 only include individuals who were able to produce the required sample for the test.

Figure 14: 2019 Disease Rates among MSG Program Participants

Health Screening Rates	Number screened	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	Malaria	Ringworm
Overall percentage of health screening participants who tested positive	8,299	9%	31%	15%	18%	29%	3%
Home Visit	269	5%	9%	3%	6%	15%	0%
Female Hygiene	88	2%	0%	2%	2%	19%	1%
After School	696	5%	2%	4%	2%	16%	2%
Male Hygiene	173	2%	3%	1%	2%	11%	0%
Singing and Dance	99	4%	4%	3%	6%	5%	2%
Maji Safi Cup	26	0%	0%	8%	4%	25%	0%
Disease Prevention Centers	33	4%	4%	4%	3%	19%	0%
Hotline	9	13%	14%	0%	0%	11%	0%
Groups	43	4%	7%	4%	5%	16%	2%
Store and Restaurant Outreach	34	0%	8%	4%	3%	7%	0%
Market Outreach	23	0%	0%	13%	0%	0%	4%
Radio Show	159	7%	9%	5%	4%	18%	1%
Health Club	203	5%	2%	3%	2%	13%	2%
Other MSG Programs (health screenings, events, emergency outreach, etc.)	2,300	5%	8%	4%	6%	18%	2%
Non-Program Participants: Community Members	4,356	13%	50%	23%	29%	40%	4%

School Results

MSG was able to collaborate with 15 schools during the 2019 Health Screening Program. Figure 15 through Figure 17 show the number and percentage of students screened by school and class. Screening and treatment took place at five secondary schools and 10 primary schools. Some of these schools had previously participated in our Health Screening Campaign, but this was the first year for MSG to screen and treat at Downhill Primary School, Leaders Academy, Nyambori Primary School, and Masonga Secondary School.

Figure 15: 2019 Health Screening Participation at Schools

School Name	Number of Health Screening Participants	Percentage of School Participants in Overall Health Screening Campaign
Tina's Educational Center	301	3.6%
Masonga Maalum	12	0.1%
Sota Primary	344	4.1%
Majengo Primary	304	3.7%
Nyamagongo Primary	160	1.9%
Downhill Primary	179	2.2%
Shirati Primary	239	2.9%
Leaders Academy	167	2.0%
Nyambori Primary	75	0.9%
Katuru Secondary	481	5.8%
Raranya Secondary	431	5.2%
Tai Secondary	757	9.1%
Bukura Secondary	439	5.3%
Masonga Secondary	372	4.5%
Thabache Primary	272	3.3%
Non-School Participants	3,766	45.4%
Total	8,299	100%

Figure 17: 2019 Chart of School Breakdown of Students and Adults

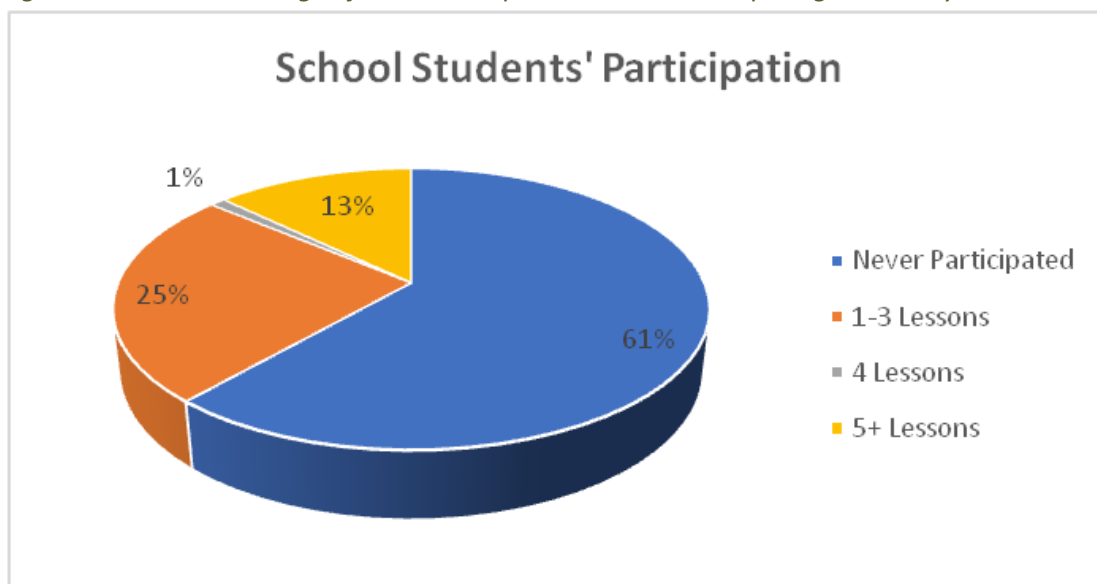
School Name	Pre-K	Class 1	Class 2	Class 3	Class 4	Class 5	Class 6	Class 7	Form 1	Form 2	Form 3	Form 4	Teacher	Parent	Overall Number Screened
Tina's Educational Center	27	27	25	37	29	59	46	46	0	0	0	0	3	2	301
Masonga Maalum	5	1	0	3	3	0	0	0	0	0	0	0	0	0	12
Sota Primary	30	40	29	49	43	40	55	56	0	0	0	0	1	1	344
Majango Primary	4	28	44	40	46	37	43	62	0	0	0	0	0	0	304
Nyamagon-go Primary	0	0	0	0	0	55	42	61	0	0	0	0	2	0	160
Downhill Primary	32	18	24	13	22	35	17	14	0	0	0	0	3	1	179
Shirati Primary	0	0	0	0	4	87	51	96	0	0	0	0	0	1	239
Leaders Academy	8	45	45	37	28	0	0	0	0	0	0	0	4	0	167
Nyambori Primary	2	7	6	6	18	3	7	25	0	0	0	0	1	0	75
Katuru Secondary	0	0	0	0	0	0	0	0	159	134	108	79	1	0	481
Raranya Secondary	0	0	0	0	0	0	0	0	103	132	95	101	0	0	431
Tai Secondary	0	0	0	0	0	0	0	0	290	201	175	89	1	1	757
Bukura Secondary	0	1	0	0	0	0	0	0	163	132	83	52	8	0	439
Masonga Secondary	0	0	0	0	0	0	0	0	108	78	98	79	9	0	372
Thabache Primary	48	44	23	46	48	29	14	18	0	0	0	0	0	2	272
Total	156	211	196	231	241	345	275	378	823	677	559	400	33	8	4,533

When looking at the data from the MSG program participants, we also looked at MSG participation levels, broken up into four levels: non-program participants, have completed 1-3 lessons with MSG, have completed 4 lessons with MSG, and have completed 5 or more lessons with MSG. MSG has assigned class grades to teach during the After School, Male Hygiene, and Female Hygiene Programs; therefore, there are some class levels that have not received MSG education. Of those who were screened at a school, 61% (2,786 participants) participated in an MSG Program either as a past or current participant, and 39% (1,747 participants) have yet to receive MSG WASH education. Figure 18 and Figure 19 show a breakdown of the different schools, classes, and overall MSG participation level.

Figure 18: 2019 MSG Participant Status per School

School Name	# Never participated	# Participated in 1-3 lessons	# Participated in 4 lessons	# Participated in 5+ lessons
Tina's Educational Center	136	79	8	78
Masonga Maalum	4	3	0	5
Sota Primary	233	75	2	34
Majango Primary	209	69	1	25
Nyamagongo Primary	120	21	2	17
Downhill Primary	127	40	0	12
Shirati Primary	112	104	0	23
Leaders Academy	78	68	1	20
Nyambori Primary	43	15	1	16
Katuru Secondary	329	93	7	52
Raranya Secondary	226	143	7	55
Tai Secondary	517	158	9	73
Bukura Secondary	272	85	4	78
Masonga Secondary	203	103	1	65
Thabache Primary	177	64	2	29
Total	2,786	1,120	45	582

Figure 19: 2019 Percentage of MSG Participant Status in Participating Secondary Schools



School Demographics

The 2019 Health Screening Program also looked at the age and gender demographics of the school students MSG worked with. The results in Figure 20 show the gender breakdown from school to school, including that most schools had a higher percentage of males than females. These rates represent the gender differences typically found in rural schools in Tanzania.

Figure 20: 2019 School Participants' Average Age and Gender

School Name	Average Age	Percentage of Males	Percentage of Females
Tina's Educational Center	12	45%	55%
Masonga Maalum	10	17%	83%
Sota Primary	11	51%	49%
Majango Primary	11	54%	46%
Nyamagongo Primary	14	54%	46%
Downhill Primary	11	55%	45%
Shirati Primary	13	40%	60%
Leaders Academy	9	56%	44%
Nyambori Primary	12	51%	49%
Katuru Secondary	16	53%	47%
Raranya Secondary	17	61%	39%
Tai Secondary	16	53%	47%
Bukura Secondary	17	58%	42%
Masonga Secondary	17	59%	41%
Thabache Primary	10	47%	53%

School Disease Rate Analysis

During this Health Screening Campaign, the program participants were screened and tested for amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, malaria, and ringworm. Figure 21 shows an analysis of the program participants' water-related disease rates.

Figure 21: 2019 Disease Rates per School

School Name	Percentage tested positive for Amoebiasis	Percentage tested positive for Intestinal Worms	Percentage tested positive for Schistosomiasis in Stool	Percentage tested positive for Schistosomiasis in Urine	Percentage tested positive for Malaria	Percentage tested positive for Ringworm
All Health Screening Participants	9%	31%	15%	18%	29%	3%
Tina's Educational Center	4%	2%	2%	2%	0%	6%
Masonga Maalum	0%	0%	0%	0%	N/A	17%
Sota Primary	8%	2%	4%	0%	26%	8%
Majango Primary	7%	9%	13%	5%	18%	3%
Nyamagongo Primary	7%	35%	9%	17%	58%	1%
Downhill Primary	15%	36%	24%	6%	23%	8%
Shirati Primary	3%	12%	10%	7%	18%	2%
Leaders Academy	3%	4%	1%	1%	N/A	10%
Nyambori Primary	10%	46%	19%	21%	70%	9%
Katuru Secondary	1%	16%	3%	6%	22%	0%
Raranya Secondary	5%	5%	2%	4%	0%	0%
Tai Secondary	5%	5%	4%	4%	24%	1%
Bukura Secondary	7%	23%	9%	16%	24%	0%
Masonga Secondary	2%	30%	20%	15%	16%	0%
Thabache Primary	10%	53%	21%	33%	66%	2%

**Note: Please note that all percentages were based on only those who produced a stool and/or urine sample. N/A means tests were not conducted at this specific school.*

Figure 21 illustrates disease prevalence rates within each school. We found that Downhill Primary students have the highest amoebiasis rates (15%) and schistosomiasis in stool rates (24%). Nyambori Primary students have the highest intestinal worm rates (46%), schistosomiasis in urine rates (21%) and malaria rates (70%). Masonga Maalum students have the highest ringworm rates (17%). Schools that have partnered with MSG in our school programs the longest, and thus have received most WASH education, tend to have healthier students (Tina's Educational Center, Sota Primary, Katuru Secondary). This can be attributed to the continued increase in knowledge provided by MSG regarding disease prevention of water-related infections. Overall, these statistics indicate that participants are generally healthier if they are being exposed or have been exposed to Maji Safi Group's WASH education.

Likewise, schools that have not yet partnered with MSG in our school programs have some of the highest disease rates, such as Downhill Primary School and Nyambori Primary School. After the 2019 Health Screening Program was

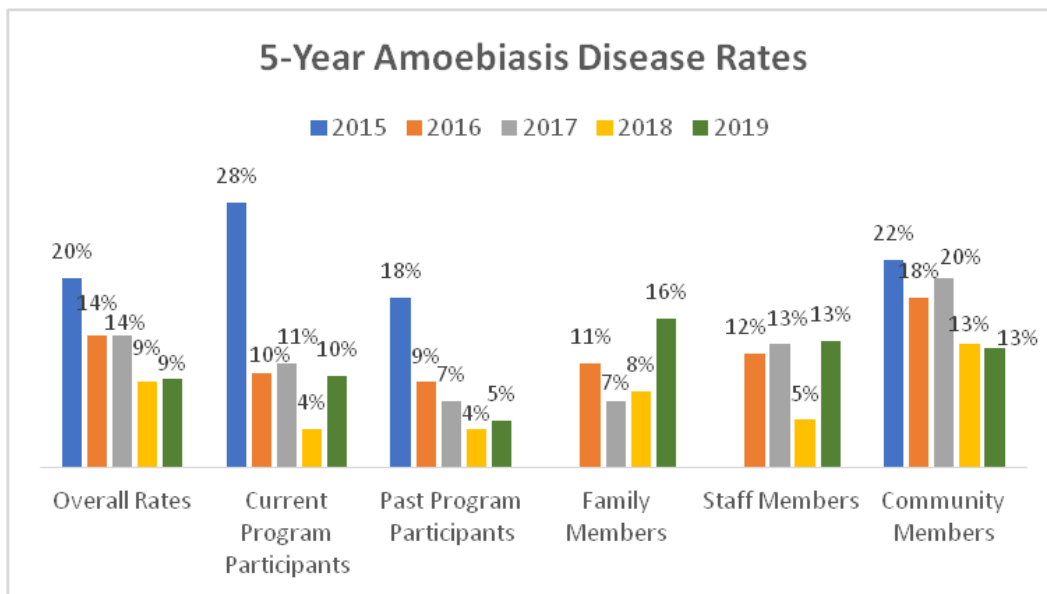
implemented, Downhill Primary School and Nyambori Primary School partnered with MSG in our school program through the establishment of an MSG School Health Club. This club will continue teaching WASH and female and male hygiene lessons throughout the next school year. We anticipate lower disease prevalence rates at these two schools in the 2020 Health Screening Program, as students will have had a full year to be educated on WASH disease prevention.

Discussion

During the 2019 Health Screening Program, Maji Safi Group (MSG) collected extensive information about disease rates in the Rorya District. These rates represent the fifth year in our longitudinal study and are important to assessing the overall impact MSG’s lessons are having on WASH behaviors in the community.

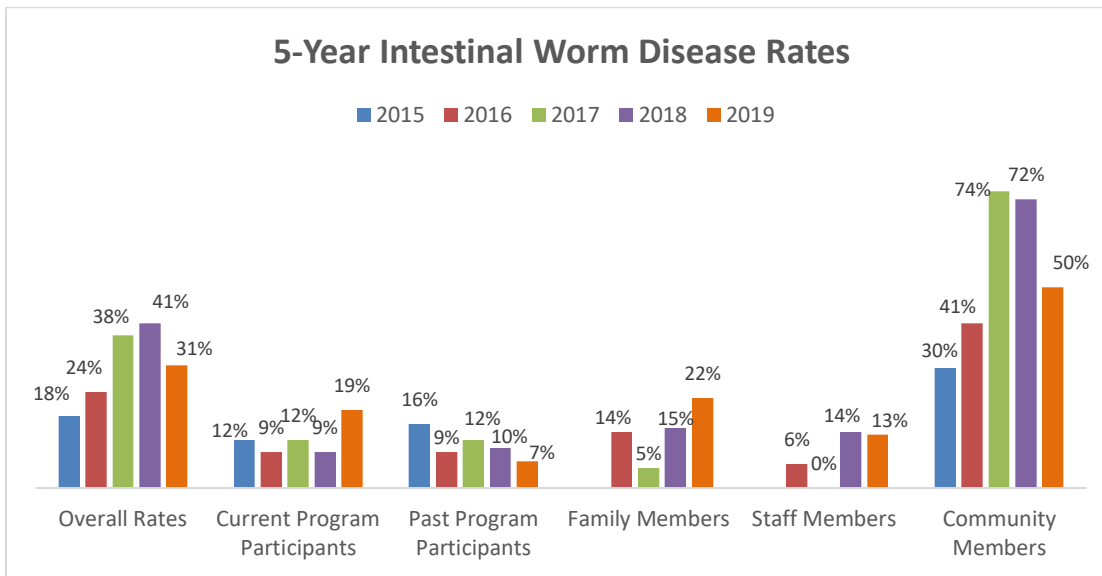
Over five years, our results have remained consistent: People who have been exposed to MSG’s WASH education are healthier than those who have not received such education. Prevention is proving to save MSG program participants from continuously contracting WASH-related diseases. Our Health Screening results continue to indicate that those related to and/or interacting with program participants, whether through a family member or an entire school, benefit from the health education their connection is learning. Both family members and students from schools that have partnered with MSG for a long time had lower WASH disease rates than community members who had not yet received WASH education from MSG. Figures 21-25 demonstrate how disease rates have varied over the years. The common trend we are seeing is that each consecutive year, current and past program participants have lower disease rates than non-program participants (except for amoebiasis in 2015 and schistosomiasis in stool in 2015). Additionally, current and past program participants have generally continued to have lower disease prevalence rates since 2015. This data maintains that MSG’s WASH-related disease prevention education is effective in positively impacting and affecting the trajectory of people’s health status.

Figure 22: 5-Year Amoebiasis Disease Rates



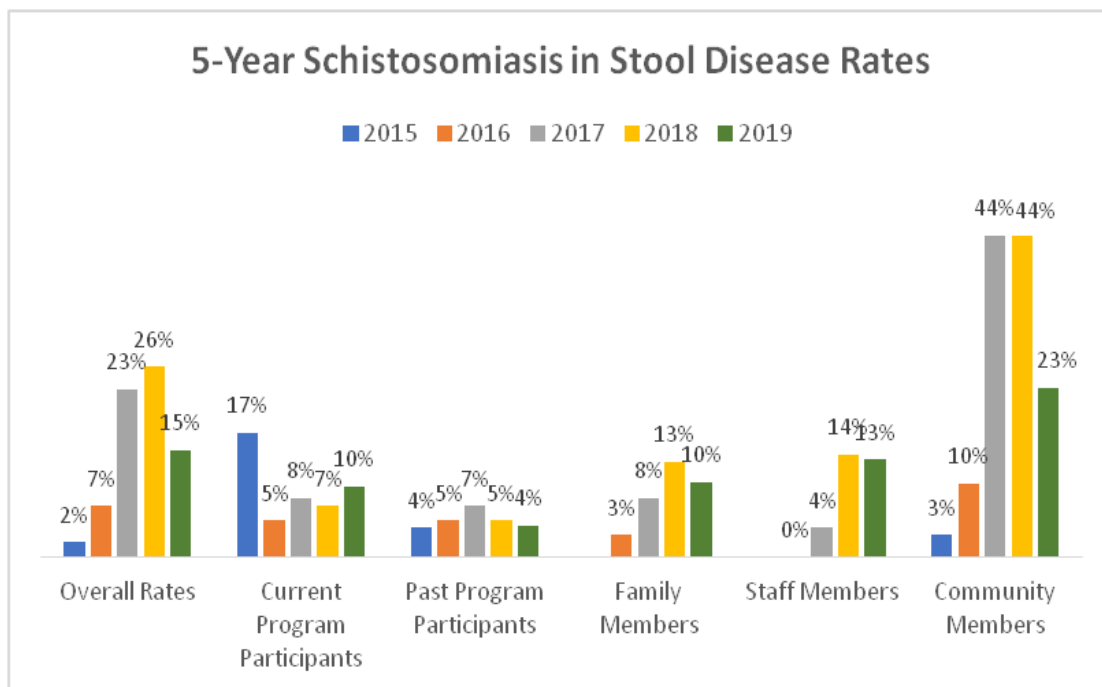
*Note: Family members and staff members were not tested in 2015. (Community Members = Non-program participants).

Figure 23: 5-Year Intestinal Worm Disease Rates



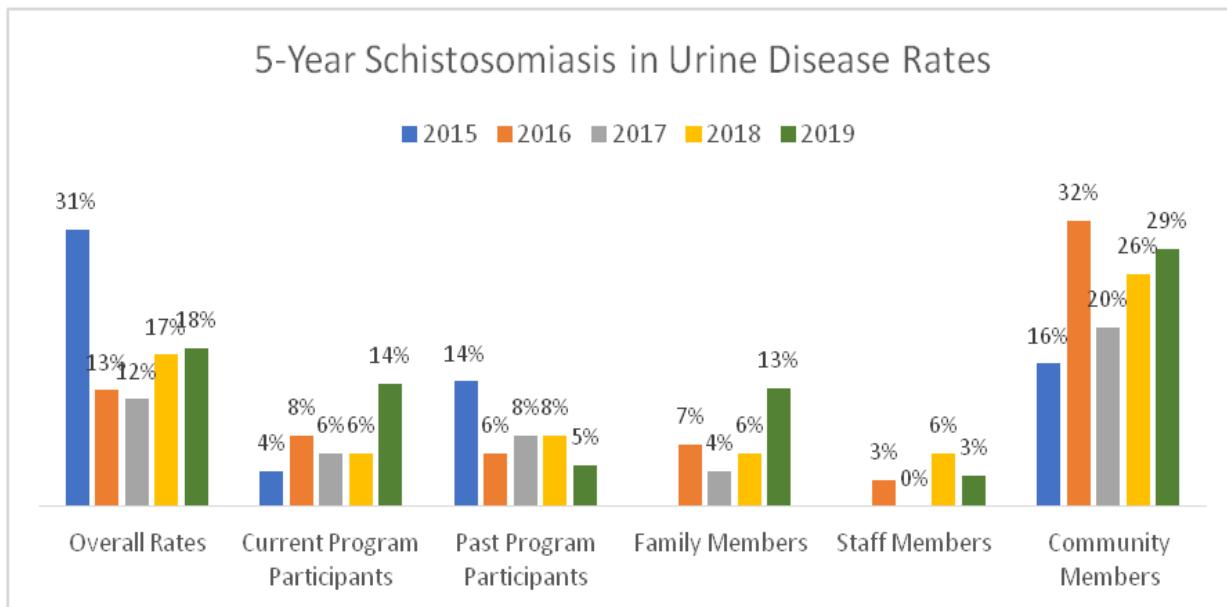
*Note: Family members and staff members were not tested in 2015. (Community Members = Non-program participants).

Figure 24: 5-Year Schistosomiasis in Stool Disease Rates



*Note: Family members and staff members were not tested in 2015. (Community Members = Non-program participants).

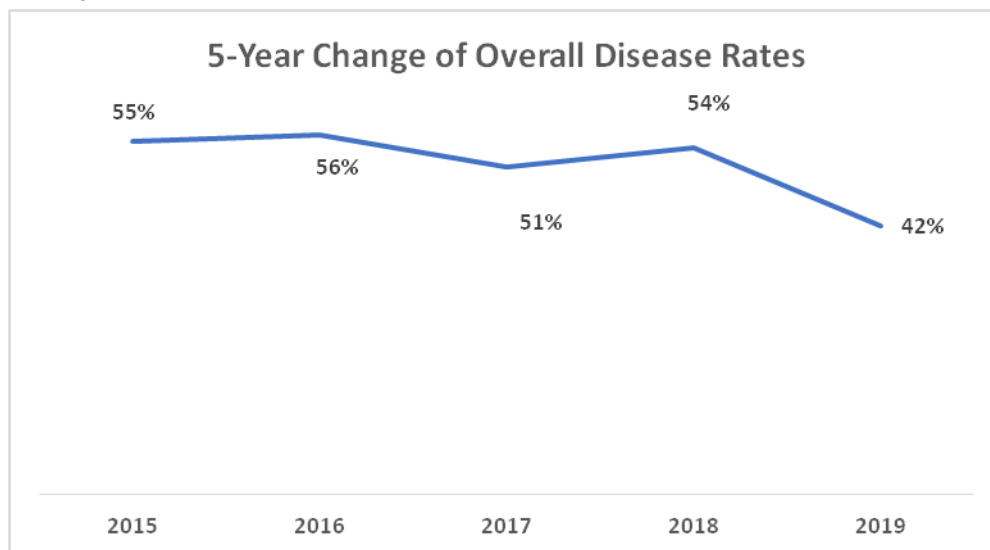
Figure 25: 4-Year Schistosomiasis in Urine Disease Rates



*Note: Family members and staff members were not tested in 2015. (Community Members = Non-program participants).

When looking at the five-year change in overall disease rates (i.e. calculating the percentage of those screened who have one or more diseases), there is a significant decrease in overall disease rates between 2018 and 2019. This was to be expected as most of the health screenings were conducted in communities and schools that are being or have been exposed to MSG’s WASH education and interventions. Only a few new communities and schools were introduced in the Health Screening Program. This is evidence that MSG’s work is contributing to improving the health of local communities in the Rorya District. The data also supports MSG’s theory of change that educating communities to teach each other and impact their families and other non-program participants to improve WASH knowledge and habits at a community level is effective. The overall disease rates from 2015-2019 are indicated in Figure 26.

Figure 26: 5-Year Trend of Overall Disease Rates



Recommendations for the Future

The 2019 Health Screening Campaign was highly successful, but there is always room for improvement. MSG recommends the following for the 2020 Health Screening Campaign:

- Update health screening questionnaire.
- Continue to collaborate with the local and district government regarding health screening dates and support to implement the program.
- Rescreen the communities and schools that were screened for the first time in 2019 to compare participants' disease prevalence rates before and after receiving MSG WASH-related disease prevention education.

Conclusion

Health screening results measure the WASH-disease prevalence rates of people who have received MSG's WASH education and participated in programs and compare them to disease prevalence rates of new MSG program participants and potential program participants who have never participated in MSG's education initiatives. The results continuously prove that there is a lower prevalence of disease rates among program participants who have completed MSG's WASH lessons. In 2019, in collaboration with the local and district governments, MSG was able to screen 8,299 people. Results indicated that MSG significantly improves the lives of program participants and community members who are exposed to MSG education. It is our hope to continue our collaboration with the local and district governments in 2020 to further evaluate MSG programs and improve the lives of community members. Together, we can provide a clean bill of health coupled with community-driven education, which is a sustainable intervention model for decreasing WASH-related diseases in rural areas of Tanzania.