Maji Safi Group
2017 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 Shirati, Tanzania. MSG's model for promoting community-driven water, sanitation and hygiene (WASH) education and disease prevention focuses on behavioral change; however, measuring such changes in the community is a challenge. In 2017, Maji Safi Group (MSG) conducted its third annual health screening campaign to test and treat MSG's current and potential program participants for schistosomiasis, amoebiasis, intestinal worms, urinary tract infections (UTIs) and in some cases malaria. The purpose of the project was to alleviate the burden of the illnesses, 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 11,291 Rorya District community members.

This year, MSG tested 3,071 people comprised of community members with no MSG education and residents who were current or past program participants. For the third year in a row, disease rates showed that MSG program participants who have been exposed to MSG's education have lower disease rates for schistosomiasis, amoebiasis, and intestinal worms than non-program participants with no exposure to MSG programs. Additionally, overall disease rates continue to decrease in the community, indicating that the community is getting healthier.

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 insect 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, and lastly, "water-related insect vectors" are through 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, urinary tract infections (UTIs) and intestinal worms. MSG also administered 300 government-donated malaria tests.

Schistosomiasis

Schistosomiasis is a water-based parasitic disease that is transmitted through skin contact with freshwater snails that hold the eggs of the Schistosoma worm (Madinga, Linsuke, Mpabanzi, Meurs, Kanobana, Speybroeck, Lutumba, & Polman, 2015). This Neglected Topical Disease (NTD) is common in tropical and sub-tropical regions that have a high predominance of 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). There are five types of schistosomiasis (CDC, 2012), but two that are most common: S. mansoni and S. haematobium (Madinga et al., 2015). S. mansoni eggs are excreted and diagnosed by examining fecal samples, while S. haematobium eggs are excreted and diagnosed through urine samples (CDC, 2012). Schistosomiasis can cause acute symptoms in an infected individual, which include 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 spreads through ingesting fecal matter in food or water or from person-to-person ("Amoebiasis", 2015). For many individuals with amoebiasis, their bodies can resolve the illness without the individual experiencing any symptoms of the disease (Stanley, 2003). However, 10%-20% of infected individuals ("General Information", 2015) develop symptoms, which may include watery or bloody diarrhea or tenderness and pain in their abdomen (Stanley, 2003). For more severe cases, amoebiasis may cause an amoebic liver abscess, which could rupture through the diaphragm causing respiratory distress, as well as produce urinary tract problems, genital diseases, or even amoebic brain abscesses (Stanley, 2003).

Urinary Tract Infections (UTIs)

Although urinary tract infections (UTIs) are not a water-related illness, they are one of the most common types of infections within the body (Mayo Clinic Staff, 2015) and appear in alarmingly high rates in underdeveloped countries where poor water and sanitation access is predominant (Mwaka, Mayanja-Kizza, Kigonya, & Kaddu-Mulindwa, 2011). UTIs are caused by a "microbial colonization" within the urinary system and can be both complicated and uncomplicated in nature (Mwaka et al., 2011, pp. 182). Complicated UTIs are caused when a "host illness" exists that enables the spread of the UTI to the individual, while an uncomplicated UTI is contracted without any underlying issues within the urinary tract (Mwaka et al., 2011, pp. 182). While some people remain asymptomatic, other people experience pain or a burning sensation when urinating, fever, and lower back pain or abdominal pressure (NIH, 2015). If UTIs are left untreated, they can cause permanent kidney damage or scarring as well as sepsis in a patient (Mayo Clinic Staff, 2015). Furthermore, UTIs can pose a dire threat for pregnant women. UTIs during pregnancy have been associated with an increased risk of "intrauterine growth restriction, pre-eclampsia, caesarean delivery and preterm deliveries" and can even result in child or maternal mortality (Hamdan, Ziad, Ali, & Adam, 2011, p. 2).

Intestinal Worms

Intestinal worms or parasites, like amoebiasis, 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 or death (Oliveira et al., 2015).

Malaria

Malaria is a water-related disease spread through insect vectors and 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% on the continent of Africa, 90% of malaria-related deaths in children under five are in sub-Saharan Africa (White et al., 2014). The species of mosquitos that transmit malaria are hardy 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). Severe symptoms may include severe anemia, impairment of consciousness, seizures, and abnormal blood coagulation, which, if left untreated, all contribute to the high rates of mortality ("Disease", 2015). The development of Malaria Rapid Strip Tests has been a more cost-effective tool in diagnosing infected individuals than standard methods (White et al., 2014).

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 = 264,000 Residents Musoma Rural = 178,000 Residents Musoma Town = 134,000 Residents
Year established	2012
Organization type	Nonprofit LLC
"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 (2012-2017)	634,972 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 almost 635,000 Mara Region residents WASH lessons 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 with or 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 and 2017, MSG partnered with the Rorya District Government through the offices of the District Medical Officer (DMO), District Health Officer (DHO) and District Education Officers (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: malaria, schistosomiasis, amoebiasis, intestinal worms, and urinary tract infections (UTIs). 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 and community members. Although we do not follow the same schools, participants and community members each year, we do aim to reach the same type of program participants and community members by visiting schools that have partnered with MSG in similar time frames and communities living in similar conditions. However, our results are not without bias, and there will be a degree of error in our results due to the change in program participants from year to year. This is specifically evident when looking at the different schools we have screened over the years; some years have focused on primary schools, others on secondary schools.

MSG's 5-Year Impact (2012-2017)

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	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	9,150 Family Members
After School	3,808 Students	1,243 Students	931 Students	1,588 Students	2,575 Students	10,145 Students
Disease Prevention Center (DPC)	791 Visits to DPC	802 Visits to DPC	1,210 Visits to DPC	1,032 Visits to DPC	1,445 Visits to DPC	5,280 Visits to DPC
Singing and Dance Group (including performances)	756 Community Members	1,048 Community Members	1,746 Community Members	3,250 Community Members	7,858 Community Members	14,658 Community Members
Maji Safi Cup	2,032 Participants	1,697 Participants	4,170 Participants	6,936 Participants	8,054 Participants	22,889 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	32,232 Community Members
Female Hygiene	-	1,282 Participants	7,890 Participants	2,342 Participants	2,502 Participants	14,016 Participants
Hotline*	-	1,326 Participants	4,603 Participants	1,467 Participants	1,830 Participants	9,226 Participants
Radio Show Listeners	-	31,500 Listeners	49,000 Listeners	98,000 Listeners	231,000 Listeners	409,500 Listeners
Radio Show Callers				206 Direct Callers	254 Direct Callers	460 Direct Callers
Health Screenings	-	-	3,060 Screened	5,160 Screened	3,071 Screened	11,291 Screened
Cholera Outreach	-	-	53,237 Participants	41,593 Participants	-	94,830 Participants
Male Hygiene	-	-	-	348 Participants	772 Participants	1,120 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	225,472 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**	**634,972 Community Members**

Notes: *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 2017, MSG collaborated with the Rorya District Government offices, working directly with the District Development Office (DDO), District Education Office (DEO), District Medical Officer (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: 90 treatments of Artemether/lumefantrine for children to treat malaria, 110 treatments of Artemether/lumefantrine for adults to treat malaria, 750 malaria rapid tests, 1,000 tablets of Praziquantel to treat schistosomiasis, and 10,000 tablets of Septrin to treat UTIs. The DMO also approved MSG to work with government lab technicians, nurses and clinicians.

2015 and 2016 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 participants were sick – 81 percent of those screened tested positive for one or more water-related diseases. 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 participants with an understanding of their WASH health situation, treatment if needed, 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.

Figure 1: 2015 Health Screening Disease rates

2015 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	UTIs
Overall percentage of health screening participants who tested positive	20%	18%	2%	31%	70%
New MSG Program participants who tested positive	28%	12%	17%	4%	66%
MSG Program participants	18%	16%	4%	14%	16%
Non-MSG Program participants	22%	30%	3%	16%	30%

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 community members, students and fishermen as a means of evaluating the effectiveness of our programs and the overall health situation in the Rorya District. Again, MSG screened for malaria, schistosomiasis, amoebiasis, intestinal worms and urinary tract infections (UTIs). Overall, disease rates showed that MSG program participants who have been exposed to MSG education typically have a lower WASH-related disease prevalence rate (i.e. schistosomiasis, amoebiasis, and intestinal worms) than non-program participants with no exposure to MSG programs. Data also suggested that MSG should reevaluate its education about UTIs and add malaria lessons to its education. Figure 2 indicates the disease rates for each water-related disease we tested for.

Figure 2: 2016 Health Screening Disease Rates

2016 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	UTIs	Malaria
Overall percentage of health screening participants who tested positive	14%	24%	7%	13%	51%	22%
Percentage of current participants who tested positive	10%	9%	5%	8%	53%	23%
Percentage of past participants who tested positive	9%	9%	5%	6%	49%	16%
Percentage of family members of program participants who tested positive	11%	14%	3%	7%	53%	21%
Percentage of staff members who tested positive	12%	6%	0%	3%	53%	11%
Percentage of community members who tested positive	18%	41%	10%	21%	49%	23%

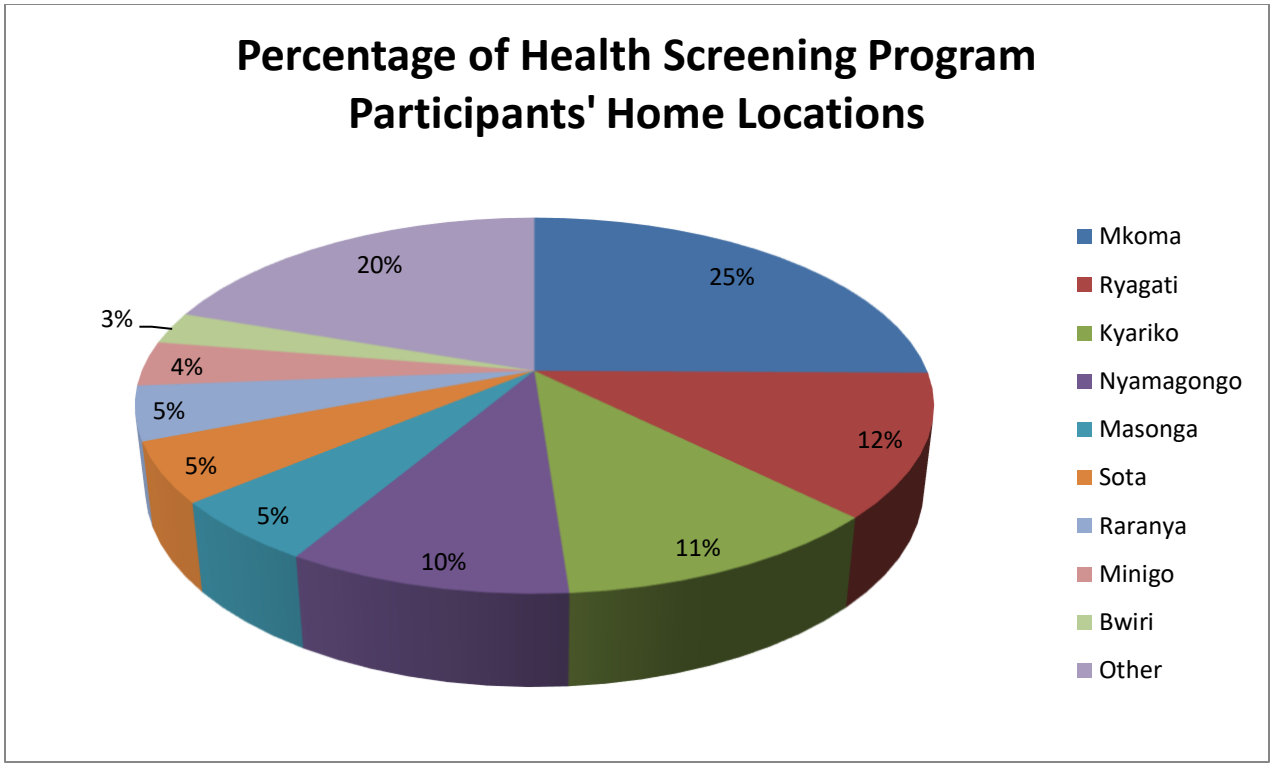
2017 Health Screening Results

2017 Demographics

In 2017, the MSG Health Screening Program was once again very well received among participants and community members. Overall, MSG screened and treated 3,071 program participants and community members. 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 youngest person tested was two months old, and the oldest person tested was 90 years old. The average age was 21. The screenings took place in several different locations: the MSG office, Tai Secondary School, Katuru Secondary School, Sarungi Secondary School, Raranya Secondary School, the Masonga/Nyamagongo community and the Ryagati community. The majority of those screened came from the village of Mkoma (25%), followed by Other (20%) which consists of 61 locations combined, then Ryagati (12%), Kyariko (11%), Nyamagongo (10%), Masonga (5%), Sota (5%), Raranya (5%), Minigo (4%), and Bwiri (3%), as indicated in Figure 3.

Figure 3: Percentage breakdown of Health Screening Program Participants' Home Locations



Overall 2017 Results

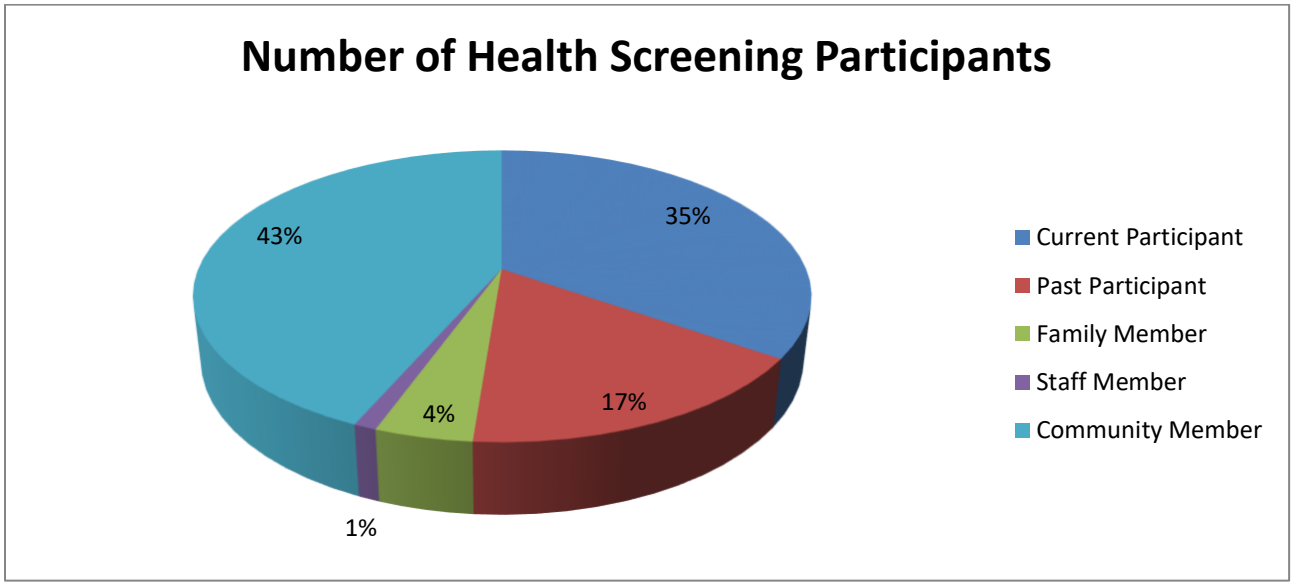
MSG used the same health screening questionnaire that was used in 2016 to ensure rates could be compared longitudinally. It was found that 79% of the 2017 health screening participants tested positive for one or more water-related diseases (amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, UTIs and malaria). Compared to the 2015 health screening results from the same area, this is a 2% decrease. However, when compared to the 2016 health screening results, this is a 2% increase of disease rates. This year, MSG found that there were higher than usual UTI rates. Therefore, the question was posed whether taking out UTIs affects the overall disease rates significantly or not. When excluding UTI disease rates from the overall analysis (including only amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, and malaria) it was found that 51% of health screening participants tested positive for one or more diseases. When comparing these rates to 2016 rates (excluding UTIs for both years), it was found that there was an overall 5% decrease in one or more WASH-diseases tested.

When looking at program participants' disease rates in comparison to non-program participants, the results continually indicated that those exposed to MSG's education typically have 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 community member (those who have had no exposure to MSG education). The breakdown of the health screenings participants' status is indicated in Figure 4 and Figure 5.

Figure 4: Health Screening Participant Status

Participant Status	Current Participant	Past Participant	Family Member	Staff Member	Community Member	Overall Total
Number of Health Screening Participants	1,063	508	133	31	1,331	**3,066**

Figure 5: Percentage Breakdown of type of Health Screening Participant



As indicated in Figure 6, there is a significant difference between disease rates among MSG program participants (current and past) and community members. The gap between non-program participants and program participants is larger than any other year. These percentages indicate that community members with no exposure to MSG programs or education have a higher percentage of amoebiasis (9%-13% higher), intestinal worms (62% higher), schistosomiasis in stool (36% -37% higher) and schistosomiasis in urine (12%-14% higher) than current and past MSG program participants. Community members had a higher percentage of positive malaria rates as well (2%). However, community members had a lower percentage rate of UTIs than MSG program participants (6% lower).

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, and schistosomiasis, than community members who have not had access to MSG education via programs. Additionally, while MSG does not put a major emphasis on teaching malaria prevention, disease rates still indicate that MSG program participants have a good understanding of prevention. However, the data also suggest that MSG should improve its UTI education as UTI prevalence rates were the same or higher for MSG program participants than for community members.

The disease rate trends of those who have been exposed to MSG programs compared to those of community members also hold for family members of MSG program participants and staff members. There are higher amoebiasis, intestinal worm and schistosomiasis rates among community members than among family members and staff. However, there is a lower UTI disease rate among community members than among family members and staff. Malaria rates indicate that family members have a 2% lower disease rate, and staff members have a 25% lower rate than community members. It is speculated that family members and staff have lower WASH-disease rates because they are exposed to MSG education.

Figure 6: 2017 Health Screening Disease Rates

2017 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	UTIs	Malaria*
Overall percentage of health screening participants who tested positive	14%	38%	23%	12%	62%	6%
Percentage of current participants who tested positive	11%	12%	8%	6%	65%	4%
Percentage of past participants who tested positive	7%	12%	7%	8%	58%	4%
Percentage of family members of program participants who tested positive	7%	5%	8%	4%	64%	2%
Percentage of staff members who tested positive	13%	0%	4%	0%	87%	7%
Percentage of community members who tested positive	20%	74%	44%	20%	59%	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.*

As Figure 6 indicates, exposure to MSG education has a significant impact on disease rates. We also wanted to see 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. The categories they could choose from were: never (they have never had a direct WASH lesson from a CHE), 1-3 times (they have had 1-3 WASH lessons from a CHE), four times (they have had four WASH lessons from a CHE) and 5^{+} (they have had five or more WASH lessons from a CHE). We chose these frequencies because we always aim to give at least four lessons in several of our programs (Home Visit, Female Hygiene, Male Hygiene, Singing and Dance, Maji Safi Cup, and After School). Figure 7 and Figure 8 show the number breakdown and percentages of the health screening participants who had received MSG's education. Figure 9 indicates that never having had an MSG lesson from a CHE contributes to the highest disease rates. This figure also shows that it is best to have four, five or more lessons from a CHE. Rates indicate that having at least four lessons lowers WASH disease rates among program participants.

Figure 7: 2017 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	1,462	489	137	978	**3,066**

Figure 8: 2017 Percentage of MSG Lessons Received by Health Screening Participants

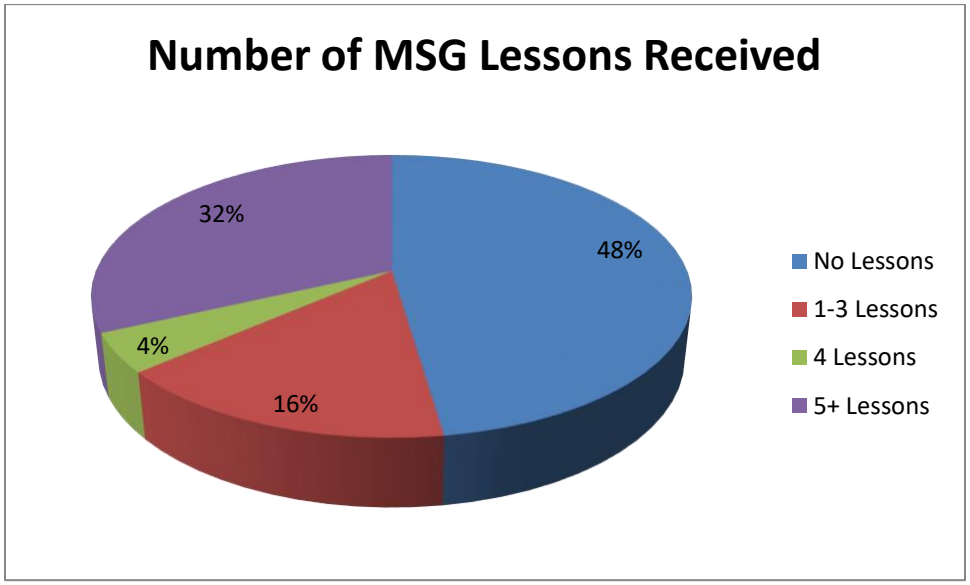


Figure 9: 2017 Health Screening Disease Rates as they Relate to Level of MSG Participation

2017 Health Screening Rates	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	UTIs	Malaria
Overall percentage of health screening participants who tested positive	14%	38%	23%	12%	62%	6%
Percentage of health screening participants who have received no MSG lessons and tested positive	19%	68%	40%	19%	60%	8%
Percentage of health screening participants who have received 1-3 MSG lessons and tested positive	14%	18%	14%	11%	62%	4%
Percentage of health screening participants who have received 4 MSG lessons and tested positive	6%	5%	4%	6%	64%	7%
Percentage of health screening participants who have received 5^{+} MSG lessons and tested positive	8%	9%	6%	5%	64%	5%

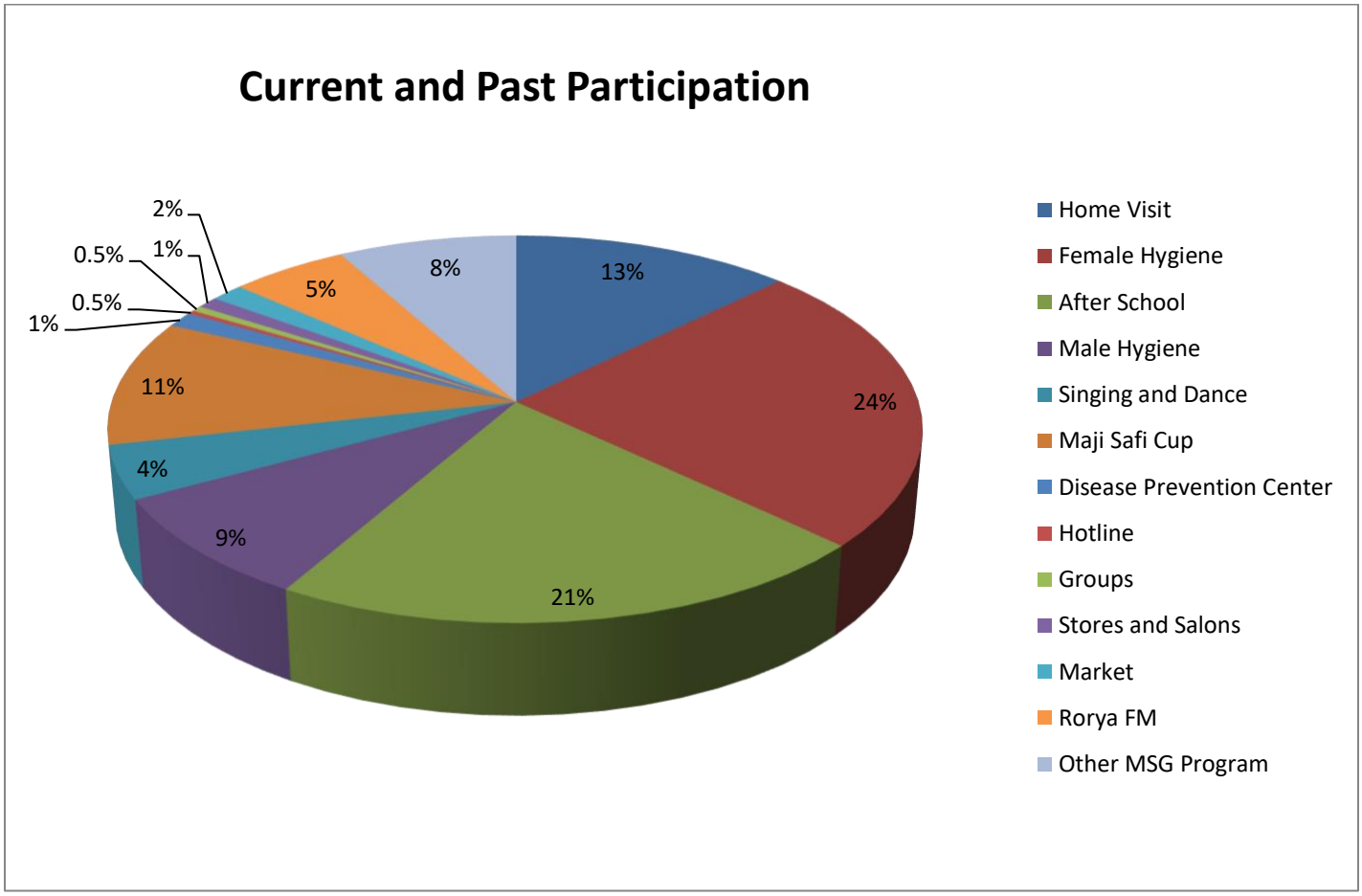
Maji Safi Group Program Disease Rates

The 2017 Health Screening questionnaire was designed to ask participants if they were current or past program participants. MSG tested 1,571 current and past program participants, which made up 52% of all those tested in 2017. The registration form was also designed to indicate which MSG programs they have participated or are currently participating in. MSG programs 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, and Other, such as Emergency Outreach or Health Screenings. It is important to note that 315 health screening participants partake (or partook) in more than one MSG program. This number indicates that they are currently in more than one MSG program or have participated in a program in the past and are currently participating in another program. As indicated in Figure 10 and Figure 11, the majority of program participants (past and current) came from Female Hygiene (24.3%), then After School (21.3%), followed by Outreach Programs (including Groups, Stores and Salons, Market, Rorya FM and Other MSG Programs) (16.5%), Home Visit (12.7%), Maji Safi Cup (10.6%), Male Hygiene (8.7%), Singing and Dance (4.5%), Disease Prevention Center (1.3%) and Hotline (0.3%).

Figure 10: Number of Current and Past MSG Program Participants

Program	Number of Current and Past Participation	Percentage
Home Visit	239	13%
Female Hygiene	459	24%
After School	402	21%
Male Hygiene	164	9%
Singing and Dance	84	4%
Maji Safi Cup	199	11%
Disease Prevention Center	24	1%
Hotline	6	0.5%
Groups	9	0.5%
Stores and Salons	18	1%
Market	28	2%
Rorya FM	101	5%
Other MSG Program	153	8%
Total	**1886**	**100%**

Figure 11: Percentage of MSG Program Participation



According to Figure 12, all MSG programs participants had lower WASH disease prevalence rates than community members who have not had any exposure to MSG programs: amoebiasis (7%-20% lower – aside from Groups which had 2% higher), intestinal worms (60%-74% lower), schistosomiasis in stool (27%-41% lower) and schistosomiasis in urine (11%-20% lower). Disease rates among the program participants also varied. Amoebiasis rates ranged from 0% positive in the Hotline Program to 22% positive in Groups. Intestinal worm rates ranged from 0% positive in the Hotline Program, Groups, and Stores and Salons to 14% positive in Rorya FM. Schistosomiasis in stool rates ranged from 1% positive in Male Hygiene and Singing and Dance to 17% in Hotline. Schistosomiasis in urine rates ranged from 0% in the Disease Prevention Center, Groups, and Stores and Salons to 9% in Maji Safi Cup.

When looking at UTI rates, however, it was found that only five of the 13 programs (Other, Stores and Salons, Hotline, Maji Safi Cup, and Singing and Dance) had a lower UTI disease rate than community members. The other programs (Home Visit, Female Hygiene, After School, Male Hygiene, Groups, and Rorya FM) screened were 1%-19% higher than community members. Lastly, we were only able to test Singing and Dance Program participants for malaria, so we are unable to know the overall disease rates for these program participants.

Figure 12: Disease Rates among MSG Program Participants

Health Screening Rates	Number screened	Amoebiasis	Intestinal Worms	Schistosomiasis in Stool	Schistosomiasis in Urine	UTI	Malaria
Overall percentage of health screening participants who tested positive	3066	14%	38%	23%	12%	62%	6%
Home Visit	239	11%	10%	3%	8%	64%	NA
Female Hygiene	459	6%	8%	7%	5%	70%	NA
After School	402	7%	8%	4%	6%	61%	NA
Male Hygiene	164	9%	4%	1%	8%	60%	NA
Singing and Dance	84	0%	8%	1%	2%	57%	5%
Maji Safi Cup	199	8%	7%	9%	9%	58%	NA
Disease Prevention Center	24	13%	4%	13%	0%	63%	NA
Hotline	6	0%	0%	17%	0%	33%	NA
Groups	9	22%	0%	11%	0%	78%	NA
Stores and Salons	18	11%	0%	6%	0%	50%	NA
Market	28	14%	4%	4%	7%	61%	NA
Rorya FM	101	14%	14%	6%	5%	64%	NA
Other MSG Programs (health screenings, emergency outreach)	153	7%	7%	7%	5%	56%	NA
Non-Program Participants: Community Members	1331	20%	74%	44%	20%	59%	6%

Secondary School Results

MSG was able to collaborate with four secondary schools during the 2017 Health Screening Program. This is a major difference from the previous years because the government was already providing a mass worm and schistosomiasis treatment campaign to all primary schools. Therefore, we were unable to screen and treat students at primary schools. The four secondary schools have either past program participants from After School or current program participants from the Male or Female Hygiene Programs. If a school did not currently partner with MSG, the students were screened to compare rates in hopes to start programs in 2018. This year, we provided health screenings to Tai, Katuru, Sarungi and Raranya Secondary Schools. Figure 13 – Figure 15 indicate the number and percentage of students screened this year and the class breakdown.

Figure 13: School Level of Health Screening Participation

School Name	Number of Health Screening Participants	Percentage of School Participation in Overall Health Screening Campaign
Katuru Secondary	522	17%
Tai Secondary	592	19%
Raranya Secondary	378	13%
Sarungi Secondary	378	12%
Non-School participants	1196	39%
Total	**3066**	**100%**

Figure 14: Pie Chart of Health Screening Participants

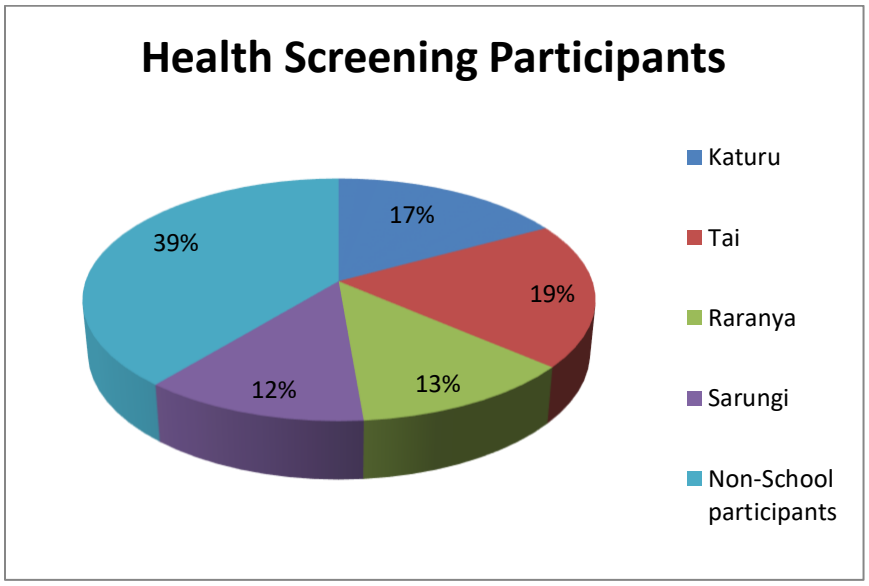


Figure 15: Chart of School and Class Breakdown

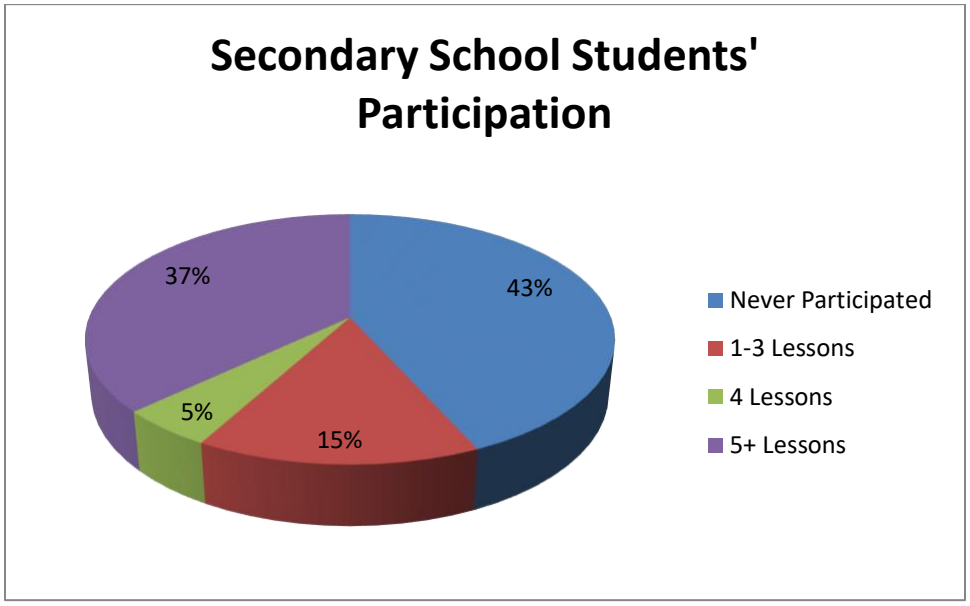
School Name	# of Form 1 Students	# of Form 2 Students	# of Form 3 Students	# of Form 4 Students	# of Parents	# of Teachers	Overall number screened
Katuru Secondary School	199	184	69	64	0	6	**522**
Tai Secondary School	211	161	110	105	0	5	**592**
Raranya Secondary School	112	155	63	43	0	5	**378**
Sarungi Secondary School	128	97	75	50	20	8	**378**
Total	**650**	**597**	**317**	**262**	**20**	**24**	**1,870**

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 is given 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 yet. Of those who were screened at a school, 57% (1,067 participants) participated in an MSG Program either as a past or current participant, and 43% (803 participants) have yet to receive MSG WASH education. Figure 16 and Figure 17 show a breakdown of the different schools, classes and overall MSG participation level.

Figure 16: MSG Participant Status per School

School Name	# Never participated	# Participated in 1-3 lessons	# Participated in 4 lessons	# Participated in 5^{+} lessons
Katuru Secondary School	72	98	32	320
Tai Secondary School	211	101	38	242
Raranya Secondary School	261	33	7	77
Sarungi Secondary School	265	44	16	53
Total	**809**	**276**	**93**	**692**

Figure 17: Percentage of MSG Participant Status in Participating Secondary Schools



Secondary School Demographics

The 2017 Health Screening Campaign was a great opportunity for us to better understand the age and gender demographics of the secondary school students MSG works with. It was found that the average overall age in secondary schools was 17 years, and the gender breakdown was 57% male and 43% female. These rates represent the gender differences you find in rural secondary schools in Tanzania. The results are indicated in Figure 18.

Figure 18: Participants' Average Age and Gender

School Name	Average Age	Percentage of Males	Percentage of Females
Katuru Secondary School	16	50%	50%
Tai Secondary School	17	60%	40%
Raranya Secondary School	16	57%	43%
Sarungi Secondary School	17	61%	39%

Secondary School Disease Rate Analysis

During this health screening, the program participants were screened and tested for amoebiasis, intestinal worms, schistosomiasis in stool, schistosomiasis in urine, and UTIs. Figure 19 shows an analysis of the program participants' water-related disease rates.

Figure 19: 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 Urinary Tract Infection
All Health Screening Participants	14%	38%	23%	12%	62%
Katuru Secondary School	10%	15%	13%	9%	58%
Tai Secondary School	11%	40%	30%	12%	65%
Raranya Secondary	17%	46%	23%	15%	62%
Sarungi Secondary	15%	59%	31%	18%	67%

**Note:* *Please note that all percentages were based off only those who produced a stool and/or urine sample.*

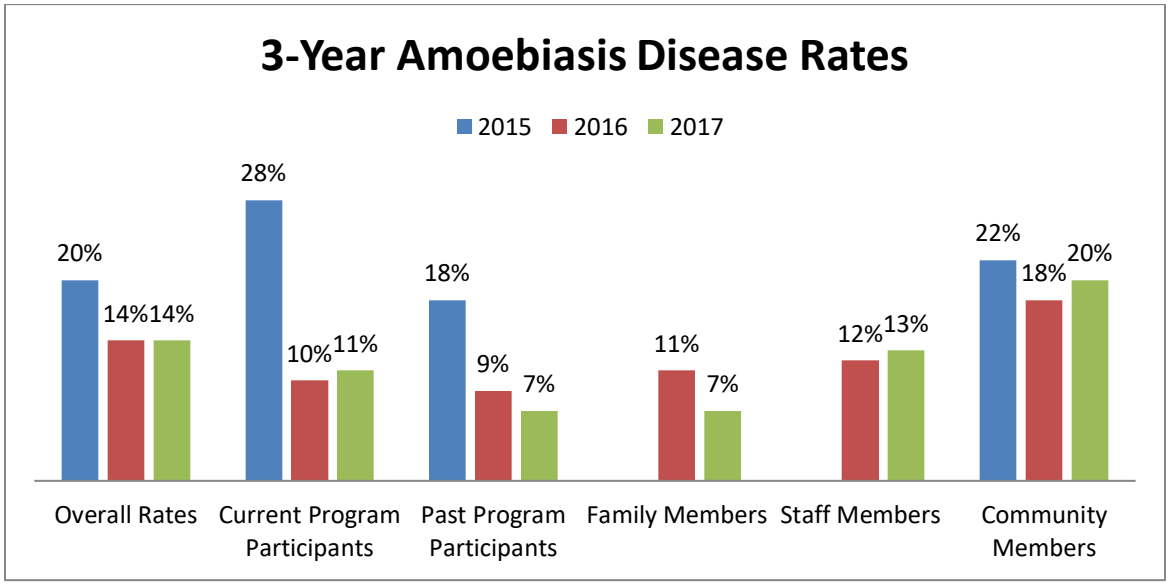
Figure 19 illustrates that students from Katuru are the healthiest. This school also has the most MSG program participants. We also found that Raranya Secondary students have the highest amoebiasis rates. Sarungi Secondary students have the highest intestinal worms and schistosomiasis in both urine and stool and UTI rates. Sarungi Secondary only started partnering with MSG within the last year, so not many students have been exposed to MSG education yet. Raranya Secondary School has yet to partner with MSG, but there are plans to start a partnership in 2018. It will be interesting to measure the disease rates for these two new schools next year after the students have received more MSG education. Overall, these statistics indicate that health screening participants generally are healthier if they are being or have been exposed to Maji Safi Group's WASH education. These statistics also indicate that students are healthier the longer their schools partner with MSG.

Discussion

Maji Safi Group (MSG) collected extensive information about disease rates during the 2017 Health Screening Program, and as they represent the third year in our longitudinal study, these rates are extremely important to assessing the overall impact MSG's lessons are having on WASH behaviors in the community.

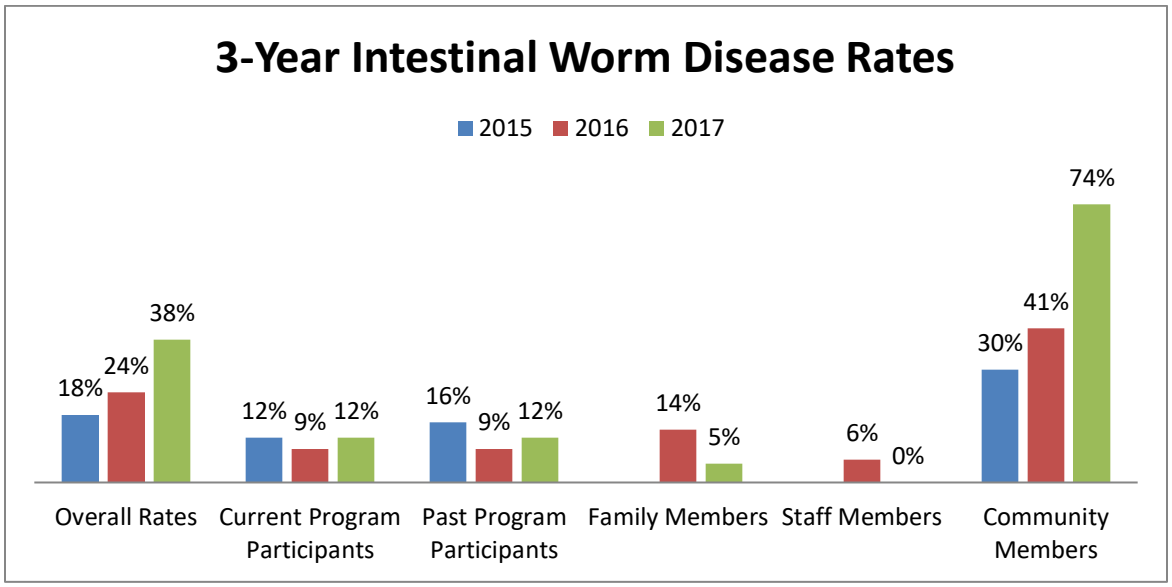
Over three years, we have found a consistent pattern: People who have been exposed to MSG's WASH education are healthier than those who have not received such education. Prevention is proving to save MSG program participants from continuously contracting WASH-related diseases. This year, it has also become apparent 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. Figures 20 – 24 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 a lower disease rate than community members (with the exception of amoebiasis in 2015, schistosomiasis in urine in 2015, and UTI rates in 2015, 2016, and 2017).

Figure 20: 3-Year Amoebiasis Disease Rates



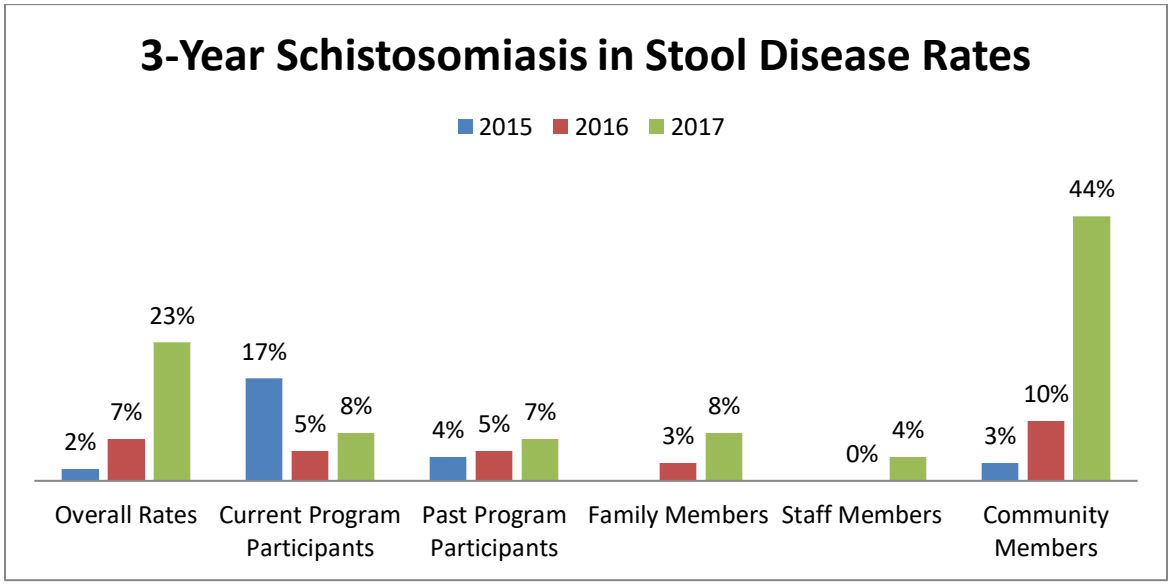
**Note: 2015 data were collected through a different method than 2016 and 2017 data. Therefore, there are no data for family members and staff members in 2015, and the disease rates were calculated using different criteria.*

Figure 21: 3-Year Intestinal Worm Disease Rates



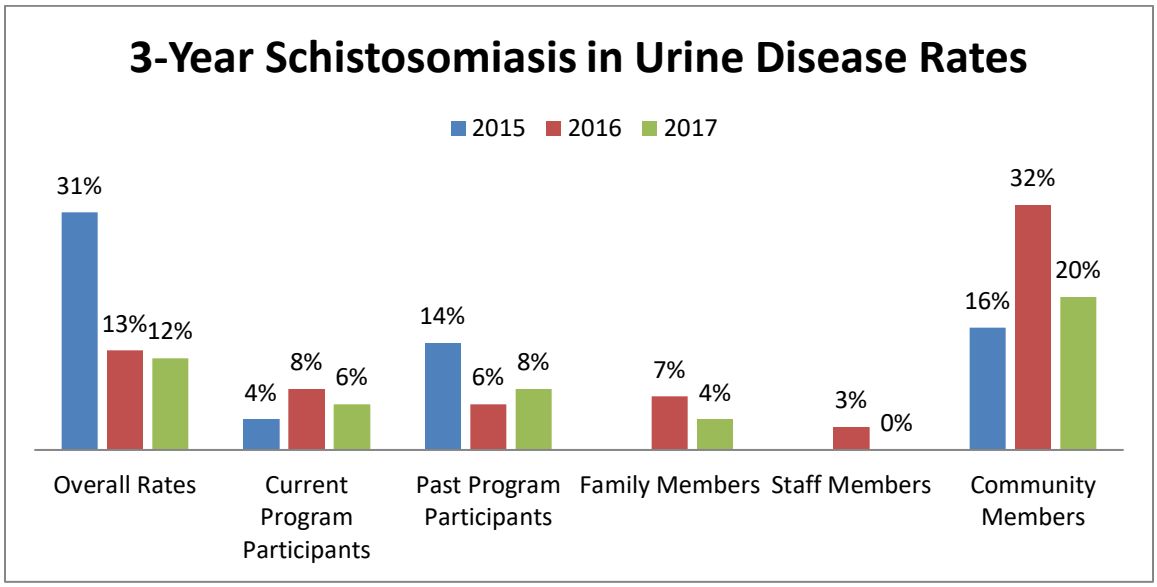
**Note: 2015 data were collected through a different method than 2016 and 2017. Therefore, there are no data for family members and staff members in 2015, and the disease rates were calculated using different criteria.*

Figure 22: 3-Year Schistosomiasis in Stool Disease Rates



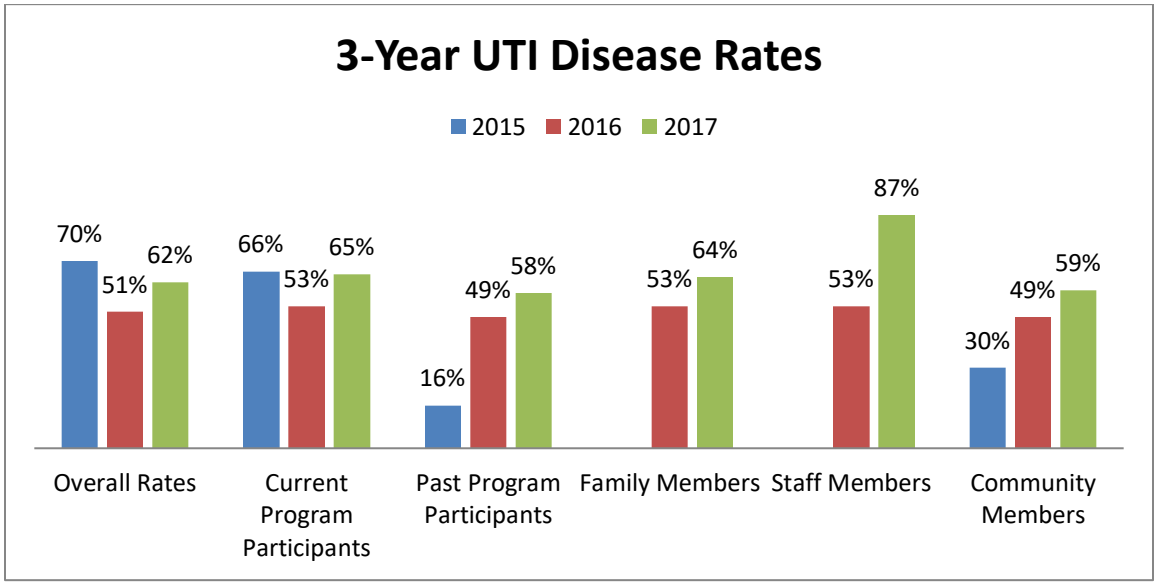
**Note: 2015 data were collected through a different method than 2016 and 2017. Therefore, there are no data for family members and staff members in 2015, and the disease rates were calculated using different criteria.*

Figure 23: 3-Year Schistosomiasis in Urine Disease Rates



**Note: 2015 data were collected through a different method than 2016 and 2017. Therefore, there are no data for family members and staff members in 2015, and the disease rates were calculated using different criteria.*

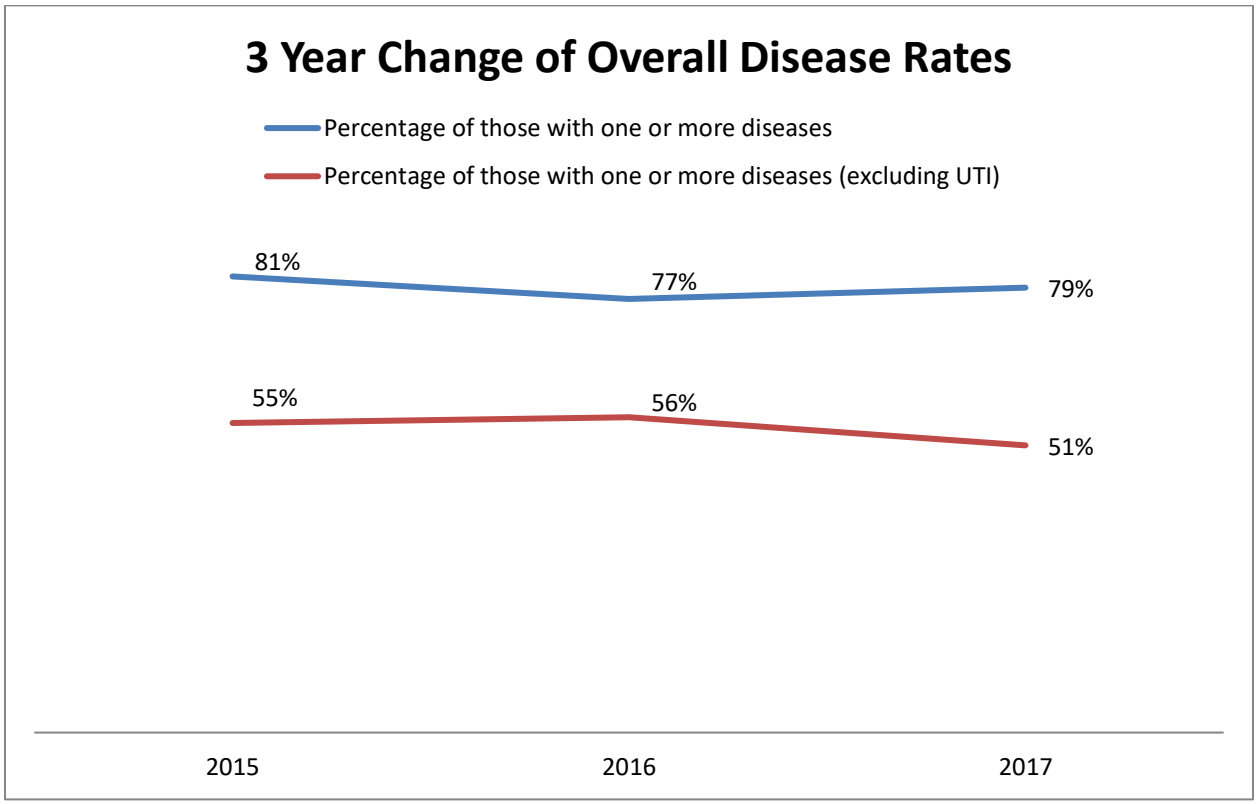
Figure 24: 3-Year UTI Disease Rates



**Note: 2015 data were collected through a different method than 2016 and 2017. Therefore, there are no data for family members and staff members in 2015, and the disease rates were calculated using different criteria.*

When looking at the three-year change in overall disease rates (i.e. calculating the percentage of those screened who have one or more diseases), we are seeing a gradual decrease in disease rates. The decrease in disease rates is indicated in figure 25.

Figure 25: 3-Year Trend of Overall Disease Rates



UTI rates this year were alarming. After discussing this issue with several doctors in the area, we concluded that the lab technicians may be finding false positives in UTI tests because most of the people we screened were dehydrated, causing more skin cells to be present in the urine test. These skin cells created a "cloudy" sample, which was considered a UTI even though the skin cells did not indicate an infection. Therefore, after much consideration, MSG will take out testing for UTIs in future health screenings, as distributing strong antibiotics for false positives is not safe for health screening participants.

Lastly, it would have been beneficial to us to screen primary school students to compare last year's rates with this year's rates. However, since we were unable to screen at primary schools this year due a conflict with governmental mass treatments for intestinal worms and schistosomiasis, we could not assess if our education continuously improves the health in primary school students.

Recommendations for the Future

The 2017 Health Screening Campaign was very successful, but there is always room for improvement. MSG recommends the following:

- Plan with the government early in the year what health screening dates would work best for both MSG and the government.
- Add more health screening participants from different locations.
- Work with the government to receive enough malaria tests to screen all our health screening participants.
- Discontinue screening for UTIs to ensure that the program participants stay safe from potential false positives.

Conclusion

Health screening results measure WASH-disease prevalence rates of people who have received MSG 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 programs. The results continuously prove that there is a lower prevalence of disease rates among program participants who have completed MSG's WASH lessons. In 2017, in collaboration with the local and district governments, MSG was able to screen 3,071 community members, focusing on secondary school students. Results indicated that MSG significantly improves the lives of program participants and community members who are exposed to MSG education. It is our hope that we can extend our collaboration with the local and district governments in 2018 to continue to 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.