

FINAL PUPIL ASSESSMENT: CHANGING CHILDREN'S KNOWLEDGE, ATTITUDES, BEHAVIORS AND OUTCOMES

SWASH+: Sustaining and Scaling School Water, Sanitation, and Hygiene Plus Community Impacts

Summary

Background: In September to November 2008, Emory University and Great Lakes University of Kisumu conducted a pupil assessment in SWASH+ project schools in Nyanza Province, Kenya to determine the impact of school WASH interventions on pupil knowledge, behaviors, health and absenteeism.

Findings: The findings of the pupil final evaluation suggest that all intervention groups are making improvements in the regular availability of appropriate water, sanitation and hygiene facilities and that children's knowledge, attitudes and behaviors are improving as well. At the same time, there is little evidence that these have resulted in attributable improvements in health or attendance so far. Additional data from school records and the final household survey may still provide additional evidence of these impacts.

Recommendations: There is a need to continue learning about ways to improve the effectiveness of WASH messages for pupils and to increase the transfer of those messages to their homes. Given that latrine conditions appear to be likely drivers of absenteeism, a better understanding of ways to improve the effectiveness of maintenance regimes would also be beneficial. Finally, further efforts must be made to learn ways to improve the sustainability of provision of school WASH elements.

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What Did We Want to Learn – Background

In September to November 2008, Emory University and Great Lakes University of Kisumu conducted a pupil and facilities assessment of SWASH+ schools in Nyanza Province, Kenya. The purpose of the assessment was to determine 1) the impact of school WASH (water, sanitation, and hygiene) interventions on pupil knowledge, behaviors, health and absenteeism, and 2) the ongoing condition of WASH facilities in intervention and control schools. Some preliminary results of the facilities assessment are documented in a separate report. This report focuses on presenting the change in pupil-level outcomes between intervention and control schools and between baseline and final evaluations.

The pupil survey is intended to answer the following evaluation questions.

Did the Base, Sanitation, and Water packages result in:

- Increased perceived availability of water, sanitation and handwashing components in schools?
- Improved knowledge of how and when to wash hands?
- Increased attitudes and behaviors regarding school latrines?
- Increased knowledge of water treatment practices
- Increased transfer of knowledge and behaviors to their homes?
- Reduced absenteeism and absenteeism due to illness?

Approach to Answering the Questions – Methods

Key indicators were developed and measured in schools in all of the five study groups:

- Base (hand washing, water treatment, hygiene education)
- Base and Sanitation (Base plus improvements in latrines)
- Base / Sanitation Control (No Intervention, comparable to Base / San schools)
- Water Supply (Base, Sanitation, and increased water supply)
- Water Control (No Intervention, comparable to Water Supply schools)

Separate controls are used for Base / Sanitation and Water Supply because the eligibility requirements for each were slightly different.

A detailed survey was designed to assess pupil knowledge, attitudes, and practices regarding water, sanitation, and handwashing as well as perceptions of school WASH conditions and availability. Enumerators conducted this survey in a random selection of approximately 25 pupils at each of 155 schools at baseline (January – March 2007) and repeated the survey in all 185 schools during the final evaluation (September – November 2008).

Data analysis

To answer the question of whether the intervention caused a change in these outcomes we make two types of comparisons, using a “Double Difference” approach. First, the baseline and final values for each school are calculated. This is the “first difference”. We then compare whether the change in intervention schools is different than the change in the controls. This is the “second difference”. The

average change in the intervention schools is compared to the average change in the control schools using a statistical t-test. This allows us to determine how likely it is that the difference is due just to chance (level of significance).

This approach takes into account that the conditions in all schools may have changed during the period of the project due to seasonal differences, economic changes, policy changes or other factors not related to the SWASH+ project. Comparing the “Double Differences” when schools have been randomly assigned to the intervention or control group provides the most rigorous test of whether changes can be attributed to the intervention.

What Did We Learn? – Results

For each indicator the baseline and final data from the different study groups are presented in the same format. Each study group is a separate column in the table. Average Baseline values (B) are presented in the first line, followed by Final values (F). The average difference between Baseline and Final (F - B) is calculated for each group in the third line. The “Attributable Difference” how much change occurred in each intervention group compared to the change within the control (“Second Difference” described above). This attributable difference is also expressed as a percentage change from the baseline. The level of significance is shown using asterisks. One asterisk means marginally significant ($p < 0.1$, or less than 10% likelihood it is due to chance). Two asterisks means it is significant ($p < .05$, or less than 5% likelihood it is due to chance). Three asterisks means it is highly significant ($p < .01$, or less than 1% likelihood it is due to chance).

Increased perceived availability of water, sanitation and handwashing components in schools?

Key findings:

- Children in intervention schools are significantly more likely to be health club members
- The majority of children in intervention schools report that there is always enough water for drinking (63-78%), significantly more than in control schools (%). The improvement was greatest in water supply schools.
- Children report a significant increase in awareness of water treatment at school (89-93%), compared to controls (14-16%).
- Children report a significant increase in the regular presence of water for handwashing (66-80%), compared to control. The increase is greatest in the water supply schools.
- Children report a significant increase in the regular availability of soap for handwashing (34-41%), compared to controls. However, on average less than half of the children report it always being available.

Table 1. Proportion who are health club members	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.06	0.07	0.06	0.06	0.10
Final (F)	0.31	0.26	0.09	0.29	0.08
Difference (F - B)	0.24	0.19	0.03	0.24	-0.01
Attributable difference (compared to control)	0.22***	0.16***		0.25***	
% change from baseline attributed to project	342.7%	226.9%		432.3%	

Table 2. Proportion of students saying there is always enough water for drinking	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.15	0.19	0.16	0.12	0.14
Final (F)	0.63	0.74	0.26	0.78	0.20
Difference (F - B)	0.48	0.55	0.11	0.65	0.06
Attributable difference (compared to control)	0.37***	0.44***		0.59***	
% change from baseline attributed to project	240.0%	237.4%		481.2%	

Table 3. Proportion who know their school treats water with WaterGuard	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.15	0.16	0.14	0.19	0.18
Final (F)	0.89	0.92	0.16	0.93	0.14
Difference (F - B)	0.74	0.75	0.03	0.74	-0.04
Attributable difference (compared to control)	0.71***	0.72***		0.78***	
% change from baseline attributed to project	483.1%	441.4%		58.1%	

Table 4. Proportion who say there is always enough water is available for handwashing	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.16	0.16	0.12	0.08	0.15
Final (F)	0.66	0.74	0.21	0.80	0.10
Difference (F - B)	0.50	0.58	0.09	0.71	-0.05
Attributable difference (compared to control)	0.40***	0.49***		0.76***	
% change from baseline attributed to project	246.5%	310.4%		894.4%	

Table 5. Proportion of students that say soap is always available at school	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.01	0.01	0.02	0.03	0.02
Final (F)	0.34	0.41	0.02	0.39	0.01
Difference (F - B)	0.33	0.40	0.00	0.37	0.00
Attributable difference (compared to control)	0.33***	0.40***		0.37***	
% change from baseline attributed to project	2891.6%	2869.4%		1377.9%	

Improved knowledge of how and when to wash hands?

Key findings:

- During the final data collection, when asked open-ended questions about what they have learned, a larger proportion of children in intervention schools report having learned hygiene or sanitation messages compared to control schools.
- The proportion of children reporting washing their hands both before eating and after the latrine increased more in intervention schools, but only improvements among pupils at schools receiving the sanitation package were significant at the $p < 0.05$ level.
- Handwashing scores increased more in intervention schools than in controls, but the increase was only significant at the $p < 0.05$ level in Base and Base/Sanitation schools.
- There was no observed change in the percent of children who lathered with soap in the hand washing observation.

Table 6. Proportion children who learned about hygiene/ sanitation (final data)	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
How to wash hands	19.2%	23.2%	6.9%	27.4%	7.1%
When to wash hands	26.5%	31.6%	11.9%	33.7%	12.1%
Importance of cleanliness	19.7%	21.0%	13.0%	25.9%	17.4%
Importance of latrines	12.9%	12.2%	6.0%	15.7%	6.3%
Desire latrine at home	2.0%	2.1%	0.8%	3.8%	0.8%

Table 7. Proportion children who report washing hands before eating and after the latrine	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.72	0.73	0.75	0.79	0.75
Final (F)	0.81	0.85	0.76	0.89	0.80
Difference (F - B)	0.09	0.12	0.01	0.10	0.05
Attributable difference (compared to control)	0.09*	0.11**		0.05	
% change from baseline attributed to project	12.1%	15.0%		5.8%	

Table 8. Average handwashing score (range = 1 to 6)	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	3.78	3.75	3.82	3.78	3.74
Final (F)	4.44	4.70	4.06	4.48	4.07
Difference (F - B)	0.66	0.95	0.24	0.70	0.33
Attributable difference (compared to control)	0.41**	0.70***		0.37*	
% change from baseline attributed to project	10.9%	18.7%		9.8%	

Table 9. Proportion observed to lather with soap	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.82	0.88	0.87	0.85	0.82
Final (F)	0.84	0.87	0.84	0.84	0.84
Difference (F - B)	0.02	0.00	-0.03	-0.01	0.03
Attributable difference (compared to control)	0.05	0.03		-0.04	
% change from baseline attributed to project	5.8%	3.3%		-4.3%	

Improved attitudes and behaviors regarding school latrines?

Key findings

- The percent of children uncomfortable using school latrines significantly declined in all intervention groups, compared to controls. The difference was greatest in Water Supply schools, followed by Base/Sanitation schools. The fraction went from almost half to less than one quarter of students.
- The fraction of students reporting never using school latrines for defecation declined more in intervention schools. This change was greater for boys than girls.
- The percent of students reporting being uncomfortable using latrine due to bad smells declined in intervention schools, especially Water Supply and Base/Sanitation schools. This is notable since this is a major cause of not wanting to use school latrines.
- The percent of students reporting being uncomfortable using latrine due to dirtiness and flies declined in intervention schools, especially Water Supply and Base/Sanitation schools. This is notable since the sanitary conditions of school latrines was cited as a major reason pupils do not want to use school latrines.

- There were few notable changes in other causes of discomfort with latrines, including privacy, fear of falling in, fear of illness, or cues. These were not major causes at baseline or final.

Table 10. Proportion not comfortable using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.48	0.53	0.50	0.43	0.39
Final (F)	0.24	0.21	0.41	0.18	0.42
Difference (F - B)	-0.23	-0.32	-0.10	-0.25	0.04
Attributable difference (compared to control)	-0.13**	0.22***	-	0.29***	-
% change from baseline attributed to project	-27.9%	-41.3%		-66.6%	

Table 11. Proportion who never use school latrines to defecate	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.03	0.05	0.03	0.03	0.04
Final (F)	0.02	0.02	0.06	0.01	0.05
Difference (F - B)	-0.02	-0.03	0.03	-0.02	0.01
Attributable difference (compared to control)	0.05***	0.06***		-0.03**	
% change from baseline attributed to project	152.0%	133.4%		102.3%	

Table 12. Proportion of boys who never use school latrines to defecate	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.04	0.05	0.03	0.04	0.04
Final (F)	0.01	0.02	0.07	0.02	0.05
Difference (F - B)	-0.02	-0.03	0.04	-0.03	0.01
Attributable difference (compared to control)	-	-		-0.04*	
% change from baseline attributed to project	-	-		-96.7%	
	158.4%	-133.7%			

Table 13. Proportion of girls who never use school latrines to defecate	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.03	0.05	0.03	0.02	0.04
Final (F)	0.02	0.01	0.05	0.01	0.05
Difference (F - B)	-0.01	-0.04	0.03	-0.02	0.02
Attributable difference (compared to control)	-0.03*	-		-0.03**	
% change from baseline attributed to project	-120.7%	-126.1%		-139.7%	

Table 14. Proportion reporting bad smell as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.40	0.44	0.41	0.37	0.26
Final (F)	0.17	0.14	0.30	0.10	0.30
Difference (F - B)	-0.23	-0.30	-0.10	-0.27	0.05
Attributable difference (compared to control)	-0.12*	-		-	
% change from baseline attributed to project	-30.5%	-45.0%		-84.2%	
				0.31***	

Table 15. Proportion reporting fear of falling inside as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.03	0.06	0.02	0.03	0.03
Final (F)	0.00	0.00	0.00	0.00	0.01
Difference (F - B)	-0.03	-0.05	-0.01	-0.02	-0.01
Attributable difference (compared to control)	-0.02	-0.04**		-0.01	
% change from baseline attributed to project	-47.9%	-72.0%		-36.8%	

Table 16. Proportion reporting fear of getting sick as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.08	0.08	0.12	0.08	0.06
Final (F)	0.04	0.03	0.04	0.01	0.06
Difference (F - B)	-0.04	-0.06	-0.07	-0.07	-0.01
Attributable difference (compared to control)	0.04	0.02		-0.06*	
% change from baseline attributed to project	48.8%	20.2%		-73.6%	

Table 17. Proportion reporting dirtiness/flies as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.35	0.42	0.39	0.32	0.24
Final (F)	0.19	0.14	0.29	0.13	0.30
Difference (F - B)	-0.16	-0.28	-0.10	-0.18	0.06
Attributable difference (compared to control)	-0.06	-0.17**		0.24***	-
% change from baseline attributed to project	-17.4%	-41.5%		-76.0%	

Table 18. Proportion reporting long queues as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.08	0.08	0.08	0.08	0.03
Final (F)	0.01	0.00	0.02	0.00	0.01
Difference (F - B)	-0.07	-0.08	-0.07	-0.08	-0.03
Attributable difference (compared to control)	0.00	-0.01		-0.05	
% change from baseline attributed to project	-5.4%	-13.5%		-65.0%	

Table 19. Proportion reporting lack of privacy as reason for discomfort using school latrines	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.02	0.04	0.02	0.02	0.01
Final (F)	0.01	0.01	0.00	0.00	0.01
Difference (F - B)	-0.01	-0.03	-0.02	-0.02	0.00
Attributable difference (compared to control)	0.00	-0.02		-0.01	
% change from baseline attributed to project	20.8%	-41.1%		-75.2%	

Increased knowledge of water treatment practices?

Key findings:

- During the final data collection, when asked open-ended questions about what they had learned, a larger proportion of children in intervention schools report having learned about WaterGuard compared to control schools.
- The percent of children aware of WaterGuard was high at baseline and did not significantly change.
- Knowledge of the proper use of WaterGuard increased in all study groups between baseline and final. The increase was significantly greater in intervention schools.

Table 20. Proportion children who learned about water treatment/ storage (final data)	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Use WaterGuard	39.7%	42.4%	19.3%	42.2%	20.5%
Importance of WaterGuard	27.0%	27.6%	14.3%	28.8%	19.4%
How to store water	27.4%	27.9%	15.0%	33.9%	23.2%

Table 21. Proportion who have heard of WaterGuard	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.95	0.96	0.95	0.95	0.95
Final (F)	0.99	1.00	0.98	1.00	0.99
Difference (F - B)	0.05	0.04	0.03	0.05	0.04
Attributable difference (compared to control)	0.02	0.01		0.01	
% change from baseline attributed to project	1.6%	1.1%		1.1%	

Table 22. Proportion who know correct WaterGuard dosage for clear water	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.14	0.17	0.14	0.21	0.18
Final (F)	0.51	0.56	0.35	0.59	0.34
Difference (F - B)	0.37	0.39	0.21	0.38	0.16
Attributable difference (compared to control)	0.16***	0.18***		0.22***	
% change from baseline attributed to project	112.1%	104.5%		107.5%	

Table 23. Proportion who know correct WaterGuard dosage for turbid water	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.10	0.09	0.08	0.14	0.08
Final (F)	0.28	0.28	0.16	0.31	0.15
Difference (F - B)	0.18	0.18	0.08	0.18	0.07
Attributable difference (compared to control)	0.10***	0.10***		0.10**	
% change from baseline attributed to project	98.9%	105.8%		76.6%	

Table 24. Proportion who know correct waiting time after WaterGuard treatment	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.15	0.16	0.15	0.20	0.19
Final (F)	0.53	0.59	0.33	0.61	0.33
Difference (F - B)	0.38	0.43	0.17	0.42	0.14
Attributable difference (compared to control)	0.21***	0.26***		0.27***	
% change from baseline attributed to project	136.2%	159.4%		139.9%	

Increased transfer of knowledge and behaviors to their homes?

Key findings:

- The proportion of children attending intervention schools that report sharing WASH messages learned at school with their families is almost double the proportion in controls schools.
- The proportion of children reporting water treatment (regardless of method) at home increased in all study groups. Although it increased more in the intervention groups, the difference was not significant at the p< 0.05 level.
- The percent of children reporting the use of Water Guard and PuR at home increased in all study groups, and increased significantly more in intervention schools.
- In all study groups, an increased percent of children reported having latrines at home. In the Water Supply group this was significantly higher than in the control.

Table 25. Proportion who told their families any WASH message from school (final data)				
Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
42.5%	45.4%	20.4%	46.3%	25.2%

Table 26. Proportion who treat water at home with any method	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.61	0.65	0.58	0.67	0.64
Final (F)	0.75	0.79	0.64	0.81	0.71
Difference (F - B)	0.14	0.14	0.05	0.14	0.08
Attributable difference (compared to control)	0.09	0.09		0.06	
% change from baseline attributed to project	14.9%	14.0%		9.4%	

Table 27. Proportion who treat water at home with WaterGuard	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.40	0.41	0.39	0.44	0.42
Final (F)	0.70	0.74	0.54	0.75	0.59
Difference (F - B)	0.29	0.33	0.15	0.30	0.17
Attributable difference (compared to control)	0.15**	0.18***		0.14***	
% change from baseline attributed to project	36.1%	44.5%		30.6%	

Table 28. Proportion who treat water at home with PuR	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.03	0.02	0.02	0.03	0.02
Final (F)	0.20	0.24	0.12	0.21	0.14
Difference (F - B)	0.17	0.22	0.10	0.17	0.12
Attributable difference (compared to control)	0.07	0.12***		0.06	
% change from baseline attributed to project	215.5%	709.4%		166.3%	

Table 29. Proportion pupils with a latrine at home	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.67	0.72	0.63	0.68	0.69
Final (F)	0.71	0.73	0.64	0.80	0.67
Difference (F - B)	0.05	0.01	0.01	0.12	-0.03
Attributable difference (compared to control)	0.04	0.00		0.15***	
% change from baseline attributed to project	5.5%	-0.4%		22.3%	

Reduced absenteeism and absenteeism due to illness?

Key findings:

- Absenteeism from all causes, any illness, (including diarrhea) decreased in all study groups between baseline and final. There were no significant differences between intervention and control, and no attributable change.

Table 30. Proportion pupils absent in the past 2 weeks	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.23	0.21	0.24	0.22	0.24
Final (F)	0.13	0.14	0.16	0.16	0.14
Difference (F - B)	-0.10	-0.07	-0.08	-0.06	-0.10
Attributable difference (compared to control)	-0.02	0.01		0.04	
% change from baseline attributed to project	-6.8%	5.0%		18.3%	

Table 31. Proportion pupils absent due to illness (among all pupils)	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.15	0.15	0.16	0.15	0.15
Final (F)	0.08	0.07	0.09	0.09	0.08
Difference (F - B)	-0.07	-0.07	-0.06	-0.06	-0.07
Attributable difference (compared to control)	-0.01	-0.01		0.02	
% change from baseline attributed to project	-3.3%	-5.6%		11.4%	

Table 32. Proportion pupils absent due to diarrhea (among all pupils)	Base (n= 35)	Base/ San (n=35)	Control (Base) (n=35)	Water Supply (n=24)	Control (Water) (n=25)
Baseline (B)	0.008	0.012	0.014	0.015	0.012
Final (F)	0.003	0.003	0.003	0.003	0.005
Difference (F - B)	-0.005	-0.009	-0.011	-0.012	-0.007
Attributable difference (compared to control)	0.006	0.002		-0.005	
% change from baseline attributed to project	71.3%	12.2%		-32.6%	

Implications and Next Steps

The findings of the pupil final evaluation suggests that all intervention groups are making improvements in the regular availability of appropriate water, sanitation and hygiene facilities and that children's knowledge, attitudes and behaviors are improving as well. At the same time, there is little evidence that these have resulted in attributable improvements in health or attendance so far. Additional data from school records and the final household survey may still provide additional evidence of these impacts.

The findings also point to opportunities for further learning within SWASH+:

1. While student knowledge and attitudes towards WASH have improved, there appears to still be room to increase the effectiveness of message transfer to students and to increase their transfer of messages to home. Identifying additional motivational drivers and effective ways to trigger them could increase the impact of the interventions. It is important to continue assessing whether existing approaches can be improved further.
2. All interventions appear to be affecting children's attitudes towards sanitation and/or improvements in the latrine conditions. Given the previous finding that latrine conditions affect absenteeism, a better understanding of this relationship is needed. If children are using school latrines more frequently, then it is particularly important that they be adequately maintained. It also suggests that it is imperative that handwashing facilities be available for children after latrine use, even if they are using latrines before the school day begins. Direct observation and qualitative assessments of latrine use and handwashing behaviors is needed to fully understand this.
3. All intervention groups had significantly higher improvements in latrine conditions, drinking water availability, and handwashing facilities than controls. However, the percent of schools always having water for handwashing and always having soap is less than the 100% target set by the SWASH+ team. Continued efforts are needed to address sustainability challenges that are likely to emerge. It is also imperative to assess how these components will be sustained in the future school WASH scale-up models.

This report includes the primary analyses of the effectiveness of the interventions in affecting children's knowledge, attitudes and behaviors. Several supplementary analyses will be added as appendices over time. These include: analysis of pupil hand rinse data, assessment of the affect of individual school characteristics on the effectiveness of the intervention, and a full presentation of all variables collected.

Appendix: Final Evaluation Data Tables

Table 1. WASH Education and Participation

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Health club					
Aware that school has a Health Club	81.8%	84.9%	31.6%	81.6%	34.3%
Member of School Health Club	30.8%	27.9%	8.7%	29.5%	8.3%
Health Club activities (noted by club members):					
Collect water	44.9%	41.4%	18.0%	59.6%	10.0%
Clean water tanks	50.1%	50.3%	15.5%	53.2%	15.6%
Treat water	50.0%	51.1%	10.0%	49.1%	6.7%
Clean latrines	26.2%	34.1%	42.8%	38.3%	40.6%
Educate students about water treatment	14.2%	16.9%	6.8%	19.7%	8.6%
Educate students about handwashing	7.1%	12.3%	1.9%	17.3%	3.3%
Educate students about sanitation	11.5%	8.0%	4.4%	11.5%	21.4%
Educate students about other health issues	7.6%	6.9%	15.9%	14.4%	22.9%
Educate community members/ parents about health issues	2.2%	3.9%	0.4%	2.6%	8.3%
Clean classrooms / compounds	16.7%	15.7%	26.1%	18.2%	38.9%
Collect rubbish	14.0%	13.8%	17.0%	24.2%	25.2%
WASH messages learned at school:					
Learned about WaterGuard	54.8%	57.2%	30.1%	59.4%	33.5%
Safe storage	27.4%	27.9%	15.0%	33.9%	23.2%
Importance of using a latrine	12.9%	12.2%	6.0%	15.7%	6.3%

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Importance of feces disposal for children	2.5%	2.2%	1.5%	3.3%	0.9%
Desire to build a latrine in the compound	2.0%	2.1%	0.8%	3.8%	0.8%
How to wash hands	19.2%	23.2%	6.9%	27.4%	7.1%
Importance of cleanliness	19.7%	21.0%	13.0%	25.9%	17.4%
How to prevent diarrhea	12.7%	17.2%	8.3%	18.3%	10.0%
Pupils shared WASH lessons with others:					
Family members	42.5%	45.4%	20.4%	46.3%	25.2%
Classmates	19.4%	20.8%	8.2%	23.5%	10.3%
Friends at other schools	9.1%	9.3%	4.2%	13.0%	3.7%
Neighbors	12.7%	13.5%	5.4%	16.2%	7.3%
Other	4.3%	3.1%	1.4%	4.0%	2.2%

Table 2. Water					
	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Place where pupil gets drinking water at school:					
Brings water from home	7.7%	6.1%	14.2%	7.3%	23.1%
Drinking water container	89.7%	95.2%	9.8%	95.3%	10.7%
Handwashing container	8.4%	8.1%	0.1%	10.4%	0.0%
Collects surface water to drink	7.4%	9.5%	13.1%	8.9%	7.3%
Availability of drinking water:					
Claim there is always enough water for drinking	65.6%	74.1%	28.8%	78.3%	19.8%
Claim there is never enough water for drinking	3.8%	0.5%	25.7%	0.5%	20.3%
Pupils take drinking water home from school	6.4%	5.1%	1.6%	12.1%	4.5%
Pupil aware that school treats water with:					
WaterGuard	89.7%	92.4%	17.6%	93.3%	14.3%
Boiling	0.5%	0.4%	1.3%	0.6%	0.8%
Filtration	9.9%	13.1%	0.6%	14.6%	0.7%
Sedimentation	0.1%	0.0%	0.0%	0.3%	0.2%
Alum	0.0%	0.1%	0.1%	0.3%	0.0%
Bleach/jik/other chlorine product	6.5%	8.1%	2.9%	14.4%	1.3%
PUR	10.1%	9.2%	1.2%	10.3%	1.1%

Table 2. Water continued					
	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Pupils reporting who is responsible for treating school water (among schools that treat water):					
Head teacher	2.6%	7.6%	23.5%	11.5%	32.5%
Patron	7.4%	4.3%	1.8%	12.5%	1.2%
Other teachers	15.3%	13.6%	44.0%	17.8%	40.6%
School Health Club members	60.7%	68.9%	6.3%	66.0%	4.8%
Prefects	22.0%	21.3%	15.3%	27.7%	23.7%
Other students	22.6%	17.4%	9.5%	19.7%	18.9%
Support staff	0.1%	0.1%	0.6%	0.0%	0.0%
WaterGuard knowledge					
Has heard of WaterGuard	99.6%	99.8%	98.3%	100.0%	99.2%
Knows correct dosage for clear water	51.7%	56.4%	36.1%	59.3%	34.1%
Knows correct dosage for turbid water	28.6%	27.8%	17.4%	30.6%	14.7%
Knows correct waiting time	55.1%	59.8%	34.2%	61.3%	32.8%
Knows all correct treatment steps	18.5%	18.5%	12.1%	21.0%	9.1%
Household water treatment					
Water is treated at home	76.3%	79.0%	64.6%	81.2%	71.3%
Pupil usually performs treatment	35.8%	36.4%	15.8%	44.8%	18.2%
Household treats with: WaterGuard	69.6%	73.7%	54.5%	75.4%	58.7%
Boiling	23.4%	27.2%	21.0%	28.8%	24.8%
Filtration	13.8%	17.6%	11.0%	22.2%	12.5%
Chlorine product (not WaterGuard)	11.8%	11.1%	11.4%	17.8%	14.1%
PUR	22.0%	22.0%	12.4%	22.2%	13.8%

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Has latrine at household	73.1%	71.7%	66.7%	77.7%	66.6%
Pupil never uses school latrines to defecate	1.9%	1.5%	5.6%	1.0%	5.0%
Boy pupils that never use school latrines to defecate	1.8%	2.0%	6.5%	1.5%	5.2%
Girl pupils that never use school latrines to defecate	2.3%	1.0%	4.5%	0.5%	5.5%
Place where pupil defecates if does not always use school latrines:					
On compound grounds somewhere	3.1%	1.7%	2.6%	4.8%	2.7%
Bush/field / behind the latrine	41.5%	29.8%	45.4%	24.0%	41.2%
Friend's/neighbor's latrine	1.5%	5.6%	3.7%	9.4%	3.8%
Public latrine	0.8%	1.0%	0.3%	0.0%	4.3%
Home latrine	57.1%	58.8%	47.3%	57.4%	46.5%
Other	5.1%	11.9%	9.2%	12.5%	18.3%
Pupil perceptions of school latrine conditions					
Latrines have a very bad smell	31.3%	24.3%	46.8%	21.9%	43.7%
Latrines are very dirty	9.4%	7.9%	18.5%	6.7%	17.0%
Not comfortable using school latrines	23.8%	20.2%	39.5%	17.7%	42.4%
Reasons for discomfort using latrines (among those not comfortable using):					
Not accustomed to using	0.7%	1.8%	1.3%	1.1%	1.3%
Smells bad / full	16.9%	12.7%	29.9%	10.4%	30.3%
Fear falling inside	0.3%	0.3%	0.4%	0.2%	1.2%
Scary / too dark	0.4%	0.1%	0.5%	0.1%	0.3%
Fear getting sick	4.2%	2.5%	4.5%	1.2%	5.6%

Table 3. Sanitation continued

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Dirty / flies	17.6%	13.8%	28.6%	13.1%	29.7%
Too many people	0.6%	0.4%	1.9%	0.0%	0.6%
Lack of privacy	0.8%	0.5%	0.4%	0.2%	0.7%
Far from school	0.0%	0.0%	0.0%	0.0%	0.0%
No water/toilet paper	0.3%	0.3%	0.4%	0.2%	0.2%

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Reports washing hands before eating	91.6%	94.4%	94.7%	94.2%	96.4%
Reports washing hands after the latrine	90.7%	90.4%	81.6%	94.2%	83.7%
Reports washing hands both before eating and after the latrine	83.3%	85.4%	77.2%	88.8%	80.3%
Observed using soap in handwashing demonstration	84.7%	87.4%	83.1%	84.2%	84.4%
Average handwashing score (1-6, 6 is best)	4.5	4.6	4.0	4.5	4.1
Availability of handwashing materials					
Claim there is always soap for handwashing at school	36.1%	40.4%	1.8%	39.0%	1.4%
Claim there is never soap for handwashing	29.1%	19.0%	96.2%	24.7%	97.9%
Claim there is a designated handwashing station	94.6%	97.7%	7.7%	98.7%	6.7%
Claim there is always sufficient water for handwashing at school	67.8%	75.6%	22.1%	80.0%	10.4%
Claim there is never sufficient water for handwashing	2.8%	1.0%	48.6%	0.5%	52.1%

Table 5. Absence and Diarrhea

	Base	Base/ Sanitation	Control (Base/ Sanitation)	Water	Control (Water)
Missed school in past 2 weeks	12.5%	14.6%	16.1%	16.3%	14.2%
Average duration of absence (days) (among those absent)	2.21	2.12	2.38	2.06	1.98
Absent due to:					
Illness (any)	7.9%	7.8%	9.5%	9.4%	7.9%
Diarrhea	0.3%	0.3%	0.5%	0.3%	0.5%
Cough	0.6%	0.6%	0.5%	1.0%	0.7%
Malaria	1.5%	1.0%	3.1%	1.7%	1.7%
Headache	4.6%	5.5%	5.0%	5.1%	4.5%
Stomach	0.8%	1.0%	1.2%	0.8%	0.5%
Caring for family members	1.7%	1.6%	2.0%	1.6%	1.7%
Funeral/ safari	1.3%	1.6%	1.9%	1.8%	2.6%
Other work	1.0%	1.1%	1.2%	1.4%	1.3%
Fetching water	0.0%	0.3%	0.1%	0.0%	0.4%
Hygiene-related reason	0.1%	0.0%	0.0%	0.0%	0.0%
Diarrhea					
Had diarrhea in past week	5.6%	5.8%	6.1%	3.5%	9.3%
Average duration of diarrhea (days) (among those with diarrhea)	2.47	2.57	2.81	2.39	2.21