Influence of hygiene education in schools on household hygiene knowledge and behaviors in Addis Ababa, Ethiopia

Catherine Bisignano

A thesis

Submitted in partial fulfillment of the

Requirements for the degree of

Master of Public Health

University of Washington

2018

Committee:

Nora Henrikson

Jacqueline Sherris

Program Authorized to Offer Degree:

Global Health

University of Washington

Abstract

Influence of hygiene education in schools on household hygiene knowledge and behaviors in Addis Ababa, Ethiopia

Catherine Bisignano

Chair of the Supervisory Committee:
Nora Henrikson
Department of Health Services

Background: Despite significantly improved access to clean water in Addis Ababa, Ethiopia in the past ten years, diarrheal diseases have risen to the leading cause of death nationwide and use of soap remains low. Improving student hygiene behaviors through school-based hygiene programming has proven to be effective but changing adult behaviors remains a challenge.

Objectives: To evaluate if and how hygiene programming aimed at students in schools in Addis Ababa, Ethiopia influences handwashing knowledge and behaviors in the home. The findings will lay the groundwork for further research on strengthening the link between school-based programming and household behaviors and influence how WASH organizations work to improve disease outcomes and quality of life.

Methods: Semi-structured interviews, environment observations, and handwashing demonstrations.

Participants: Thirty-five adult family members of children enrolled in Addis government primary schools.

Results: Participants overwhelmingly believed that adults can learn from children. Participants of children enrolled in their school's Hygiene Club perceived and could identify changes in their children's and their own hygiene behaviors, while participants without a Hygiene Club member could not. Regardless of children's Hygiene Club enrollment status, intervention participants demonstrated significantly better handwashing and were significantly more likely to have soap present at their handwashing station than control participants.

Conclusions: Study findings suggest strong potential for improving household hygiene behaviors through school-based hygiene education.

INTRODUCTION

Despite considerable improvements to water and sanitation access in the past 10 years, Ethiopia still faces an enormous disease burden due to unclean water, inadequate sanitation, and poor hygiene behaviors. The Institute for Health Metrics and Evaluation found that diarrheal disease-related deaths, largely caused by unclean drinking water, poor sanitation, and poor hygiene behaviors, have risen from the third to the leading cause of child deaths in Ethiopia from 2005 to 2016.[1] Further, in 2016 diarrheal diseases were the top cause of death and disability combined for all ages, and barriers to accessing water, sanitation, and hygiene were found to be the second highest risk factor for death and disability combined.[1]

The United Nations estimates that washing hands with soap at critical times could reduce the number of diarrhea cases globally by 35%. Three literature reviews conducted between 2003 and 2005 found an estimated 44% to 47% reduction in diarrhea cases through handwashing with soap.[2-5] While 97% of urban households in Ethiopia had access to an improved source of drinking water in 2016, soap was observed in only 28% of those same households.[6] These findings suggest that Ethiopia's high burden of disease from diarrhea-causing pathogens could be significantly reduced through an increase in soap access in the home.

However, WASH facilities (including soap) are only part of the solution to improved hygiene behaviors and better health outcomes. Behavior change interventions are also critical to the long-term use of WASH infrastructure. A 2015 study in Kathmandu, Nepal by the nonprofit organization *Splash* found that children washed their hands after using the bathroom 72% of the time four to six months after enrolling in a hygiene education intervention, compared to 39% pre-implementation.[7] Similarly, a 2014 study in India found a significant increase in the proportion of villagers handwashing with soap at critical times among an intervention group (participating in community and school-based events surrounding hygiene behaviors) compared both to a control group and baseline data from the intervention group.[8] School-based hygiene interventions have also shown promise in improving parental and family behavior change, but to date have not been tested in an urban area.[9,10,11]

OBJECTIVES

The purpose of this study was to evaluate if and how hygiene programming aimed at students in schools in Addis Ababa, Ethiopia influences hygiene knowledge and behaviors in the home. The findings will lay the groundwork for further research on how to strengthen the link between school programming and household behaviors and influence how WASH organizations target households for hygiene behavior change in the future. This study aimed to: (1) understand parent and child communication dynamics and their experiences of participating in a school-based hygiene curriculum; (2) assess household hygiene knowledge and behaviors after exposure to a hygiene curriculum at their child's school compared to unexposed households; and (3) determine parental perspectives on improvements that could benefit a school-based hygiene curriculum.

METHODS

Since 2012, the organization *Splash* has been working with Addis Ababa government schools to provide clean drinking water, handwashing facilities, toilet rehabilitation, and an interactive hygiene curriculum to students. They have established an exclusive partnership with the Ministry of Education to serve as the sole implementer of hygiene education programming in the city and expect to reach all 375,000 children in 450 government primary schools in Addis by 2022. As discussed above, *Splash* has had considerable success improving handwashing rates among children in schools through their hygiene education program. However, the organization was interested to understand if and how their interventions impact not just students but the members of their households. The primary author had previously worked with *Splash* on handwashing research in Nepal and innovations to behavior change programming for Ethiopia, Nepal, and India, so the organization and primary author collaborated to design the following study. To this end, we conducted semi-structured interviews, environment observations, and handwashing demonstrations with adult family members of children enrolled in Addis Ababa government primary schools (grades one through eight) between January and March 2018.

Intervention

The study included interviews with both intervention and control households. Intervention households were those that had at least one child enrolled in a school with water, sanitation, and hygiene programming. This programming was implemented by *Splash*. The *Splash* intervention model, implemented at all schools in which intervention participants' children were enrolled, included the components listed in Table 1.

A signature of *Splash*'s hygiene education programming is the formation of a student Hygiene Club at every school. These 20-30 students receive extensive training on hygiene topics and learn activities and games that increase knowledge and promote improved behaviors. Hygiene Club members are selected by teachers and school management as strong leaders with the potential to encourage behavior change among their peers and the community. It is the responsibility of the Hygiene Club to incorporate handwashing and other hygiene lessons into school-wide assemblies, work with teachers to conduct hygiene activities in the classroom, keep the WASH facilities clean and functional, and develop innovative strategies for improving hygiene knowledge and behaviors among all students at the school. Two of the most important components of *Splash*'s interventions are a song that teaches the six handwashing steps (see Figure 1 for handwashing step instructions) and the annual soap drive that asks all families to contribute a bar of soap to the school.

Recruitment and sampling

We identified households from eight intervention schools and two control schools. Eligibility criteria included being government-run, enrolling students from all primary grades, and having conducted at least one academic year of hygiene education programming implemented by the nonprofit organization *Splash*. Exclusion criteria included currently participating in a *Splash* program that included additional interventions not listed in Table 1. Twenty schools from eight of Addis Ababa's ten sub-cities met the intervention school inclusion criteria. Control schools were government-run primary schools that had not yet begun *Splash* programming but were scheduled to begin *Splash* efforts following completion of the study. Twelve schools from all ten sub-cities met the control school inclusion criteria.

An intervention school was selected from each of the eight represented sub-cities by simple random cluster sampling clustered by sub-city using Excel's random number generator. Two control government schools were selected by simple random clustering, clustered by lower and higher socioeconomic status of sub-cities. *Splash* Ethiopia staff identified which control schools were in wealthier parts of the city and which were in poorer parts and the schools were divided into those categories. One school was randomly selected from each using Excel's random number generation. The primary author conducted the random number generation for both intervention and control schools. See Figure 2 for distribution of schools.

The principal or other school staff at each school purposively selected three to six families based on proximity to the school (households had to be reached from the school by walking or close public transit), their likely presence at home during the day, and their representativeness of the school community. The school contact was also responsible for ensuring that students of selected families were not all in the same grade and not all households selected had a student enrolled in the school's Hygiene Club. Any adult member of the household present at the time of the interview could serve as the household participant. Participants were recruited until data saturation was achieved. The final sample consisted of 26 intervention households and nine control households. We had a response rate of 92%. Two households had no one at home at the time of the visit and one chose not to participate.

Data collection procedure

Interviews

The primary author and research assistant conducted 15-30-minute semi-structured interviews with an adult household member present at home at the time of the visit. As a native Amharic speaker, the research assistant assisted with interviews and translated them. She was working as a *Splash* intern with limited prior translation experience.

On the day of interviews, the interviewer and translator met students from selected households at their school and students walked them to their homes to complete the interview and direct observations. The interview

guide (see appendix) was informed by the specific aims of the study and developed in consultation with Splash Ethiopia staff and following systematic reviews of the literature. The interview questions covered the following topics: basic household demographics, participant-child dynamics; hygiene knowledge and sources of knowledge; changes in hygiene knowledge; hygiene behaviors, motivators, and barriers; changes in hygiene behaviors; and communication methods between school and home. The interview guide was written in English and translated into Amharic in advance of the interviews. The interviews were audio-recorded and later translated and transcribed.

Direct Observations

In addition to semi-structured interviews, household visits included direct observation of a participant handwashing demonstration and household WASH facilities. The translator asked participants to show the primary author their handwashing station. The primary author noted the water source, type of handwashing facility (jug and bowl, sink, etc.), and soap presence. The participant was then asked to demonstrate typical handwashing. Any bias in better-than-typical handwashing is likely nondifferential between intervention and control participants. The primary author took notes on soap and water use, approximate time spent washing, and number of handwashing steps demonstrated.

Data analysis

Interview data were initially analyzed using grounding code formation indexed into the three distinct areas that corresponded with the three primary aims of the study: (1) parent and child communication dynamics; (2) hygiene knowledge and behaviors; and (3) perspectives on improving hygiene communication with households. Transcripts were coded using QDA Miner Lite. The coder completed 29% of cases for initial open coding construction and developed a coding memo based on the themes that emerged. The remaining cases were coded in accordance with the coding memo and anything unexpected was added as a new code. Coding was conducted by a single coder. After initial coding, the primary author and a second coder completed concept mapping,

identifying themes that answered the study research questions. Content analysis was conducted by calculating coding frequencies.

Ethics

Study methodology and procedures were reviewed and given exemption status by the University of Washington Institutional Review Board. Written informed consent was obtained prior to interviews and the translator answered participant questions. Participants were coded using numbers and interview data was anonymized using this coding system to preserve anonymity during analysis.

RESULTS

Thirty-five adult household members of students in Addis Ababa government primary schools were interviewed. Twenty-eight participants were female, including 17 mothers and two sisters. Seven participants were male, including three fathers and two brothers. See Table 2 for more participant background characteristics.

Participants believe that parents can learn from their children

Participants overwhelmingly believed that parents and other adult family members can learn from their children. When asked whether they thought the children in their family could teach them new things, 30 of 35 participants said yes (86%), four were not sure (11%), and one said that adults cannot learn anything from children (3%). As two participants explained:

> *"Students in this generation have much more knowledge in terms of technology and other new things."* – Father of 2, dayworker

> *"Definitely, [adults can learn from children]. My generation and this generation are different, and they teach us a lot."* Mother of 6, unemployed

In support of this stated belief, more than half of intervention participants could describe something specific that they had learned from their child that their child had learned in school (16 of 26 participants, 62%) and ten of 13 participants who had a trained Hygiene Club member in the home were able to describe Hygiene

Club activities and hygiene information they had learned from that child (77%). Further, several participants explained that they had moved to Addis for a better education and brighter future for their children and recognized that they could benefit from their children's educational opportunities. As one described:

> *"I didn't get to finish my schooling… Therefore, I never did have the opportunity to fully experience school and learning but through my son I get to experience learning to some extent."* – Father of 2, dayworker

Participants are motivated by cleanliness and health to wash their hands

Every single participant mentioned both a desire to stay healthy and be clean as reasons for washing their hands. When asked about why they wash their hands and what reminds them to wash their hands, participants talked about their health:

> "*[Washing my hands] is very important. Diseases like typhoid and typhus are mainly caused by having poor hygiene and mainly if we don't wash our hands properly. Therefore, washing our hands properly is very critical to be healthy."* – Caretaker of 2 and mother of 4, vegetable stand owner

> *"I once was diagnosed with cholera and was severely ill. That experience reminds me to wash my hands before I eat food. I give handwashing a priority."* – Father of 2, dayworker

They also discussed motivations related to cleanliness:

> *"I am reminded to wash my hands when I touch dirt and see charcoal marks on my hands."* – Adult sister of 1 and mother of 1, unemployed

> *"I am motivated to wash my hands when I touch dirty* (sic). *I am a driver by profession, and I am encouraged to wash my hands after I change tires or clean my car… as my hands will be very dirty."* – Father of 2, private driver

Some participants cited their consideration for others, their desire for good social standing, role modeling for neighbors and their children, religious beliefs, and acting out of habit as additional motivations for washing their hands. See Table 3 for complete findings.

Numerous barriers prevent good hygiene practices

While all households had access to a municipal piped water source within 5 minutes of their home and all participants had a handwashing station in or just outside their home, many participants identified barriers to practicing good hygiene, particularly handwashing, that they or others in their community face. When it came to

barriers the participants themselves faced, not having access to water or soap and low socioeconomic status were the two most commonly cited obstacles, both of which were widely seen as out of the participants' control. Fourteen of 35 participants talked about times when they were not able to wash their hands due to lack of water or soap access. Many described situations when they were away from home and did not have control over their access to water or soap, such as the following:

> *"[I don't always wash my hands] when I am at people's house or on the road because I won't have the means to wash my hands. When you are at people's house, if they don't offer you water and soap to wash your hands with, you usually don't ask for it out of respect. Therefore, you don't wash your hands."* – Adult sister of 3, hair stylist

> *"[I don't wash my hands] when I am at work and I don't have water and soap available on me."* – Father of 2, trash collector

Another six participants cited their limited finances as a major barrier to good hygiene. They explained:

> *"I am very poor and there are times where we don't have soap at home."* – Mother of 2, vegetable stand owner

> *"We want to purify drinking water but it can get expensive."* – Uncle of 2 and father of 4, dairy farmer

Other obstacles participants experienced themselves included a lack of hygiene knowledge and being forgetful, careless, or in a hurry.

When asked about their neighbors' hygiene behaviors, participants largely focused on lack of knowledge; low socioeconomic status; and being forgetful, careless, or in a hurry as barriers to good hygiene practices. 17 participants described others' limited knowledge of the importance of handwashing with soap or practicing other proper hygiene behaviors as a primary reason for poor hygiene, such as:

> *"I think it has to do with awareness or proper education level. If people are educated about hygiene they will follow good handwashing behaviors."* – Mother of 6, unemployed

A further 13 talked about their neighbors' low socioeconomic status and limited means to practice good hygiene, and nine believed that others in their community practice poor hygiene because they are forgetful or careless. As one participant explained:

> *"When I see people who are always very dirty, I just think that they are very careless."* – Adult sister of 1 and mother of 3, housewife

Other obstacles to good hygiene that participants believed others in their community experience were having poor family role models or support and having limited water and soap access. See Table 4 for complete findings.

Participants with a Hygiene Club member in the family observed changes in household hygiene

Among households that included at least one Hygiene Club member, hygiene behaviors improved in response to in-school hygiene programming. Ten of 13 participants with a trained Hygiene Club member identified changes in knowledge or behaviors by their child(ren), themselves, or other family members (77%). Further, all participants who were the mother or father of the Hygiene Club member – the household members most closely interacting with their children in most households – could describe hygiene changes. Ten of these participants perceived changes in their children while six identified changes in themselves or other family members. When asked what changes they saw in members of their household, participants said:

> "*She not only educates people about good hygiene practices, she finds ways to keep our home clean and makes sure we have soap at all times. Ever since [she] joined the Hygiene Club, she has a much better hygiene behavior and good handwashing practice at home. She makes sure that everyone at the house is doing the same."* – Mother of 4, housewife

> *"I used to tell her to wash her hands before eating a meal and such but now she does it on her own In fact, she tries to teach me how to properly wash my hands."* – Mother of 2, unemployed

> *"I can say for sure that her involvement with Splash Hygiene Club has influenced her younger brother's hygiene behavior. His school has no hygiene programming, therefore, he is not exposed to hygiene education at the same level as her."* – Adult brother of 4, engineer

> *"I am more alert about washing my hands with soap."* – Mother of 4, housewife

> *"I have learned about diseases that are caused by poor hygiene."* – Mother of 2, vegetable stand owner

Participants without a Hygiene Club member in the family are unaware of hygiene programming or its impact

Not a single participant whose family did not include a Hygiene Club member (either trained or recently enrolled) identified changes in household hygiene knowledge or behaviors since *Splash* hygiene programming began at their child's school. In fact, only two of 13 participants without a trained Hygiene Club member knew prior to the day of the interview that their child(ren)'s school had any WASH programming in place (15%). One

of these participants was the relative of a child who recently joined the Hygiene Club but has not yet received training. She explained:

> *"I recently heard about it, as she joined the clubs recently. She hasn't told much, she just told me that she joined the Hygiene Club."* – Female cousin of 7th grade girl, vocational school student

The other knew very little about the program:

> *"It is my first-time hearing about Splash [hygiene education]. But I recently heard that the students have clean water available at their school."* – Sister-in-law of 6th grade boy, housewife

Household hygiene knowledge and behaviors improve with in-school programming with and without participant awareness

Despite perceiving no changes in household hygiene, participants without a Hygiene Club member had significantly better hygiene knowledge and behaviors than control participants – those whose children were enrolled in schools without WASH programming. Further, there was no significant difference between observable hygiene knowledge and behaviors among participants with and without a Hygiene Club member in the household.

As shown in Table 5, intervention participants demonstrated significantly more handwashing steps (from among the six taught in the *Splash* handwashing song) than control households in an observed handwashing demonstration. Intervention participants demonstrated an average of 4.0 steps compared to 1.8 by control participants. There was no significant difference between handwashing steps demonstrated by participants with a student in the Hygiene Club or not (3.8 steps among intervention participants compared to 4.3 steps among control participants; $p = 0.4023$).

During an observation of household WASH facilities, soap was found within easy reach of the handwashing station in 22 of 26 intervention households (85%), compared to just three of nine control households (33%). Intervention households were significantly more likely to have soap present at the handwashing station at the time of the interview than control households. See Table 6 for more information. There was no significant difference in likelihood of soap presence between participants with a student in the Hygiene Club or not (84.6% of intervention participants compared to 84.6% of control participants; $p = 1.000$).

Participants see schools at the center of future household hygiene outreach

While many parents were dissatisfied with the communication and opportunities for parent engagement currently offered by their child(ren)'s schools, they overwhelmingly saw schools as the best potential source for improving household hygiene behaviors in the future. Generally, schools do not currently communicate regularly. Twenty-one of 35 participants estimated that their school communicates with the household three or fewer times per year with no significant difference between intervention and control participants. Nine participants said they receive communication from the school eight or more times per year or "often." From among intervention school families, two of 13 participants with a child in the Hygiene Club remembered receiving information about hygiene activities and one was invited to attend a hygiene-related activity at school. One of 13 participants without a Hygiene Club member recalled receiving anything from their school related to hygiene and none were invited to a hygiene activity. Likewise, one control participant received hygiene messaging from the school and none were invited to participate in a hygiene activity or meeting at school. There was no significant difference between levels of hygiene communication between Hygiene Club and non-Hygiene Club households or between intervention and control schools.

Many participants expressed a feeling of frustration over school communication but when asked how hygiene programming could better reach households (without suggesting that programming needed to come from schools), all recommendations centered around opportunities for the school to engage families. Thirty of 35 participants recommended schools host hygiene-related activities or meetings for parents and families. Suggestions included:

> *"If the school can host a parent hygiene education event that will be great. I will attend and I think it will be very useful."* – Mother of 2, vegetable stand owner

> *"Hygiene program in school should include parents in school activities. I think it will be helpful if the school selects model students from the hygiene clubs to teach or raise awareness on hygiene for the student and parents."* – Adult brother of 5, accounting college student

> *"Instead of sending home flyers and posters, I prefer if we get a face-to-face education session or discussion at their school. Flyers are good too but you will probably read them ones and throw them away."* – Father of 2, day worker

Eleven participants expressed an interest in their school sending home hygiene education materials. As one participant pointed out:

> *"If the school sends a written message to parents regarding hygiene education, everyone in the house will have access to it and people living around us could be benefited from it as well."* -Caretaker of 2 and mother of 4, vegetable stand owner

A further four participants recommended engaging parents in WASH facility improvement projects at the school to increase their awareness at home, one suggested increasing the number of hygiene activities and educational opportunities for students who are not in the Hygiene Club so all students were prepared to teach their families about good hygiene, and one suggested that schools provide families with soap.

DISCUSSION

We conducted a study on the influence of school-based hygiene education on household hygiene knowledge and behaviors in Addis Ababa, Ethiopia. Through semi-structured interviews and direct observation of household environments and participant handwashing, we explored communication dynamics between adult family members and their school-aged children and the potential for using children as change agents for household hygiene, household hygiene knowledge and behaviors after exposure to school-based hygiene education, motivations for and barriers to washing hands and practicing good hygiene, and ideas for improving hygiene programming to better reach households in the future. We found that most adults believe they can learn from their children, that most family members with a child in the Hygiene Club could identify changes in household hygiene behaviors, and that measurable hygiene knowledge and behaviors improve with exposure to a school-based hygiene education program whether people are consciously aware of the program or not. These findings suggest strong potential for changing household hygiene knowledge and behaviors through school-based hygiene programming in Addis Ababa, Ethiopia.

The findings are consistent with the limited research conducted on the relationship between school-based hygiene education for children and household hygiene knowledge and behaviors. A 2006 study in western Kenya found that 14% of parents reported treating their water after their children participated in a school-based hygiene

intervention compared to 6% at baseline ($P<0.01$).[9] Similarly, a 2005 study in western Kenya found significant improvements in hygiene knowledge among parents and guardians after being taught by schoolchildren who participated in a hygiene education program.[10] A 2016 study in rural Eastern Zambia also found that when children practiced and were encouraged to share health messages with their family, mothers reported high levels of trust in children's health information and children were able to make small changes to family member behaviors.[11]

Our study adds to this body of research the findings that (1) when children serve as leaders of their school's hygiene programming, they engage their families far more in their learning and perceptions of changed behaviors are significantly more common than among those students who just receive the hygiene education, and, (2) that household hygiene behaviors improve even without awareness of exposure to hygiene education through their children. It is unclear from the data why intervention households without a Hygiene Club member were not conscious of hygiene programming but were still impacted in knowledge and behaviors by it. One explanation may be that participants without a Hygiene Club member are exposed to subtle behavior change nudges such as seeing their child demonstrate proper handwashing techniques and being asked to donate a bar of soap to the school every year. While participants are not aware of these cues, they may still be responding to them. However, further research with different household intervention groups would be necessary to determine if there is evidence to support this hypothesis.

Strengths of our study include the combination of interviews and direct observations as well as the inclusion of a control group. By conducting both interviews and observations at each household, we can consider how participants perceive their relationship with their children and their children's education and the influence of hygiene programming on their home lives as well as how those perceptions compare to measured outcomes. This mixed method approach gives us insights into participant beliefs and experiences and some background to the quantitative findings. Including a control group allowed us to compare the perceptions and observed behaviors of those exposed to a school-based hygiene program with those who have not been exposed without having to rely solely on how participants think their knowledge and behaviors have changed over the course of one year or more. The time since initial exposure was significant and identifying small changes in one's own behavior can be

difficult, so a control group serves as a stronger comparison group than comparing current knowledge and behaviors to participants' memories of pre-intervention knowledge and behaviors.

Limitations of our study include its small sample size, participant sampling strategy, and generalizability. Because of the small sample size, the opportunities to find significant results when comparing soap presence and handwashing steps between different sub-groups of the study population are very limited. We could improve the power of the quantitative outcome measures and allow for more cluster analyses with a much larger sample size. The participant sampling strategy – asking school principals to select households for participation – is also limiting because principals may have had an agenda when selecting participants that did not match our own and we had no way to control for that, or they may have selected the most convenient families without considering who might offer diverse perspectives. Additionally, by selecting only households within a short distance from the school, we failed to capture the perspectives of families who choose or are forced to send their children to schools farther away. By interviewing households during the workday, we also failed to capture perspectives of families in which everyone works full time. Finally, we do not know how consistent adult relationships with their children are across other Ethiopian, African, and global communities. Many Addis Ababa families have moved to the city for their children's education and are poised to take advantage of school resources and we cannot determine the widespread potential for using children as household change agents in communities not in this situation. These study limitations restrict the generalizability of the findings without conducting similar research in other contexts and increasing the sample size.

Despite limitations, the findings from our study suggest that there is strong potential to improve household hygiene behaviors through school-based hygiene programming for students. Schools serve as a critical and efficient access point for water, sanitation, and to influence hygiene behavior among students, and if organizations can reach adults through these centralized and accessible institutions that serve children in even the most hard-to-reach communities in the world, the potential for improving behaviors, health outcomes, and quality of life not just for children but also their parents and communities as well is substantial.

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TABLES AND FIGURES

Table 1. *Splash* School WASH Intervention Components

	Activity/Intervention	Objective	Implementor
Infrastructure Interventions	Fiberglass or concrete and tile handwashing stations with piped water connected to the municipal supply and/or school storage tank	Improve access to handwashing facilities	Splash staff
	Water filtration system that utilizes UF and carbon filtration	Improve drinking water quality	Splash staff
	Fiberglass or concrete and tile drinking water stations connected to water filtration system	Improve access to clean drinking water	Splash staff
Behavior Change Interventions	Orientation workshop for school management and PTSA	Enable school's understanding of the importance of school WASH programming	Splash staff
	3-day training workshop with 2 focal teachers selected by the school to lead hygiene programming	Equip teachers to implement the hygiene program at their school	Splash staff
	School-wide teacher training	Improve teachers' hygiene knowledge, providing training on methodology and appropriate activities for passing the knowledge onto their students	Focal teachers with Splash support
	Hygiene Club workshop with the 20-30 students selected for the Hygiene Club (50:50 boy/girl ratio, mix of grades, strong leaders) -	Increase knowledge, incite motivation, and create a plan for change with student leaders. Students will become advocates for good hygiene practices within their school and community	Focal teachers with Splash support
	Soap Drive – request that each student and teacher bring in one bar of soap	Ensure that soap is always accessible to students at school	Focal teachers and Hygiene Club
	Child-to-child activities conducted by Hygiene Club	Transfer hygiene knowledge and motivation to the entire student body	Hygiene Club
	Hygiene Club monthly meetings	Provide structure to Hygiene Club and make sure they are completing their responsibilities	Hygiene Club with focal teacher support

Table 2. Participant background characteristics (n = 35)

Characteristics	n (%)
Sex:	
Female	28 (80.0)
Male	7 (20.0)
Participant relation to student(s):	
Mother	17 (48.6)
Father	3 (8.6)
Sister	3 (8.6)
Brother	2 (5.6)
Caretaker	2 (5.6)
Other relative	8 (22.6)
Occupation of participants:	
Homemaker	11 (31.4)
Unemployed	6 (17.1)
Cleaner/trash collector	5 (14.3)
Vegetable stand owner	3 (10.7)
Student	2 (5.7)
Other	8 (22.9)

Table 3. Motivations for handwashing with soap

Motivations	**Mention Count**	**% of Cases**
Health	76	100.0
Being Clean/Hygienic	63	100.0
In Consideration for Others	8	22.9
Good Social Standing/Image	4	11.4
Role Modeling	4	11.4
Religious Beliefs	3	8.6
Out of Habit	1	2.9

Table 4. Barriers to handwashing with soap

	Personal Barriers		Others' Barriers	
Barriers	Mention Count	% of Cases	Mention Count	% of Cases
No Water or Soap Access	14	40.0	3	8.6
Low SES/Limited Means	7	17.1	17	37.1
Forgetful/Careless/In a Hurry	4	11.4	10	25.7
Lack of Knowledge	2	5.7	21	48.6
Poor Family Role Modeling & Support	0	0.0	4	8.6

Table 5. Demonstration of handwashing steps

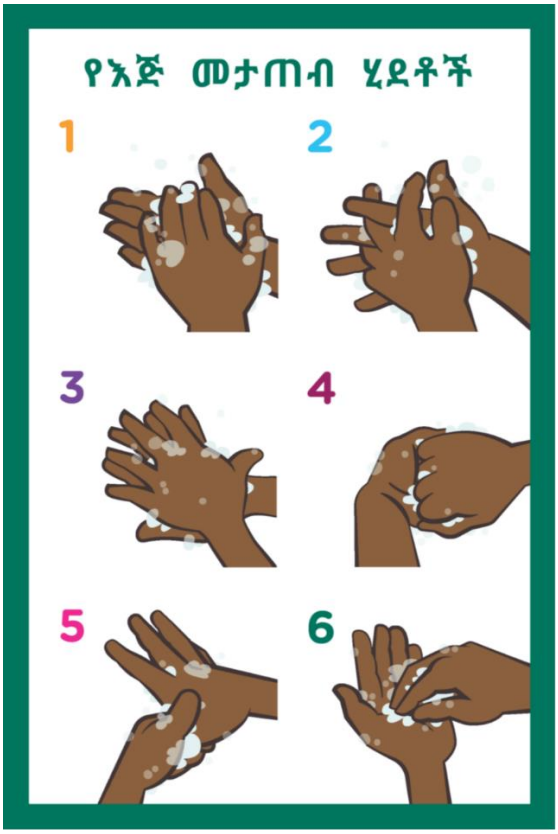
	Mean # steps	Difference (95% CI)	P-value
Participant*			
Intervention (n = 23)	4.0	2.2 (1.6, 2.8)	0.000
Control (n = 8)	1.8		
Student's Hygiene Club Status (from intervention households)			
Hygiene Club member (n = 12)	3.8	.4 (-0.6, 1.5)	0.4023
Not in club (n = 11)	4.3		

* 3 intervention and 1 control participants were unable to or refused to demonstrate handwashing

Table 6. Soap presence

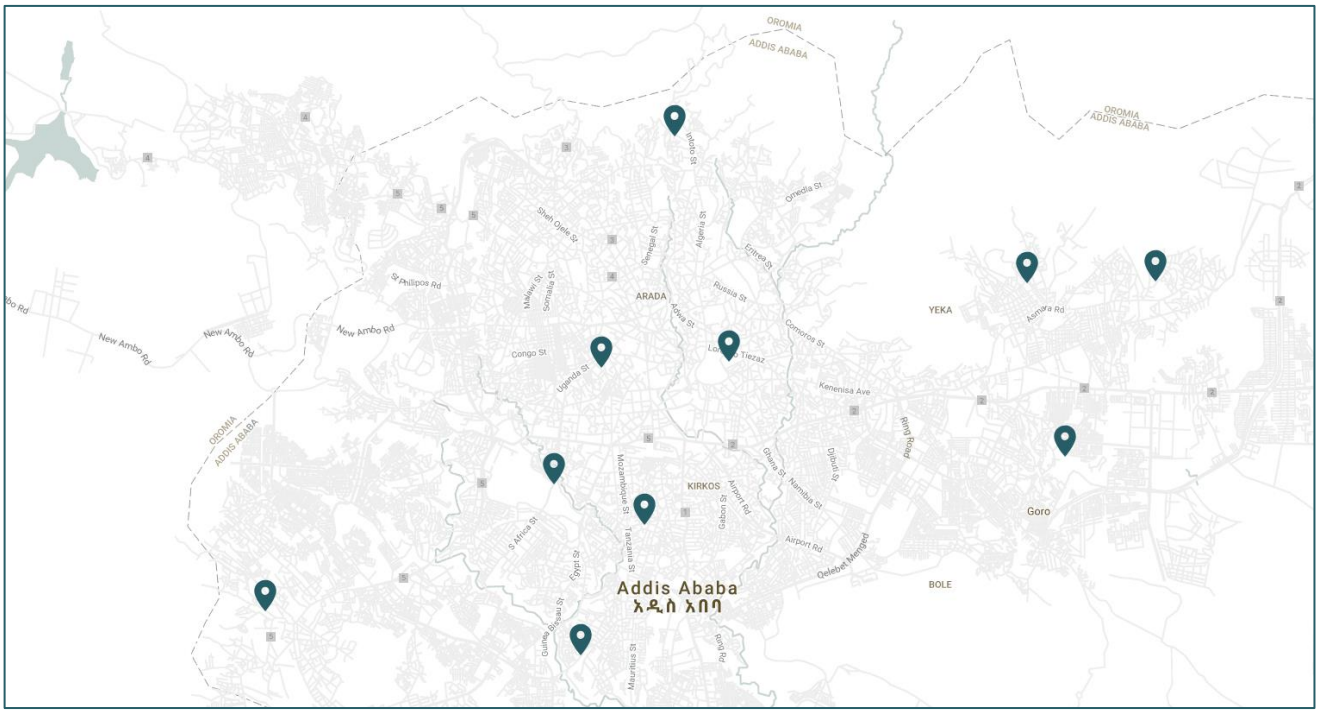
	Percentage Households with Soap Present	Difference (95% CI)	P-value (Fisher's Exact)
Participant			
Intervention (n = 26)	84.6	51.3 (17.5, 85.1)	0.007
Control (n = 9)	33.3		
Student's Hygiene Club Status (from intervention households)			
Hygiene Club member (n = 13)	84.6	00.0 (-23.3, 23.3)	1.000
No Hygiene Club member (n = 13)	84.6		

Figure 1. Handwashing steps poster



Designed by *Splash*

Figure 2. Map of school distribution in Addis Ababa. All households located within 2 km of closest school.



APPENDIX I – INTERVIEW GUIDE

Demographics

1. Which school(s) do(es) your child(ren) attend?
2. Household member demographics: [12]

Family Title	Gender	Age	Profession	Grade for students)

3. Is/are your child(ren) in school full or part time?
    a. If part time, how much of the year does your child miss?
        i. Why?

Handwashing Demonstration

4. Please show where you wash your hands [13]
5. Please demonstrate how you wash your hands (check all observed behaviors that apply and fill in the blanks) [13]

Participant washed palms, fingers, back of hand, knuckles between fingers, and nails
Participant completed some but not all the handwashing steps. How many? _____
Participant could not demonstrate handwashing. Why not? _____
Participant washed hands for approximately _____ seconds
Participant used soap
Notes on handwashing demonstration:

Home Observations (not asked aloud)

6. Is there soap next to the handwashing station? [12]
7. Does the handwashing station have running water, a bucket of water, or other? [14]
8. Is there soap in the kitchen (if separate from the handwashing station)? [12]
9. Is there fecal matter in the toilet?
10. Is there a way to wipe after using the toilet (toilet paper, water, or other)?
11. What type of roof does the home have? [14]

Concrete/cement
Wood
Rock/shale tile
Ceramic tile
Metal
Corrugated tin
Grass/thatch
Cannot see the roof/see what material it is made of
Other (specify) _____

12. Notes on household observations:

Child-Parent Dynamics

13. What kinds of things does your child/children share with you about school?
    a. What are they excited about at school?
    b. What activities do they participate in?
14. What does your child/children try to teach you from what they learned in school?
    a. Can parents learn things from children?
14. What has your child/children told you about the Splash hygiene activities? *(not included in interview with non-Splash families)*
    a. What activities have they done?
    b. What have they learned?

Hygiene Knowledge and Sources of Knowledge

15. What are the critical times to wash your hands? [14]
    a. Do you remember where you learned about these critical times? From family members as a child, friends, school, your children, etc.?
16. What are the benefits to washing your hands regularly? [15]
    a. How did you learn about benefits of handwashing? (first-hand experience, from family members as a child, your children, neighbors, friends, etc.)
    b. Who benefits?
17. Where and from whom did your children first learn to wash their hands? (School? Home? Etc. – don't prompt)
    a. How old were they?
    b. Do you think this was the best time/place/way for them to learn?

Changes in Hygiene Knowledge

18. What have you learned about hygiene since your child began Splash hygiene activities at school? *(not included in interview with non-Splash families)*
    a. How did you get that new information? (from your child, from handouts from the school, from conversations with other parents, etc. – don't prompt)
19. What has your child learned since they began Splash hygiene activities at school? *(not included in interview with non-Splash families)*
    a. If nothing, why not?

Hygiene Behaviors, Motivators, and Barriers

20. How safe is the water your family drinks? [16]
    a. What makes you think that?
        i. Do you purify it?
        ii. If so, how?
21. When do you usually wash your hands? [15,17]
    a. Has your child talked to you about important handwashing times?
22. Why do you think some people in your community follow good handwashing behaviors while others do not?
    a. What are signs of someone using good hygiene practices?
    b. What makes people with good hygiene different from people with poor hygiene?
    c. Do most people in your community was their hands? [14]
23. What have you seen about hygiene practices amongst other families from your school compared to your neighbors who don't have children enrolled in the same school?
    a. Why do you think there are differences (if any)?
    b. What makes families from your school different from families not at your school?

24. What do you use to wash your hands?
    a. If soap, how often do you buy soap?
    b. Where do you get the soap from?
    c. Are there times you are unable to use these materials to wash your hands?
25. What else do you use soap for?
    a. What is your top priority for soap use?
26. Why do you was your hands? [14,15,18]
    a. Are there things you think about that remind you to wash your hands?
    b. Are there things you see that remind you to wash your hands?
    c. What other cues encourage you to wash your hands, if any?
    d. Have your motivations changed since your child/children began participating in Splash programming?
27. When you don't wash your hands, what are the reasons for not washing/what prevents you from washing your hands? [15,16,18-20]
    a. Are these reasons/barriers in or out of your control?
28. Why do your children was their hands?
    a. Where did they learn about why they should wash their hands?
        iii. School? Home? Friends? Community? Etc.
29. How important is hand hygiene to you? [7]
    a. Why is it important or not?
    b. Can you identify things that helped you decide it was important?
30. What is your perception of people who are always very clean or very dirty? [14]
    a. Do you think there is a relationship between cleanliness and status in society?
31. How have your hygiene behaviors changed since Splash programming began at your child's school? *(not included in interview with non-Splash families)*
32. How have your child's hygiene behaviors changed since Splash programing began at their school? *(not included in interview with non-Splash families)*

Communication Methods Between School and Home

1. How often do you receive written or verbal communication from your student's school?
    a. What kind of communication do you receive?
    b. Do you read it?
2. Do you value communication from your child/children's school?
3. Does the school send home materials (homework, flyers, etc.) about hygiene education activities?
    a. If so, what have they sent home?
4. Does the school host parent information nights or parent hygiene education nights?
    a. If so, have you ever attended?
    b. What did you think of the experience?
    c. Would you go again?
    d. Did you learn anything?
        i. If so, what did you learn?
33. How could the school better communicate about hygiene education activities to parents?
    a. How important is this to you?
34. What ideas do you have for how hygiene programming could better reach households (through schools or other institutions)?