Exploring the potential of schoolchildren as change agents in the context of school WASH in rural Zambia

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Glossary of Terms

BCC   Behavior Change Communication

CtC   Child-to-Child Communication

DoI   Diffusion of Innovations

DEBS   District Education Board Secretary

FGD   Focus Group Discussions

IRB   Institutional Review Board

KII   Key Informant Interviews

PLA   Participatory Learning Activities

PTA   Parent Teacher Association

SPLASH   Schools Promoting Learning Achievement through Sanitation and Hygiene

WASH   Water, Sanitation and Hygiene

Executive Summary

Background: Access to adequate water, sanitation and hygiene (WASH) at school has been shown to improve health of pupils and increase school attendance. Interventions that target the school can also serve as an entry point to improve WASH access at home. Using the school – an established and trusted source of knowledge – as a means of information dissemination is especially pertinent in rural settings where other techniques to engage communities might not be as effective. Yet, few school-based WASH programs use systematic or evidence-based approaches to promote dissemination of knowledge and practice, and there is limited research on the mechanisms by which children can influence their parents and siblings as agents of hygiene behavior change. In this study, we explored the potential for children to be change agents for behavior change and technology adoption in their households. The work was conducted in the context of a school-based WASH program, SPLASH, funded by USAID| Zambia and managed by the USAID WASHplus project.

Methods: We employed qualitative methods in order to gain a richer understanding of the attitudes and norms surrounding children as change agents, in the form of a two-phased study at five different SPLASH schools. During phase 1, we conducted two focus group discussions (FGD) with 16 pupils, one with boys and one with girls, and interviews with teachers who serve as the school's WASH coordinators. Pupils drew pictures, which they used to discuss their normative school and home WASH environments and behaviors, and the differences between the environments. Pupils conducted role-plays to show how they would speak to or teach a family member about WASH. At the end of phase 1, we gave the pupils a homework assignment that consisted of two sheets of paper containing pictorial WASH related tasks. One was an instruction sheet on how to make a tippy-tap, while the other showed the dangers of open defecation and drinking unsafe water. In phase 2 we conducted FGDs with the same pupils to assess their attitudes and opinions of carrying out the assignment. We also conducted five FGDs with a total of 39 pupils' female guardians. Female guardians were posed questions related to communication behaviors with their children and their impression of the WASH behaviors discussed by children. Data were analyzed using verbatim transcriptions and translation from the local language to English using grounded theory methodology.

Findings: Most pupils reported safe sanitation and hygiene behaviors at school and, due to a high perceived risk of disease, wanted to practice these behaviors at home. There were pupils who reported not using latrines for defecation, at the school and home level. Pupils discussed a desire to alter their environment in order to have safe sanitation, but did not feel they had the physical agency to influence this change. They reported negotiating with their parents (namely a male household head) to influence the construction of home latrines. As for hand hygiene, pupils discussed that they were successful in building tippy-taps at home using the homework. Another method pupils used was regularly reminding their parents to wash their hands. The pictorial homework assignment aided in discussion of sanitation and hygiene, as pupils reported that having a piece of paper allowed for their families to trust and easily understand the information

they were trying to teach. Mothers were receptive towards receiving WASH information from their children mostly due to the value they placed on their children's education, previous exposure to sanitation and hygiene information and an existing desire to change. Teachers reported engaging children in activities that encourage WASH discussion at home. However, the specific methodologies used to encourage communication about discrete WASH behaviors are still unclear. Pupils in the SPLASH school area are shown to have the capability to communicate WASH knowledge and behaviors to family members, however, discrete activities and guidance are needed for students.

Recommendations: Based on the results there are four major areas that SPLASH can target to encourage children to become change agents:

- **Messaging**: Integrate more pictures-based messaging to communicate healthy WASH behaviors using determinants for positive behavior (e.g. fear of getting sick).
- **Teaching methodology:** Incorporate WASH information into regular classtime; have teachers subsequently encourage school children to communicate about WASH through homework.
- **Community change:** Engage key outside influencers to motivate the involvement of household decision-makers to encourage proper WASH behaviors.
- **Future research:** Conduct further research investigating the specific teaching methodology and how it can impact WASH behaviors. Investigate how pupils can best influence their peers for WASH behaviors at the school level.

Introduction

Background

Study Site Context

Zambia is a land-locked country in sub-Saharan Africa with one of the lowest rates of access to safe water sources in the world [1]. It has a population of 13 million people; 61% of whom reside in rural areas [2]. On average, 4.8 million Zambians do not have access to clean water [3]. In Eastern Province, fecal-oral diseases are common, as open defecation is widely practiced [3]. Moreover, children are particularly vulnerable to improper water, sanitation and hygiene (WASH) facilities with diarrheal diseases being one of the leading causes of child mortality [4-6].
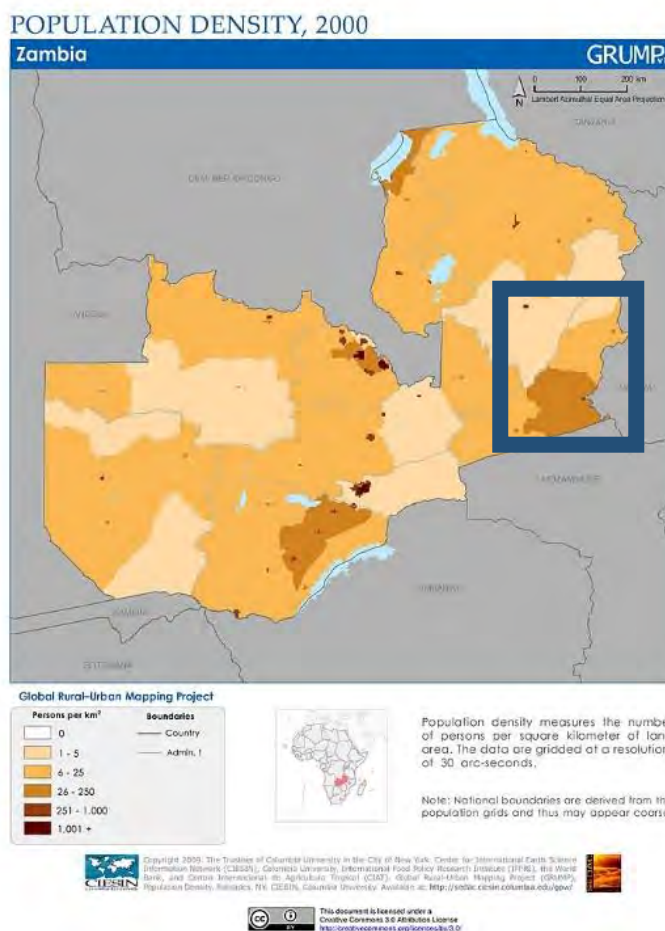
This study was conducted in Lundazi, a rural area of Eastern Zambia on the border of Malawi. Approximately 66% of the population is considered to be living in extreme poverty and Eastern Province is one of the poorest provinces in the country [7]. Lundazi has one of the lowest population densities at 6 to 25 people per km² (see Figure 1) [8].

In Eastern Province, the literacy rate amongst adults is low [9]. It is especially low in women where only 47.7% of the population are considered to be literate [9].

Children as Change Agents

The concept of using children as change agents for health messages was explored previously in other resource-poor countries such as Tanzania, Kenya and Nigeria [10-13].

Children are seen as good agents of change for several reasons: they are fast learners, curious and have regular access to information through school [14]. Children attending school in rural and remote areas can target households typically missed by traditional behavior change communication (BCC) campaigns. Furthermore, students may be seen by parents as trusted purveyors of information and can demonstrate key behaviors [10]. Children can advocate for healthy behaviors as active members of society and can be regular reminders for habit-forming

Figure 1 MAP OF ZAMBIA WITH POPULATION DENSITY: BLUE BOX SHOWS THE STUDY SITE AREA

activities [15]. Utilizing children to communicate health messages is also an inexpensive way to market a health intervention [14]. With the increase in children attending schools in Zambia (98% enrollment rate in 2005), there is a unique opportunity for health communication interventions to disseminate information to the community [13, 14, 16].

The potential role of children as agents of change in health promotion has been explored recently in developing African countries such as Tanzania, Kenya and Nigeria [10-13, 17]. These studies focused on a concept known as the Child-to-Child method (CtC) that was originally created for peer-to-peer education. CtC was shown to work as well when utilizing children as change agents by disseminating messages from Children-to-Community [10, 11, 13-15]. According to Bailey et al. (1992), CtC has a six-step methodology to teaching children in becoming change agents for health promotion: *(1) choosing the right idea and understanding it well; (2) investigating and finding out more; (3) reporting, discussing and planning; (4) taking action (individually and together); (5) discussing the results of the action; and (6) doing it better and sustaining the action* [18]. In Kenya, a behavior change education intervention utilized these techniques to teach children about health prevention [11]. In a pre/post-test assessment, the study showed an overall increase in children's sense of ownership and practical knowledge of health concepts [11].

Teachers play an important role in children's ability and motivation to communicate what they have learned in school. According to the literature, didactic teaching approaches where the teacher is utilizing a top-down, one-way process are not appropriate to encourage child to community communication [11]. Teachers must incorporate techniques and activities promoting participatory approaches (e.g. role playing, drawing, singing) that allow children to become owners of the health information being taught [10, 13-15]. Thus, children become empowered and motivated to communicate this information to their community [10-13, 17]. In previous studies and reports, children were shown to be more successful change agents through this approach [10-12,14, 15].

One of the most important aspects of utilizing children as change agents is ensuring the community trusts and accepts information received from children [13]. In a qualitative study in Tanzania, children, their families and their teachers were queried to understand the possibility of children being change agents. It was found that parents were receptive to the idea of children communicating health and sanitation messages to them [13]. From the parental perspective, factors which lead to acceptance of children providing information were motivation, perception of children, time to spend with children [13]. In the same study, children also communicated feeling like they could communicate health messages to their families [13]. Factors which were seen to be influential in promoting communication for students were motivation, confidence and ability [13].

These studies indicate that children have the capacity to influence family behaviors through appropriate teaching techniques. In order to understand whether these techniques are possible in Zambia, we conducted a qualitative study assessing child, parental, and teacher perspectives. The aim of this study was to develop and refine the behavior change approaches used within the SPLASH program to promote improved water, sanitation, and hygiene (WASH) knowledge and practices at school and at home. We explored the role of school children as agents of change in rural Zambia, specifically in the context of WASH knowledge and behaviors.

Research Questions

The goal of this study was to influence and inform the behavior change promotion approach of SPLASH in Eastern Province, Zambia. To achieve this goal, this study addressed the following research questions:

Primary Question: What is the potential for children to become agents of change for WASH behavior change in rural Eastern Zambia?

Secondary Questions:
1) What are the WASH behaviors of schoolchildren and existing cultural norms and practices of WASH in Eastern Zambia?
2) How are schoolchildren in the SPLASH area able to communicate WASH information learned from school to home?
3) How are parents receptive to children being agents of WASH behavior change?
4) What role do teachers play in promoting WASH message dissemination and behavior change?

Methods

Research Setting

This study was conducted at five primary schools in the Lundazi District of Eastern Province, Zambia. Schools were purposively selected by SPLASH staff to participate in the study based on the following selection criteria:

(1) whether the school had received all of the following aspects of the SPLASH intervention
   a. Water point construction/rehabilitation;
   b. Latrine construction/rehabilitation to fit norms regarding student/latrine ratios;
   c. Hand washing facilities (temporary or permanent) with needed supplies to practice hand washing;
   d. Drinking water facilities;
   e. WASH clubs and teacher training to implement hygiene promotion activities;
   f. Availability of hygiene promotion materials.

(2) the location of the school (peri-urban or rural)
   a. Three peri-urban schools were chosen with distances of 17 kilometers, 24 kilometers and 35 kilometers from town.
   b. Two schools with distances of 67 kilometers and 86 kilometers from the town center were chosen to represent the rural schools. This distinction was made since rural areas in Zambia have reported lower access to technology and contact with people outside their village [9]. Furthermore, it can imply more difficulties in accessing supplies.

Data Collection

Study Design

This study utilized qualitative methods, including focus group discussions, participatory learning activities (PLAs) and key informant interviews (KIIs). Data collection took place over five weeks during the months of July and August of 2013 in the Lundazi District of Eastern Province, Zambia. Prior to data collection, piloting and revision of the questionnaire and discussion guides took place in June of 2013 in Chipata, Zambia. All FGDs and KIIs were conducted in empty classrooms and offices on school grounds. Data collection was guided by the theoretical framework the Diffusion of Innovations.

Diffusion of Innovations

The theory of Diffusion of Innovations (DoI) developed by Everett Rogers (1995), describes how an innovation or idea disseminates from individual utilization to the larger population [19]. Rogers describes three different antecedents that are essential to know in order to understand if the adoption of an innovation is possible: (1) prior conditions (e.g. social norms, felt needs of a population, perceived characteristics of an innovation); (2) knowledge (characteristics of the adopter); (3) persuasion (characteristics of the innovation) (see Figure 2) [19]. Communication channels for eventual adoption of an innovation begin with prior knowledge that leads to persuasion, decision to adopt, implementation of the innovation and, finally confirmation (i.e. continued adoption of the innovation).

Figure 5-1. A Model of Five Stages in the Innovation-Decision Process
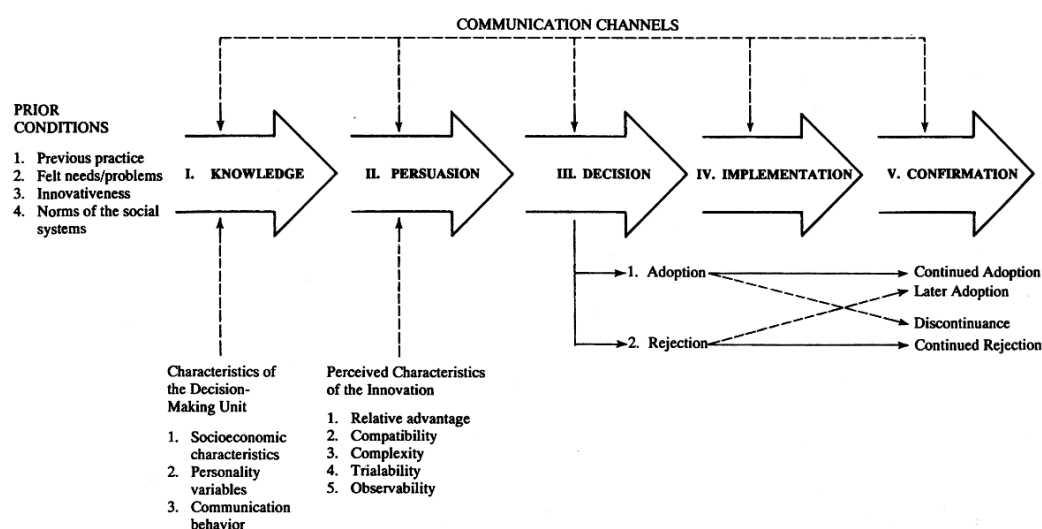
The *innovation-decision process* is the process through which an individual (or other decision-making unit) passes from first knowledge of an innovation, to forming an attitude toward the innovation, to a decision to adopt or reject, to implementation of the new idea, and to confirmation of this decision.

Figure 2 MODEL OF THE DIFFUSION OF INNOVATIONS ADOPTION PROCESS [30]

We conducted FGDs with pupils and stratified based on the sex of the child. For the purposes of this project, we defined a child as someone who is younger than the age of 18. In total, 20 FGDs were conducted with boys and girls ages 10-12 years. Five FGDs were held with female guardians of the aforementioned boys and girls, with a total of 39 female guardians recruited

from five different schools. Five KIIs were conducted with school teachers who were WASH coordinators at the respective schools. During each FGD with pupils, several different PLA techniques were utilized. PLA implies utilizing collaborative or active learning techniques (e.g. drawing, drama, etc.) that encourage the pupil's voice to be heard [20]. Primarily, these activities have been shown to promote discussion amongst children and are easier than a typical question and answer format [20].

Two Phased Design

In an effort to understand the various constructs of the DoI theory, we utilized two different phases of data collection.

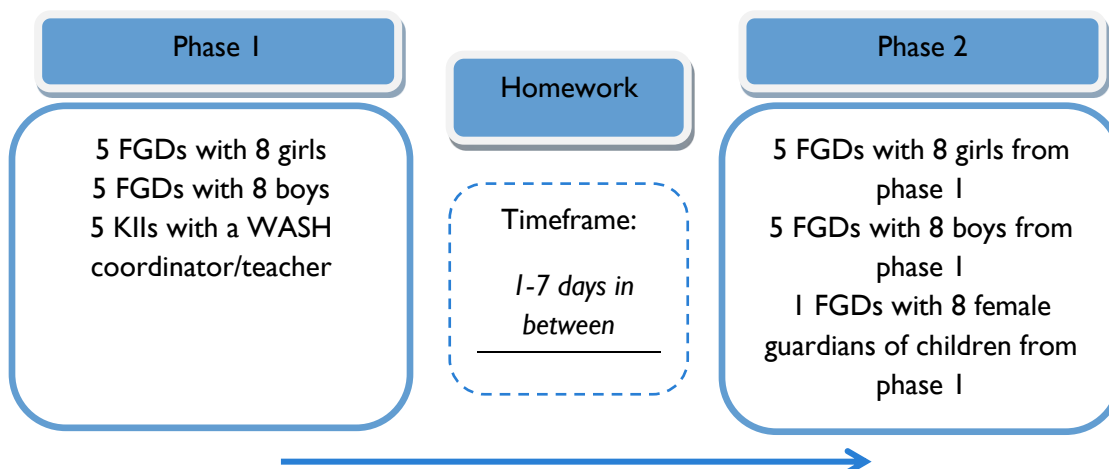| Phase 1	Homework	Phase 2
5 FGDs with 8 girls 5 FGDs with 8 boys 5 KIIs with a WASH coordinator/teacher	Timeframe: *1-7 days in between*	5 FGDs with 8 girls from phase 1 5 FGDs with 8 boys from phase 1 1 FGDs with 8 female guardians of children from phase 1

Figure 3 MODEL OF TWO PHASED STUDY DESIGN

Data were collected by two trained research assistants who moderated FGDs and took detailed notes during each session. We utilized three different FGD guides and one KII guide (see Table 1). FGD guides were developed iteratively and were improved after each field visit following debriefings with the research assistants. Demographic data were collected prior to FGDs with children and with parents using a six-item questionnaire.

Participants

Pupils

A total of 80 pupils participated in FGDs using PLAs. At each school, with the aid of a teacher, pupils were purposively sampled based on the following characteristics: they were considered by their teacher to be communicative, between the ages of 8-12 years, between the grades 3-7 and they were willing to participate in the study. Pupils were separated into two groups based on sex, and were requested to participate in two different phases of focus group discussions that lasted approximately 70 minutes each.

Guardians

A total of 39 female guardians were recruited from five different schools in the Lundazi District. We defined female guardians as any form of caretaker (e.g. an aunt, grandmother, mother, stepmother, etc.) to one of the children from FGD phase 1. In order to recruit guardians, we asked the school principal to contact their female guardians through their children. They were

eligible to participate if they were over the age of 18, spoke the local language of Tumbuka and were willing to participate in the study.

Teachers

A total of five different teachers were interviewed as key informants. Teachers were over the age of 18. Four teachers were WASH coordinators at each school and one teacher was only involved in WASH activities at the school. WASH coordinators are teachers in SPLASH schools who elect themselves to be in charge of the WASH management at school. They were interviewed in English by the study supervisor. The interviews lasted approximately 30 minutes each.

Tool	Population	Total Number of Participants	
		Phase 1	*Phase 2*
FGDs	Girls	40	38
	Boys	40	39
	Female Guardians	**X**	39
KIIs	Teachers	5	**X**

Table 1 TOOLS USED WITH EACH POPULATION

Figure 4 (LEFT) STUDY STAFF SHOWING HOMEWORK TO STUDENTS (RIGHT) STUDY STAFF TRANSLATING TOOLS

Phase 1

During phase 1 at each school, we conducted the following activities:

- One key informant interview with teachers at the school who were WASH coordinators.

    - **Goal:** To understand their points of view regarding activities taking place at the school regarding WASH and their opinion on the success of children as agents of change.

- Two focus group discussions with participatory learning activities with 16 pupils, stratified on boys and girls

    - **Goal:** To assess the cultural and normative WASH behaviors of pupils which speaks to antecedent of knowledge (1) the prior conditions, (2) felt needs/problems, and (4) norms of the social systems [19].

    - Participatory Learning Activities (PLA): (1) *Drawings*: Pupils drew pictures of their school and home WASH environment and used the pictures as a tool for discussion. (2) *Role-play*: Two pupils pretended as if they were speaking to someone at home about WASH. We asked them to first pretend to speak to one of their parents. Next, we asked them to pretend to speak to one of their siblings at home. (3) *Homework*: At the end of phase 1, we encouraged children to communicate WASH-related information to their families. Pupils were given two WASH-related picture-based homework assignments (Figure 4). Research assistants told pupils to utilize the assignments to speak about drinking clean water, not defecating in the open and hand hygiene. The research assistants did not tell the pupils to make a tippy tap or construct any WASH technology. *Assignment 1*: a paper that included a description of how to construct a tippy-tap (a low-cost hand washing technology) to promote safe hand washing behaviors (see Figure 5). *Assignment 2*: a paper that included an illustration that shows the health risks of open-defecation and drinking untreated water and this assignment was chosen due to the clear depiction of the potential risks of these behaviors (see Figure 5).

Phase 2

We visited each school for phase 2 on average three days following phase 1 activities (with a range of between one and seven days) to allow time for the children to speak to their parents. We conducted the following activities:

- Two FGDs with participatory learning activities with the same16 pupils, stratified on boys and girls (from phase 1)

    - **Goal**: to understand whether families were persuaded to adopt the WASH behaviors and technology explained in the homework. And to understand their attitudes and opinions of doing the assignment.

- Participatory Learning Activities: (1) *Drawings*: Pupils drew pictures of those with whom they spoke about the homework. (2) *Role-play*: Two pupils role-played to show us how they talked to their families about WASH.

- One FGD with 8 female guardians
  - **Goal:** to understand their communication behaviors with children and their impression of the WASH behaviors and assignment discussed by children.
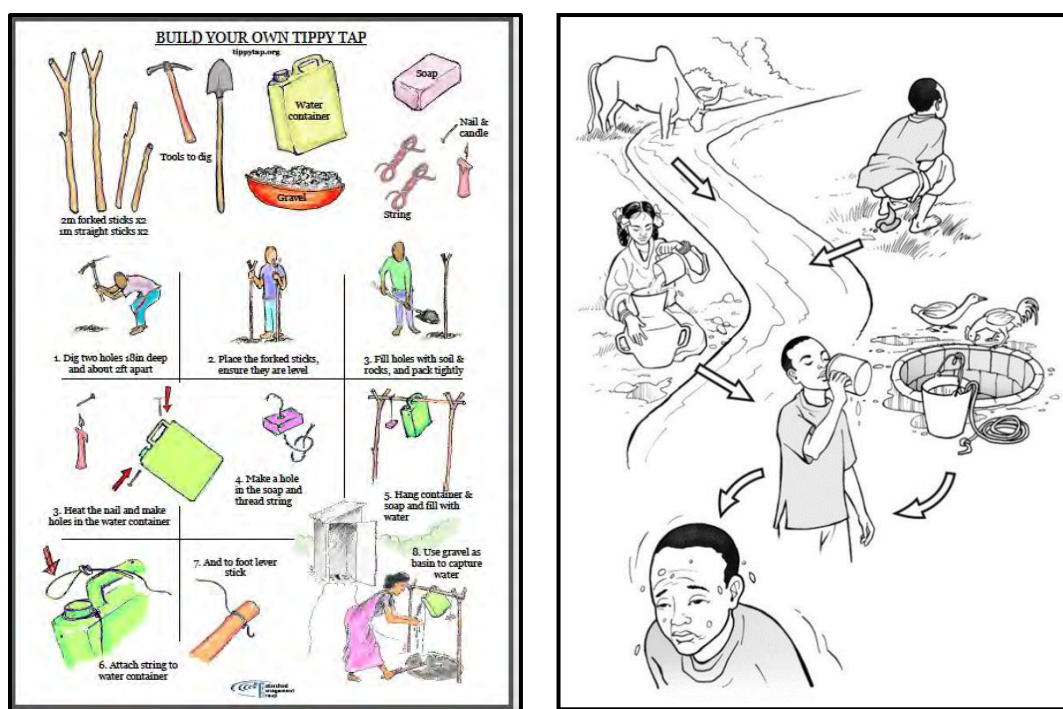

Figure 5 HOMEWORK FROM PHASE 1: (1) TIPPYTAP.ORG [21]; (2) WASH FRIENDLY SCHOOL PACKETS [22]

Ethics and Data Analysis

Ethics

SPLASH and Emory University staff conducted a four-day enumerator training in Chipata, Zambia. The training consisted of a thorough ethics course from FHI360, education and practice on qualitative methodology, and the translation of tools and consent forms. Both enumerators passed the ethics training before conducting research. A digital recording device was used to ensure the most accurate information possible was recorded. All recordings will be destroyed and all data has been de-identified to adhere to confidentiality as per approval by Institutional Review Board (IRB) of Emory University, FHI 360, and the ERES Converge IRB (local Zambian IRB). Emory University's IRB, FHI 360's technical and ethical review boards and the Zambian Institutional Review Board (ERES) approved this study. All participants assented or provided consent to participate in this study.

Data Analysis

Data was analyzed by creating inductive and deductive coding utilizing the Grounded Theory approach [23]. Grounded Theory is a methodology for qualitative data analysis that utilizes an iterative, circular process to categorize and establish links by constantly comparing the different categories [24]. Deductive coding implies using constructs from a preexisting theory to categorize the textual data. These codes were gleaned from the DoI theoretical framework. Inductive coding are developed through recognizing patterns in the data itself after thoroughly reading and writing notes on the data (see page 4) [24].

Transcripts translated from the local language, Tumbuka, into the English language were coded and analyzed using MaxQDA software. Transcripts were first read thoroughly using memos to decipher key themes. A codebook was then created using the key themes gleaned from the memos. FGDs were organized and analyzed by school. Textual data were then analyzed using thematic analysis. We coded data across all FGDs using the same codebook and identified key themes that arose. Themes were then compared across schools, sex and whether they were a parent or a pupil to understand the experience on a collective whole. Data were triangulated by comparing codes across parents, pupils and teachers.

Findings

We determined four major themes and sub-themes after analyzing the data: WASH behaviors and motivators, family receptiveness, child agency and teacher influence. Thematic results below were garnered from transcripts from FGDs with children and parents and detailed notes taken from KIIs with teachers. Quotations that best represent themes are shown throughout the text. Demographic results were collected from questionnaires asked to participants prior to FGDs.

Demographics of Participants

A total of five teachers, 39 female guardians and 80 pupils participated in the study. In Table 2 are demographic characteristics for pupils that participated in the study. The average age of participating pupils was 11.76 (SD=0.66). The median grade level of each pupil was five (Range: 3-7). Thirty-six (45%) pupils reported being WASH club members.

Table of Pupil Demographics N=80		
Characteristic	Mean	SD
Age	11.76	0.66
Boys	11.75	0.54
Girls	11.77	0.66
	Median	Range
Grade	5	3-7
Boys	5	3-7
Girls	5	4-7
	n=80	%
Who do you live with in your household?		
Mother	61	76.3%
Father	60	75.0%
Sister	26	32.5%
Brother	21	26.3%
Other Relatives	35	43.8%
WASH Club Membership		
Yes	36	45.0%
No	44	55.0%

Table 2 PUPIL DEMOGRAPHICS

Results of the female guardian demographics are in Table 3 below. The average age of participants was 35.35 (SD=7.76). Female guardians were asked to note the number of children in their household who went to a SPLASH school, the median number reported was two children (range: 1-5). Female guardians were asked whether they were members of the Parent Teacher Association (PTA) and six (15.4%) participants responded they were members. The primary employment of household earners was farming (n=23, 59.0%).

Table of Female Guardian Demographics N=33		
Characteristic	Mean	SD
Age	35.35	7.76
	Median	Range
Number of children at SPLASH school	2	1-5
Number of people that live in the household	7	7-10
	n	%
Member of PTA		
Yes	6	15.4%
No	27	69.2%
Primary Household Earner		
Father/Uncle	21	53.9%
Mother	7	17.9%
Both	5	12.8%
Employment of Earner		
Farmer	23	59.0%
Private Business	4	10.3%
Teacher	3	7.7%
Other	3	7.7%

Table 3 FEMALE GUARDIAN DEMOGRAPHICS

Themes

WASH Behaviors and Determinants

During phase 1, pupils drew pictures of their school and home environments to express what the WASH environments resembled at school and home (see Figure 6 below). With the aid of the drawings, pupils were able to elucidate on their normative WASH behaviors at school and at home. Pupils also utilized the drawings to compare the two environments and discuss the differences. Below is an example of pictures that one student drew. On the left, it depicts two girls washing their hands at school, a latrine, borehole, and a tippy-tap. In the drawing on the right (home) the child has drawn feces underneath a tree and a stream where her family sometimes fetches water.
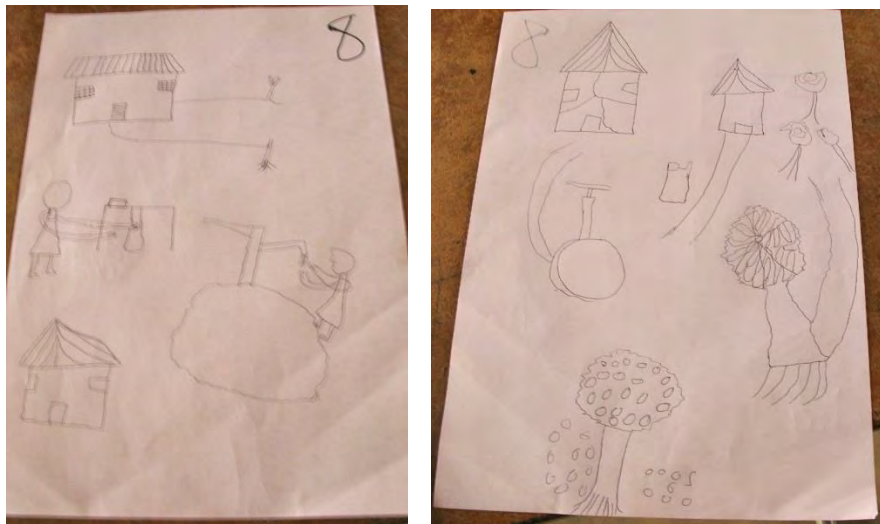

Figure 6 CHILD'S DRAWING OF SCHOOL (LEFT) AND HOME (RIGHT)

Pupils were asked to share information regarding the normative WASH behaviors of pupils and the local population. When asked, pupils provided information regarding activities of fellow classmates and other members of their community. The most frequently mentioned determinant for safe WASH behaviors (i.e. hand washing at key moments, defecating in a toilet and drinking clean water) was shown to be fear or high perceived risk of disease. SPLASH determined three key behaviors they specifically wanted to disseminate: hand washing at key moments, defecating in a toilet and drinking clean water.

Below is a table of the reported behaviors and the expressed determinants for these behaviors. The behaviors are divided into safe and unsafe behaviors as defined by SPLASH.

Table 4 REPORTED WASH BEHAVIORS AND DETERMINANTS

		School		Home/Village	
		Safe	Unsafe	Safe	Unsafe
Behavior	**Defecation**	Defecate in latrines	Open defecation	Defecate in latrines	Open defecation
Voiced Determinants		Fear of diseases Desire to keep the school grounds clean	Fear of toilets Unfamiliar with toilets	Fear of diseases	Fear of toilets collapsing Lack of access to a toilet Not enough toilets at home Lack of knowledge/obstinacy
Behavior	**Hand washing**	Wash hands before eating and after defecation	Do not wash hands before eating and after defecation	Wash hands before eating and after defecation	Do not wash hands before eating and after defecation
Voiced Determinants		Fear of diseases	Lack of understanding Lack of knowledge Open defecation	Fear of diseases	Lack of access to hand washing technology (e.g. tippy-tap or jug of water to pour).
Behavior	**Drinking water**	Fetch water from a safe source Treat water from an unsafe source	*Not reported*	Fetch water from borehole Treat water from an unsafe source	Fetch water from well stream Do not treat water from an unsafe source
Voiced Determinants		Fear of diseases Proximity to a safe source	*Not reported*	Proximity to a safe source Knowledge that water from an uncovered well and stream is unsafe	Lack of access to safe sources Lack of access to water treatment Find water treatment itself disgusting (e.g. foul smell or taste)

School WASH behaviors and determinants

Below is a further description of the WASH behaviors being conducted at school and at home. The results of reported WASH behaviors at school are divided into the three key behaviors (i.e. hand washing, defecation and drinking water). The results are organized below into the three different behaviors and their determinants. The most commonly mentioned determinant that was present across all behaviors was fear of disease.

Figure 7 SAFE WASH BEHAVIORS BEING CONDUCTED AT A SCHOOL

School: Hand washing

Safe

Almost all pupils reported regularly washing their hands at key times as defined by SPLASH: after defecation and before eating. Pupils reported regularly using tippy-taps that were strategically placed outside the toilets at every school that was visited.

Unsafe

Despite reporting regular hand washing at key times, there were a few reports that some pupils were not washing their hands after leaving the latrine at school. Pupils said this was due to a lack of understanding or knowledge about hygiene. In most of the schools, pupils reported that those who practiced open-defecation on school grounds also would not wash their hands at the key times (i.e. after defecation and before eating).

School: Defecation

Safe

At all schools most pupils reported using the latrines at school. There were many drivers associated with this behavior namely, high perceived risk of disease. One pupil said when asked why she goes to the toilet "We are scared that we will get sick." Furthermore, pupils noted a sense of pride of their environment and keeping the area around their school clean. At one peri-urban school a boy noted when asked why he uses a toilet "We can destroy the place." This sentiment was echoed by a girl participant at a rural school "(We use the toilet) because we want to keep our surroundings clean and healthy."

Unsafe

At the two rural schools, pupils reported there were still some students who would not use the latrines and would practice open-defecation. One of the drivers for this behavior was that these pupils were not familiar with toilets and did not have them in their homes. Another reported

determinant was that the toilets were not clean or smelled bad. At this school the SPLASH toilets were in the process of being built.

School: Drinking water
Safe
All pupils reported fetching water from the borehole at school for drinking water (an improved water source). They reported storing water in containers and tanks at the school for drinking. Pupils chose to use the borehole because they were afraid to drink dirty water.

Unsafe
There was no evidence of pupils reporting unsafe water fetching practices at school.

Home WASH behaviors
Pupils reported more safe WASH behaviors at school than at home. Across all schools the WASH behaviors by home and village were similar. Although many pupils reported safe WASH behaviors at home, many also reported other members of their families and villages not practicing safe WASH behaviors. There were more pupils mentioning unsafe WASH behaviors in the further out rural areas. This was most likely linked to lack of access to safe WASH technology.

> **Reasons for open defecation at home**
>
> "During farming season (rainy season) that's when we go to the bush because the toilets collapse."
>
> **– Girl, Rural school**
>
> "(Others use the bush because) they are scared to use the toilet…They fear that it can fall."
>
> **– Boy, Rural school**

Home: Hand washing
Safe
In all schools, some of the pupils reported already having built tippy-taps and using them regularly at home. Pupils reported fear of germs as a reason for why they washed their hands at key times.

Unsafe
Some pupils reported observing unsafe hand washing behaviors in the villages and at home. A few pupils said they and their families either did not wash their hands at home after defecation or, if they did, they did not wash with soap. Access to supplies was shown to be a barrier in tippy-tap construction and hand washing behaviors.

Home: Defecation
Safe
Pupils were motivated to use the toilet because they cared about their home environment and because they were afraid of getting diseases. At one peri-urban school, boys discussed feeling annoyed that people used the bush to defecate because they were harming the environment.

Unsafe

Pupils mentioned that at home another barrier was the number of toilets at home. One boy pupil at a peri-urban school said: "Sometimes you can find your friend (in the toilet) and then you can go to the bush."

Most pupils reported using toilets at home. However, in all school areas, pupils reported that there were some community members that still defecated in the open. Open-defecation was discussed as being linked to a lack of access to toilets, being too lazy to build toilets. In most school areas they also noted that some children were afraid of toilets because they were often not well made and could easily collapse.

Another pupil reported that during the rainy season toilets often collapse and therefore they do not have access to use them. At one school some pupils noted that there were some people in their village who had a toilet but still did not use it. When asked why people do this, the pupils replied that people practiced open-defecation because of ignorance and lack of knowledge.

Home: Drinking water

Safe

Many pupils reported using different sources of water for different purposes at home. Specifically, pupils listed fetching water from the borehole (i.e. water pump), a well or a stream. Pupils reported that most people would fetch water from safe sources like the borehole for drinking because they were afraid of getting sick.

Unsafe

Yet, there were some pupils who reported getting water from unsafe sources, namely, a well or the stream due the distance of the borehole. However, pupils reported their families treating the water when they got their water from the well.

At the end of the FGDs with parents we asked them what recommendations they had for SPLASH. At a peri-urban school, one parent said: "We have a lot of chlorine but they should dig us a borehole because some people don't use the chlorine, especially me, I don't like the smell." Although these parents knew to treat unsafe water, they did not want use the treatment.

Family Receptiveness

Most parents and families were shown to be receptive to receiving information from school children. Families were shown to be receptive based on trusting the information their children received at school, regularly communicating with them and a sense of importance of hygiene.

Figure 8 MOTHER AT ONE OF THE SPLASH SCHOOLS

Who influences the community?

Guardians reported receiving and trusting information from **community health workers, the radio, traditional leaders (i.e. headmen or chiefs)** and **physicians/clinicians** in addition to **children**.

Trust

Trust was a pervasive aspect of receptiveness across all FGDs. Children were discussed as being trusted sources of information from the female guardian and pupil perspectives.

Parent perspective

Most parents reported not only trusting what their children learned at school, they were also enthusiastic about receiving information from their children. During most of the FGDs with parents, they discussed schoolchildren as being regular communicators of information. All female guardians we spoke with reported trusting the information their children receive at school. Guardians reported trusting children because they know that the child is learning.

Child perspective

Although children discussed that parents trusted them, pupils also implied parents needed to have visual confirmation of something in order to trust it. This point of view was echoed by most of the pupils. They felt that without the papers (see Figure 5) we had given them, their parents might not have believed them. At one peri-urban school a boy pupil said when asked why their families believed what they said about WASH "Because of the papers, they saw them and I spoke nicely."

Trust is linked to education

"(We trust what a child learns at school because) the child becomes clever and there is a difference between myself, who is at home, and one who goes to school."

– Female Guardian, Peri-Urban School

"Some parents aren't learnt (ignorant) so when someone else is learning (at school) they trust that person."

– Boy, Peri-Urban School

Valuing hygiene

Parents expressed valuing hygiene. This was common throughout all of the FGDs with female guardians. Female guardians expressed knowing hygiene was important because they had already heard about it from doctors, community health workers and the radio. Because of this, some female guardians noted that they had already changed their behavior in regards to WASH before speaking to their children.

How do children teach?

Reminding their families
"We can learn anything about hygiene, information about water and toilets and the feeding habits for home because the child reminds me on things when they talk about them."
– Female Guardian, Rural School

Repeating what their teacher said
"A child is also a teacher. They teach us what they learn at school. They tell us at home not to put things carelessly. They say the teacher told us not to do this but you do that."
– Female Guardian, Peri-Urban School

Showing and explaining homework
"My child came with papers …She explained everything and showed me how to make a tippy tap…everyone (in the family) was gathered to listen to what she had told me."
– Female Guardian, Peri-Urban School

Showing respect
"I kneel down (when I approach my parents)"
– Boy, Peri-Urban School

Child Agency

Child agency was a recurring theme throughout the FGDs. Pupils discussed being able to influence their families through talking to them about drinking water, using a toilet and washing their hands after key times. They also were able to influence change by helping to change their environment and by showing or demonstrating.

Self-Efficacy to Influence

Most pupils across all FGDs expressed feeling confident to be able to change their families' WASH behavior. Although there were a few pupils in each school who did not feel they could influence their parents.

The theme of being confident was linked to feeling prepared by their teachers. Pupils were discussed from both the parent and child perspectives as able to teach and influence the home from knowledge they learned at school. Pupils felt confident in their abilities to regularly discuss and teach at home about WASH.

> **Pupils know action steps for change**
>
> "(If our parents don't wash their hands) we will tell them to do it. Also we will tell them what the champion from the WASH club teaches us, we go in the village and teach our parents. Our parents, some of them refuse but some accept. So the WASH club champion should make sure people start washing their hands and report."
> **– Girl, Peri-Urban School**

Desire to Change

Many children spoke about having a desire to teach their families to understand WASH. They were motivated to teach their families because they wanted to protect them from becoming sick. Pupils expressed that they wanted family members to know about hygiene and cleanliness to prevent diseases. Pupils expressed not only wanting to teach their families but also to teach their siblings and peers. One girl pupil from a peri-urban school responded when asked how she tells her family about WASH: "I'm supposed to tell them (my younger siblings) and tell mum that they didn't wash their hands before eating"

Environmental Change

Many pupils expressed physically changing their environment to influence home behaviors. All pupils we spoke with had attempted to make a tippy-tap. There were a few pupils who were not successful in building tippy-taps because they did not have access to a container to hold the water.

For certain environmental changes pupils expressed knowing they needed help from their parents, or an older sibling, especially a male adult family member. One girl at a rural school noted this by saying: "Father you should dig a toilet; we admire those at school." None of the pupils reported attempting to build a toilet alone.

Teacher Influence

Teachers are perceived as trusted sources of information for parents and children. Teachers reported communicating about WASH regularly in the classroom. They expressed utilizing different techniques to engage children.

Figure 9 MANY TEACHERS ENGAGED CHILDREN BY HAVING THEM WRITE MESSAGES

Teachers used the following techniques:
- Telling and showing children how to interact with technology and what to do
- Drama: having pupils act out diseases
- Modeling WASH practices for pupils
- Having pupils write messages to remind each other of safe WASH behaviors (Figure 9)
- Integrating WASH during regular class time and then telling pupils to teach their families
- Addressing children during assembly – turning assembly into a school-wide WASH club

Although many of these techniques are interactive and participatory, these imply having specific instruction and direction. Teachers mentioned needing easy and understandable activities and resources to effectively teach about WASH. Specifically, teachers noted that complicated activities were not ideal.

Discussion of Findings

We found considerable evidence that children may serve as effective and efficient change agents. Pupils were shown to be able to influence WASH behaviors and technology adoption among their families in Eastern Zambia. Research on this question has been limited, and our data show, that at least in similar contexts, there is considerable potential for structured engagement with pupils as a way to influence practices at home.

Schoolchildren were practicing safe WASH behaviors and were confident in their ability to be able to talk about not only hand washing behaviors but also open defecation and drinking clean water. Female guardians were receptive to learning about WASH from their children. Parents expressed trusting their children because they attended school and further, trusting their teachers. Pupils were viewed as trustworthy from parents because there was a cultural value placed on hygiene and on education. Below is a conceptual framework that was created in response to the primary research question.
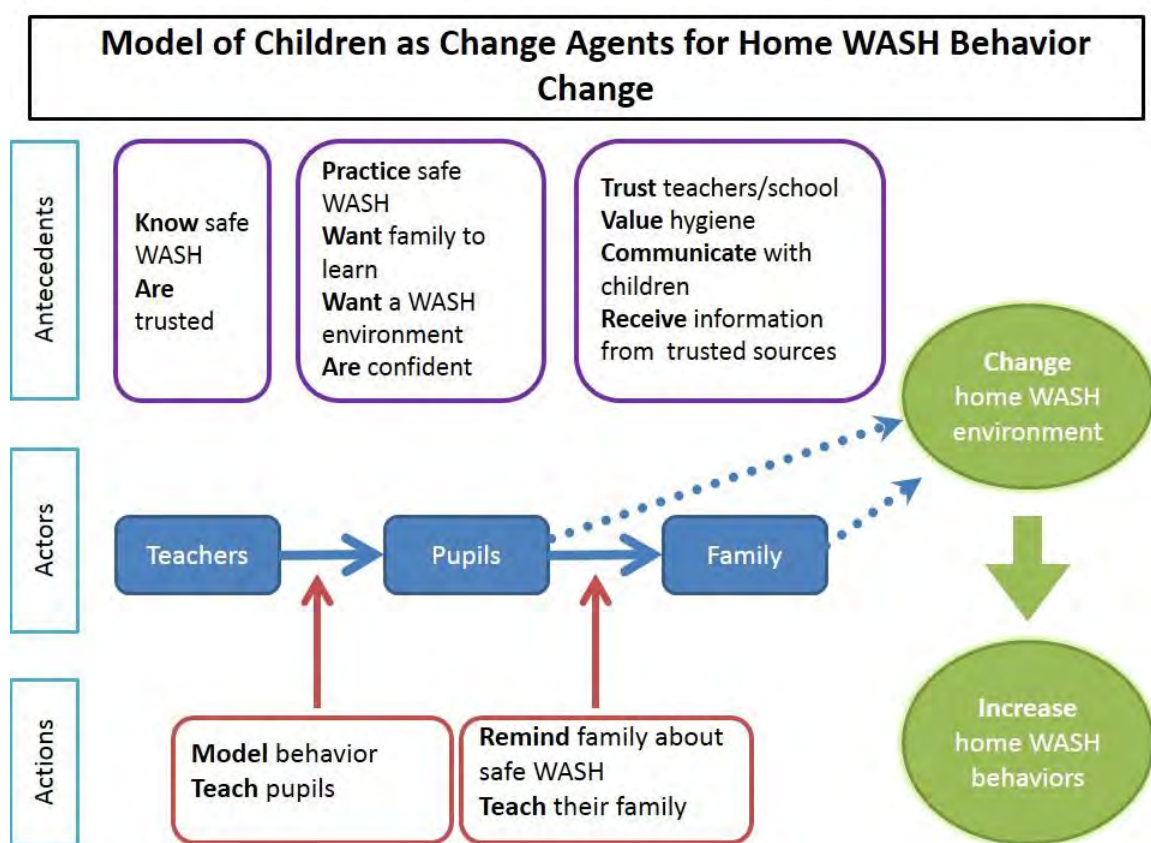

Figure 10 MODEL OF CHILDREN AS CHANGE AGENTS FOR HOME WASH BEHAVIOR CHANGE

Our data identified several antecedents necessary for schoolchildren to be able to influence their home WASH environment (Figure 10). It includes the action steps involved in order to disseminate messages from school to home and how to change the home environment. The model starts with teachers as the beginning of the chain of communication, modeling and providing discrete instruction to children about WASH. The information then goes to pupils

who disseminate information subsequently to their families. Taking into account all of the various nuances, the model leads to a change in WASH environment, brought about by both children and parents, and ultimately potentially a change in family WASH behavior. Another aspect about the framework above is families must trust schoolchildren. This was consistent with other studies that looked at children as change agents for health [10, 12, 13].

We found that schoolchildren were able to influence change at home for safe WASH behaviors in two ways. First, schoolchildren were regularly reminding and teaching their family members about WASH behaviors or technology. Second, schoolchildren also discussed directly influencing the home WASH environment itself. Practicing safe WASH behaviors is heavily influenced by access to a safe WASH environment that includes access to boreholes, access to tippy taps or a hand washing station and a latrine in some form [25]. Pupils showed that they recognize this necessity. They reported feeling able to change their home WASH environment by physically building a tippy-tap. Tippy-taps are easy to construct for children if they have access to the necessary materials (i.e. plastic jug, sticks and rope). We asked pupils to discuss not defecating in the open. In response to this request, many pupils elected to speak to their families about building a latrine. Building a latrine requires manpower and physical ability that is outside the scope of what a child can do alone [26]. When pupils felt they could not physically change their environment, they enlisted the help of an older siblings or a parent. Pupils discussed speaking to their parents (mostly fathers) about building more latrines at home. We suppose this was due to the fact that pupils knew that was an aspect of WASH technology that was outside of their physical control. This was consistent with another study by Onyango-Ouma et al. that assessed children as change agents for health and hygiene in Kenya [10]. This study also shows that it is feasible for schoolchildren to feel efficacious in influencing smaller environmental changes that are in their control. Pupils also can conceivably influence their parents to build more toilets. But, it was noted that many pupils were afraid of poorly built toilets. This highlights the need for informing community members on how to construct safe latrines.

Specific instruction from teachers was shown to be a key aspect of child to parent message dissemination. Parents described pupils as regularly bringing information home from school and discussing what they had learned at school. Teachers told us that they had instructed schoolchildren to talk to their families about WASH. Previous studies have not specifically looked at the importance of instruction when looking at child to parent message dissemination. Although, children will tend to share and talk about what they learn at school, they are more likely to do it with discrete instruction.

Limitations

There are some limitations to this study. There is a lack of generalizability of the findings to other populations. It would be difficult, for example, to try and generalize these findings to non-schoolchildren. We also chose to speak to children who were around the age 11, yet their levels of education varied. It is possible that the large range of education levels could have influenced their participation. Also, we did not speak to schoolchildren under the age of 10; it is possible that they might not be able to influence their families in the same way as older children. In addition, we only spoke to female guardians; we did not receive the perspective of men. Men might have different points of view on children as change agents. Since fathers were discussed by pupils as key in building latrines, it could be advantageous to hear their points of view on learning WASH information from children. Also, we utilized self-report as a way to understand behaviors. Self-report is not the ideal way to discuss hand washing as it has been shown to be an unreliable measure [27].

Conclusion

The findings show that there is strong evidence to support schoolchildren's ability to change their families' WASH knowledge and practice in the context of a school-based WASH intervention. The study showed that pupils utilize techniques like altering their environment, reminding their family regularly and communicating using their homework to influence change at the home level. Families were shown to be receptive due to previous exposure to WASH information and trusting information from the school. Yet, pupils require instruction from teachers or other trusted adults in order to know how to be able to influence their families. WASH-based homework should be utilized in schools to encourage community change. Moreover, further research is necessary to understand the exact teaching methodologies necessary to leverage this communication technique further.

Recommendations

The following recommendations were based on the findings from FGDs and KIIs:

Messages

- Due to the low literacy rate in Eastern Province, SPLASH should invest more in providing pictorial handouts that children can bring home to their parents as they provide distinct opportunities for children to interact with their parents
- To motivate children to practice safe behaviors, SPLASH should encourage drawings in strategic places to convey messages regarding key WASH behaviors
- Target unsafe WASH behaviors that persist to be problematic at the school and home level (i.e. open defecation)
- Utilize voiced determinants from participants to influence behavior change
    - Fear of disease
    - Caring about environment
    - Knowledge about safety

Teaching Methodologies

- Integrate WASH-related activities into everyday classroom instruction
    - Utilize the picture-based homework assignments we used (page 9) to disseminate information in regards to safe hand washing, defecation and drinking behaviors
    - Encourage pupils to build tippy-taps at home by providing them with the tippy-tap instruction sheet
- Teachers specifically requested picture or Nyanja (local language) based messaging for the school to provide to pupils
- Encourage teachers to assign WASH-related activities or homework for pupils to do at home with their parents
- Teachers should continue to tell pupils to remind their families about WASH
- Provide teacher with very simple tasks to have pupils do with their families
- Encourage teachers to work with pupils who might not be comfortable with latrines, in order to encourage use

Influencing Community-Level Change

- SPLASH should engage the headmen in all WASH-related activities in order to influence the involvement of men
- Pupils should be encouraged by teachers or the WASH champions to be active members of the community in regards to influencing proper WASH practice (e.g. utilizing drama and music to convey messages)

Future Research

- Conduct further research investigating the specific teaching methodologies teachers use and how it can impact WASH behaviors at the home and school levels
- Investigate how pupils can best influence their peers for WASH behaviors at the school level
- Pilot materials and specific participatory activites for various aspects of WASH could improve the role of children as change agents
- Conduct further investigation of the role of men as household decisionmakers for home WASH technology

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