Best Practices for Water Development, Usage and Sustainability

A study of barriers to sustainability of use and maintenance of water and sanitation facilities in Ethiopian primary schools

by
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In collaboration with
Save the Children US
Ethiopia

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Gogi ‘Wosenyelesh’ Grewal

Acronyms

ADB	Asian Development Bank
CSPP	Community-School Partnership Program
DHS	Demographic and Health Survey
FGD	Focus Group Discussion
KETB	Kebele Education Training Board
M&E	Monitoring & Evaluation
NGO	Non-Governmental Organization
O&M	Operation & Maintenance
PTA	Parent-Teacher Association
RC	Regional Coordinator
SCUS	Save the Children US
SD	School Director
SDC	School District Coordinator
SMC	School Management Committee
SNNPR	Southern Nations, Nationalities and Peoples' Region
WASH	Water, Sanitation, and Hygiene
VIP	Ventilated Improved Pit
MDG	Millennium Development Goal
UNICEF	United Nations Children's Fund
WHO	World Health Organization
ZC	Zonal Coordinator

Glossary

Hand-dug well: a traditional method of obtaining groundwater in rural areas. These can range from shallow wells (5metres) to deep wells (over 20 metres)

Highland: Slang for a plastic water bottle, usually being reused for water collection

Kebele: The smallest administrative unit in Ethiopia

Rainwater/roof water catchment: A water collection method in which rainwater runs off the roof of a structure and into rain gutters which then channel the water into a standpipe or directly into a large drum for storage.

Roto: A plastic barrel-like container commonly used to store water.

Woreda: Administrative division equivalent to a district. Woredas are collected together into *zones* or further broken up into *kebeles*.

Zone: Administrative units into which regions are divided.

Executive Summary

Despite recent efforts by the government and local and international organizations, access to safe and sufficient water and sanitation across diverse geographical and ethnic areas remains a significant problem in Ethiopia. The importance of adequate water and sanitation in the prevention of morbidity and mortality from infectious diseases caused by water-borne parasites, bacteria, viruses and protozoa is widely acknowledged. Schools present a desirable space for water and sanitation interventions that have the potential to impact health, and subsequently attendance and overall performance in education. Such interventions, however meet many challenges, particularly with regards to sustainability. This report focuses on investigating barriers to sustainability of use and maintenance of water and sanitation facilities and identifying best practices; namely, those revolving around drinking water, hand-washing, and latrines.

The main objective of this study was to identify barriers to use and sustainability of school-based water, sanitation, and hygiene (WASH) interventions and to highlight best practices, specifically with regards to those implemented within Community-School Partnership Program target schools (CSPP), in hopes of identifying ways to improve both current and future interventions.

To fulfill this objective, both primary and secondary data were collected, including fieldwork carried out in Amhara, Gambella, Oromiya, Somali, Southern Nations, Nationalities, and Peoples Region, and Tigray. In-depth questionnaires and observations were conducted at 46 CSPP target schools in order to understand and assess the experiences, challenges, and best practices regarding school-based drinking, hand-washing, and latrine facilities. Qualitative analysis was based on structured and semi-structured interviews, focus group discussions (FGDs), and extensive observations. School directors (SDs), Parent-Teacher Association (PTA) members, teachers, students and woreda officials were interviewed.

Trends that emerged in terms of water and hand-washing facilities were a frequent break down due to perceived lack of quality of taps as well as improper use by a large volume of children. For latrines, the greatest concerns were lack of child-friendly design and issues with cleanliness that prevent children from using them. The findings also confirm the important role in decision-making played by the PTA and SDs with regards to repairs of facilities, and barriers to repairs such as lack of funds and spare parts.

Overall, the use of latrines and hand-washing by students is reported to be steadily improving by school staff. As indicated by FGDs with children, awareness of the importance of water and sanitation is not lacking. Behavior change takes time, so it is vital to continue promotion of hygiene until a critical mass is reached. Best practices regarding drinking water, hand-washing, and latrine use should be promoted across all target schools to ensure the best possible outcomes.

Based on the findings, I present the following **key** recommendations:

Opportunities for improvement of existing strategies:

- Records kept regarding school activities should be expanded to include WASH
- Income-generation at the school-level should be encouraged to contribute towards WASH
- The full potential of all school staff, including guards, should be utilized to increase supervision of WASH facility use
- Promotion of WASH in school and the community should continue
- In-depth studies to explore the disconnect between knowledge and practice should be commissioned

Best practices for sustainability of WASH facilities:

- Water source development should occur under the guidance of a qualified professional
- Seasonal timing of construction/development should be taken into consideration
- Access to taps should be limited to staff or designated student club leaders who facilitate drinking
- Containers for daily storage of safe drinking water should be used if possible to minimize wear
- Measures to protect facilities from theft and damage should be taken
- Creative solutions for long-lasting hand-washing stations should be encouraged and shared
- Contributions from community and parents may be leveraged to provide soap for hand-washing
- If latrines are built without doors, temporary solutions to provide more privacy should be encouraged
- Water should be kept inside or near latrines for continual cleaning if available

The report begins with an introduction to water and sanitation in the context of development, along with a brief overview of some relevant statistics pertaining to Ethiopia. Next, the methodology and limitations of the study are described, before a discussion of findings in terms of drinking water, hand-washing, and latrine facilities. Finally, I conclude by offering a detailed list of best practices.

1. Introduction

The importance of water and sanitation

Unsafe water, inadequate sanitation, and insufficient hygiene are responsible for 80% of diarrhea worldwide (Pruss-Ustun et al., 2008). Black et al (2003) estimated that of the 10 million children dying per year, diarrhea is responsible for 22% of deaths in children under five years, second only to pneumonia. The adoption of the Millennium Development Goals (MDGs) by the member states of the United Nations was an effort to address the glaring inequalities between the world's richest and poorest countries. MDG 7 addresses the need to 'ensure environmental sustainability', which encompasses the target of halving, by 2015, the proportion of people without sustainable access to safe drinking water and basic sanitation. To have any hope of achieving these goals, key stakeholders and programmers must carefully assess the effectiveness of the water and sanitation projects they implement to ensure that target populations are receiving intended benefits.

According to the World Health Organization (2008), only 42% of the Ethiopian population had sustainable access to improved drinking water sources as of 2006, and a measly 11% had access to improved sanitation. An 'improved' water source includes: piped water into a dwelling, plot or yard; a public tap or standpipe; a tube well or borehole; a protected dug well or spring; or collected rainwater. An 'improved' sanitation source is one that features a flush or pour-flush toilet connecting to a piped sewer system or septic tank; a pit latrine; a ventilated improved pit (VIP) latrine; or a composting toilet (WHO, 2008). An improved water source, however, does not necessarily mean a safe water source, and the microbiological quality of water along with storage and hygiene practices continue to play a large role in the development of diarrheal disease.

An overview of water and sanitation in schools

Many studies have examined the efficacy of various water, sanitation, and hygiene interventions in developing countries (Hutton et al., 2007; Quick et al., 2002; Sobsey et al., 2008). Despite a rich literature of observational and intervention studies relating household microbiological water quality to health outcomes (Gundry et al., 2004), few studies have been found that directly explore the impact of school-based water interventions on diarrheal disease outcomes and school attendance. Lack of sanitary facilities and water points in schools for teachers to demonstrate behaviors such as hand-washing are likely a barrier to the effective teaching of hygiene behaviors (Dlamini & Mabuza, 2005).

Conceptualizing sustainability

Development of infrastructure, in this case water points and latrines, should seek not only to have a positive impact on the targeted population, but also to sustain this impact over time. There is no single, universally agreed upon definition of sustainability. Furthermore, there is no consensus on the best method to measure sustainability. Sustainability has several dimensions, including economic, social, technical, environmental, institutional and functional. In the context of delivery of water and sanitation services, however, it is perhaps more useful to narrow the definition of sustainability to one that simply focuses on 'whether or not something continues to work over time,' (Abrams, 1998).

According to Abrams (1998), the two phases of sustainability are the initiation phase and the continuation phase. The initiation phase includes the planning, design, and construction of water and sanitation infrastructure. The continuation phase includes all subsequent activities that will occur, such as management, maintenance, and payment for repairs. The support a community or local government receives from outside of itself is critical to sustainability of the continuation phase (Abrams, 1998). Inevitably, people trained in repairs move on and infrastructure sustains damage and breaks down. For this reason, schools receiving water and sanitation services require support from the kebele level, which in turn requires support from the woreda level, which in turn requires support from the zonal level, and so on.

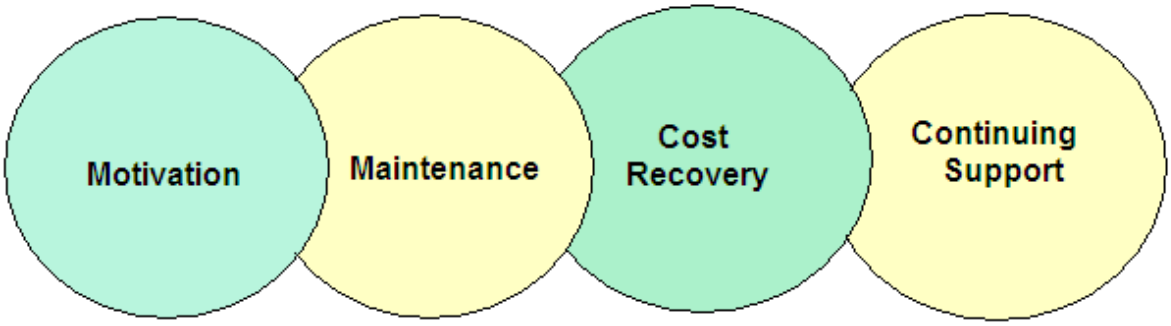
The following figure (Figure 1), borrowed from Carter et. al (1999), illustrates four essential and interlinked aspects of a sustainable water and sanitation project. *Motivation* refers to the buy-in from the target population that is necessary for them to choose to actually use the facilities rather than their traditional method. Latrine use, for example, may be a challenge to introduce in rural schools where children are accustomed to open defecation. Thus, raising awareness of the benefits of improved water, hygiene and sanitation is crucial to program success. Motivation of other stakeholders such as local community leaders, district and zone level government and the communities outside the school is also necessary to ensure support of the WASH project.

The next dimension of the sustainability chain, *maintenance*, refers to the importance of having a local care-taker or committee with someone who has received training on simple management and maintenance issues (Carter et. al, 1999). In order to be effective over the long-term, this person or committee needs appropriate support from a woreda, zonal, or regional level government agency or NGO which has adequate resources and training and can respond quickly to needs. Availability of spare parts and tools is also a clear need.

It is an unfortunate reality that developing country Governments lack adequate resources, and that NGOs are similarly unable or unwilling to continuously fund projects over the long-term. Thus, a mechanism for *recovering cost* of maintenance and repairs is desirable in the equation for long-term sustainability.

Follow-up from government agencies, NGOs, or other donors is vital for ensuring a continuation of appropriate use, management, and maintenance of WASH facilities. The translation of knowledge into practice is likely to take a considerable amount of time, and it is important that facilities be kept up as this gradual behavior change occurs. Thus, *continuing support* from back-stopping agencies must be provided.

Figure 1: The sustainability chain



Source: Carter et. al (1999)

2. Study Design and Methodology

Key research questions and objectives

The goal of the study was to investigate and document experiences with CSPP school water and sanitation facilities in selected regions of Ethiopia in order to illuminate best practices in use and sustainability of drinking water, hand-washing and latrine facilities. This was accomplished by exploring the following key research questions:

Text Box 1: Key research questions with objective

1. **What is the existing infrastructure for drinking water, hand-washing and sanitation in CSPP schools in Ethiopia?**
    - Investigate coverage of drinking water, hand-washing, and segregated latrines among CSPP schools in order to determine where gaps remain.
    - Inspect the type and condition of WASH hardware and software to gain insight into what works and what common challenges exist.

2. **What are the prevailing systems for management, maintenance, and repair of drinking water, hand-washing, and sanitation facilities?**
    - Determine who is responsible for different aspect of water and sanitation at the school level.
    - Investigate how both the school and larger communities contribute to water, sanitation, and hygiene at the school-level.
    - Document lessons learned about school-level successes and failures.

3. **What are the barriers to sustained use of the school WASH facilities?**
    - Explore student beliefs and practices regarding hygiene and sanitation to find opportunities for improvement in knowledge and lessons on how to make facilities more child-friendly.

Methodology

This was a qualitative study conducted in the Tigray, Somali, Gambella, Oromiya, SNNP, and Amhara regions of Ethiopia, and both primary and secondary data were collected and analyzed.

Primary data

Primary data was obtained through a combination of in-depth interviews with school administrative staff and PTA members, focus group discussions with students, observations, facilities checklists, and structured or semi-structured interviews with relevant CSPP staff, community members and/or Woreda water, health and education officials. These activities were carried out during the period of October to December, 2010.

In-depth structured interviews with school leadership at 46 CSPP schools were conducted to document general information and to learn about the management of and problems with WASH facilities. School directors were interviewed when present, with vice-directors or head teachers being the next preferred school staff to speak with. Discussions with PTA or SMC members were also held to include their perspective and note their contributions to the management of WASH in the schools. The interview guide was developed based on materials from the Center for Global Safe Water at Emory University (http://www.sph.emory.edu/CGSW/).

A crucial component of the study was observation of the drinking water, hand-washing, and latrine facilities available at each school to document the structural condition, cleanliness, and ease-of-use. This was accomplished through examination of the facilities to ensure they were working as described by school administration, and checklists were used to record general observations of the school compound.

To further gauge beliefs and practices surrounding the use of WASH facilities, focus group discussions were conducted with male and female students whenever time permitted. These discussions, which were conducted separately with boys and girls, explored general awareness of students with regards to hygiene, their experiences with the WASH facilities in their schools, and the challenges and benefits associated with them.

Secondary data

An extensive literature review was conducted to develop a profile of the regions and put the research questions in to the larger context of development. Documents from the CSPP Monitoring and Evaluation unit, national surveys such as DHS, and academic literature were reviewed to gather statistical information relevant to the project.

Sample selection

Ideally, random selection of CSPP schools throughout the country would have been employed. Due to the considerable distances between schools, particularly in rural areas, a purposive sampling technique was used instead. As there was not sufficient time to visit each and every region, study sites were selected to be representative of as many climatic and geographic zones as possible. Thus, Somali region was chosen to represent the hotter and drier lowlands (at the exclusion of Afar) while Gambella was chosen to represent the wet and humid areas (at the exclusion of Benishangul Gumuz). Because most CSPP target schools are located in the remaining regions of the country, Oromiya (highland and lowland), Amhara, SNNPR, and Tigray were all sampled.

Once a region was decided upon, CSPP Regional Coordinators were consulted to determine which zones would be sampled. Due to the presence of their field offices and their familiarity with areas, CSPP Zonal Coordinators then suggested up to four woredas from which to select schools, taking into account a desire for a variety of characteristics. Criteria for school selection included designation as a CSPP target school, presence of a water point and/or latrine facilities, and willingness of the local School District Coordinator or other appropriate staff to accompany the researcher to the site. School were not notified prior to visit.

Sample

Though a total of 54 schools were visited, complete observations and questionnaires were administered at only 46 of these due to time constraints and availability of interviewees (Table 1).

Table 1: Number of schools included in the study sample, by region and zone

Region	Zone	Number of Schools
Amhara	West Gojjam	4
	South Wollo	7
Gambella	Itang	4
	Nure	2
Oromiya	East Shoa	6
	West Arsi	3
SNNPR	Hadiya	3
	Kembata Tembaro	4
	Sidama	4
Somali	Jijiga	7
Tigray	Eastern	2
TOTAL		**46**

In order to ensure variety despite the small sample size, the researcher sought schools that varied with respect to size of school, type of water source, majority religion, urban vs. rural location, presence of electricity, and number of kebeles served, among others.

Table 2: General school characteristics

	n=46	Percent	Mean
Interviewee position			
School director	36	78.3	
Vice director	4	8.7	
Teacher	4	8.7	
PTA member	2	4.4	
Years working at current school	46		3.9
No.of kebeles served	46		3.5
Total students	44		899.4
Girls	44		434.5
Boys	44		456.5
Total teachers	46		20
Female	46		7
Male	46		13
No. of functional classrooms	43		10.2
No. with electricity	45	35.6	
Roof material	45		
Improved/Iron sheets	44	97.8	
Unimproved/raw material	1	2.2	
Floor material	45		
Cement/concret	41	91.1	
Unimproved/dirt	4	8.9	

Limitations

While efforts were made to minimize sources of bias in the study and make data comparable and amenable to analysis, such as preparation of a standard observation guide and interview schedule, other limiting factors emerged and are listed below.

- Due to observation being an important component of the study and given the time constraints of only being able to visit an average of three schools per day, the sample size was necessarily small. Thus, statistical analysis to determine significance could not be performed and the results may not be generalizable.

- Further time constraints resulted from the fact that visiting of schools was possible only in the company of local SDC or kebele officials, and was most useful during hours when school was in session. In some cases, schools were only operating one morning shift. Thus, interviewing and observations could sometimes be carried out only for half the day.

- Presence of SDCs or CSPP staff during interviews may have influenced respondents to provide 'correct' rather than candid responses.

- As the researcher was not familiar with the local languages, most interviews and all FGDs were conducted through translators. Thus, the nuances of conversations may be lost.

- The researcher was unable to obtain up-to-date data on time since installment of non-CSPP WASH facilities, thus relied on informal information provided by the SDs, SDCs and/or PTAs.

- In a few cases of conducting the questionnaire with the school leader, it was obvious the interviewee was not providing honest answers, as confirmed by triangulation with students and observation.

- Not every school had all three desired facilities (drinking water, hand-washing and latrines). In many cases, the infrastructure had been developed but was not yet useable due to lack of rain.

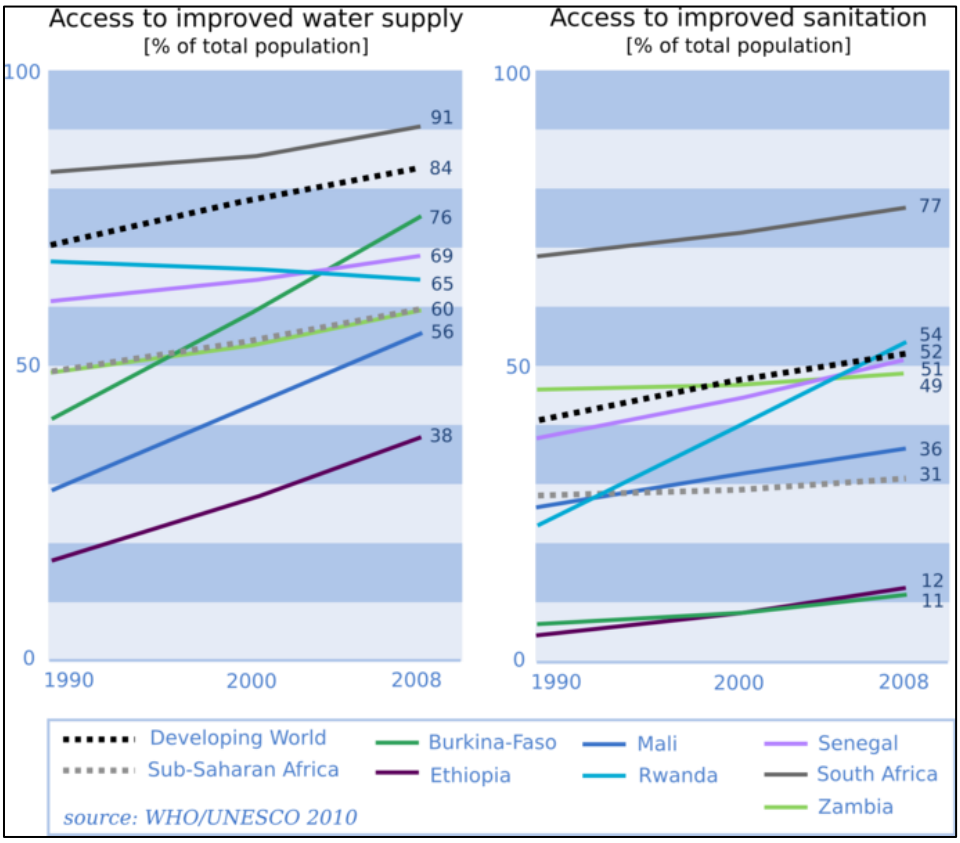
- Despite an attempt to select schools with varying characteristics, not all cultures, hydrogeologic zones, and other factors that may influence use and management of WASH facilities were represented.

3. Background: Study Setting

Ethiopia

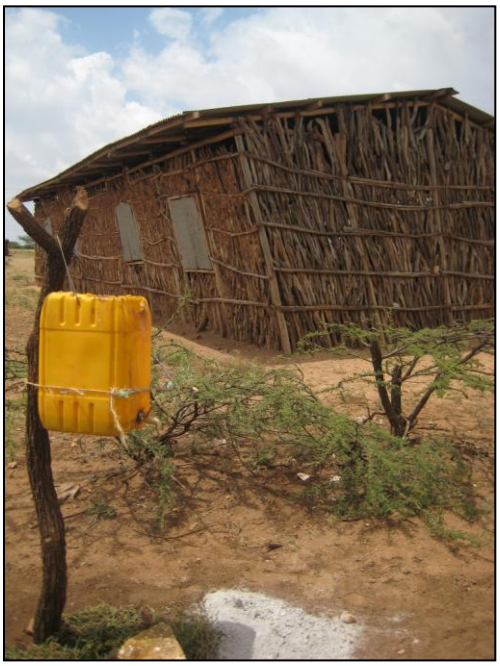
Ethiopia, with a population of more than 90 million, is the second most populous African nation and has some of the poorest water and sanitation coverage in Africa and the world (please refer to Figure 2). Part of the challenge of delivering large-scale interventions to this population is the sheer variety of cultures, landscapes and climates. There is tremendous variety both within and between regions not only in the features already mentioned, but also in terms of institutional capacity. What works in one region may not necessarily be as successful in another, thus it is important to be able to adapt interventions to meet the localized needs of particular sub-groups of the population. Woreda water offices are responsible for monitoring and technical assistance, but are often limited in resources and capacity to do so in practice.

Figure 2: Trends in access to improved water and sanitation in selected sub-Saharan African countries



Source: Based on data from the Joint Monitoring Programme for Water Supply and Sanitation

An effort visit schools in as many regions as possible was made in order to try to capture such variety as well as obstacles schools in different settings may face with regards to development, use, and maintenance of water and sanitation in schools. The Somali region, for example, is the relatively underdeveloped and drought-prone Eastern-most state of Ethiopia, bordered by Djibouti to the north and Somalia to the north, east and south. This region has the lowest net attendance ratio for primary school children in the country, at only 13.8% (CSA, 2006). Gambella, on the other hand, had recently faced problems of wide-spread flooding which caused a delay in the opening of schools at the time of the study. Amhara, Oromiya, and Tigray are relatively well developed and are home to the largest proportion of the population.

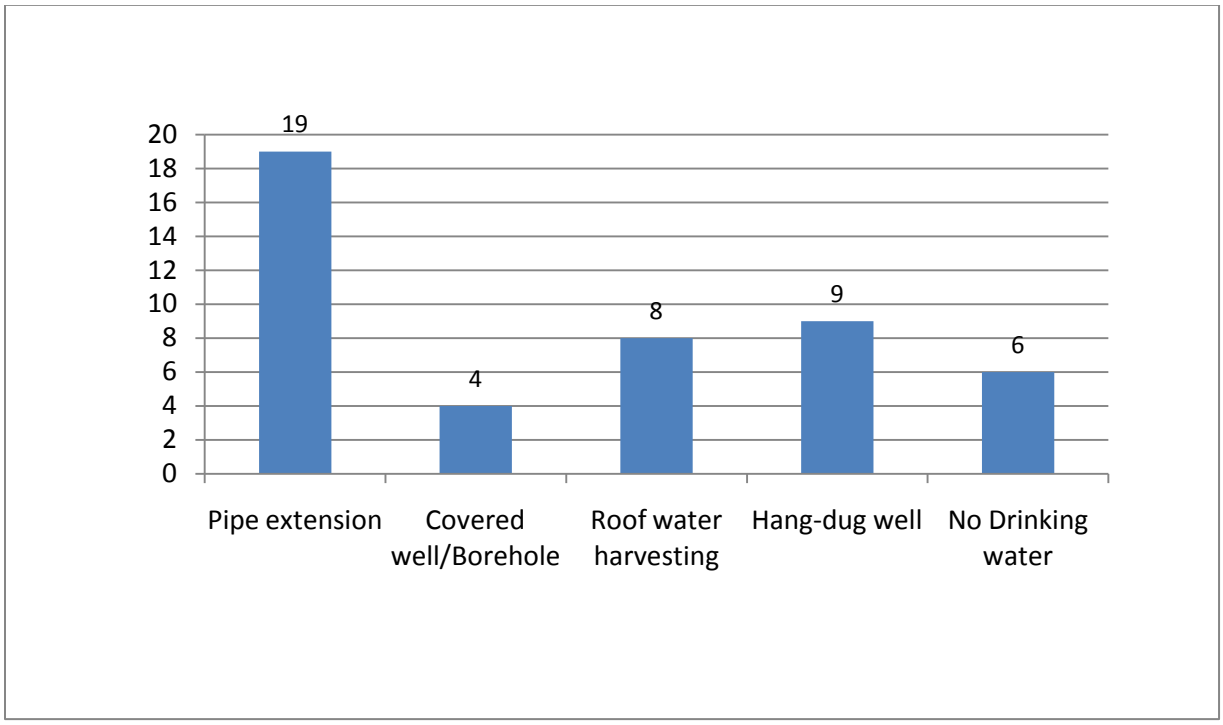


4. Findings and Analysis

4.1 Drinking Water Facilities

The majority of schools visited (87%) had a source of drinking water within the school compound. As shown in Figure 3, 47.5% of these were pipe extensions from a municipal water supply, 22.5% were hand-dug wells, 20% had roof water harvesting schemes, and 10% had a covered well or borehole.

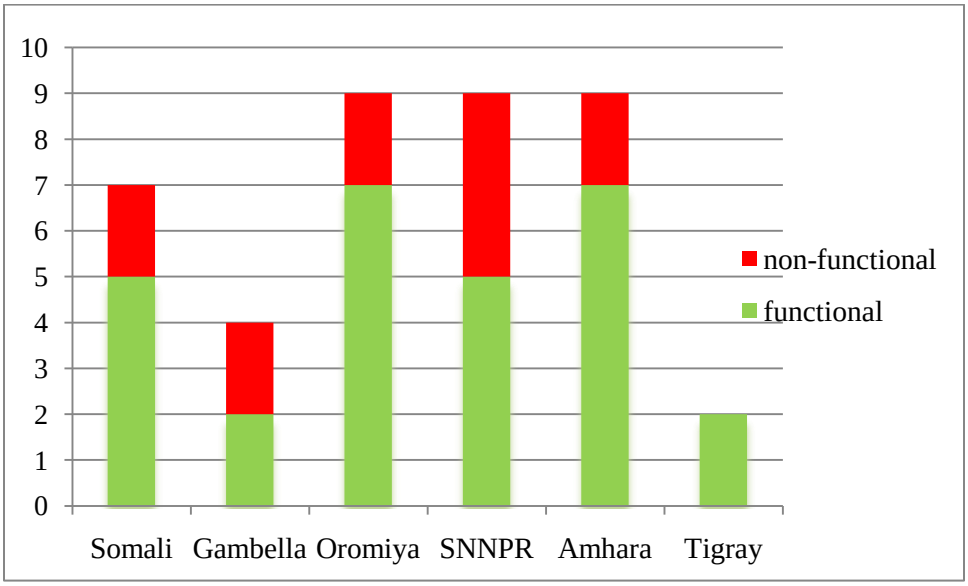
Figure 3: Types of water sources in the study sample



Source: Primary data collected at all sampled schools

Most of these water points (82.5%) had been constructed with the within the past three years, and 70% of all water points observed were functional. Figure 4 on the following page displays the proportion of non-functional water facilities by region.

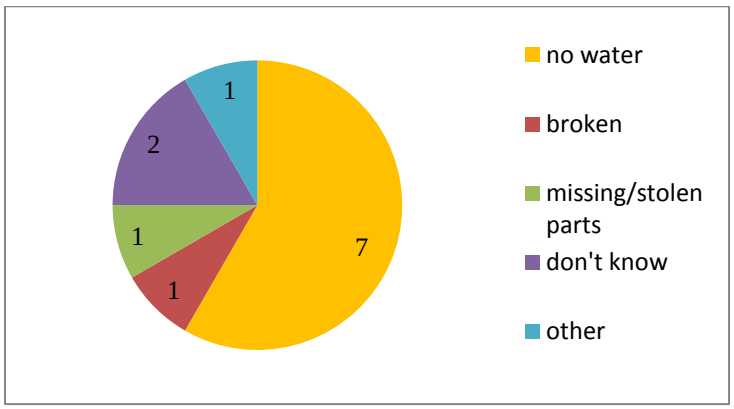
Figure 4: Proportion of non-functional water facilities by region



Source: Primary data collected at all sampled schools

Of the 12 schools where water sources were not working or being used, the majority (7) cited no water as the main reason (please refer to Figure 5). In three cases this was a lack of rainwater stored in recently constructed roof water catchments at schools that had completed water development after the summer rains, and thus there had been no time for water to accumulate. In another case, however, there were pipes installed but no water supply from the nearby town. At three other schools, the well was dry or hand pump had not been built properly in the first place. One of the people reporting 'don't know', had a fully constructed well with hand pump that had never been functional due to some unknown technical problem. The 'other' in Figure 5 refers to a school in Gambella which had a hand pump yielding plenty of water; however the water was not potable as it was loaded with red sediment. It was being used only for cleaning and cooking purposes.

Figure 5: Reasons for non-function of water facility



Source: Primary data collected at all sampled schools

When asked why they have been unable to repair their water source, more than half cited lack of money to do so as the reason, while one third reported that there is no local person with the appropriate skills or knowledge to solve the problem. Only 27.5% of interviewees reported having someone in the school or community trained on how to operate and make minor repairs to the drinking water facility, and of these only 7.7% said the training was good enough to ensure the sustained maintenance of the facilities.

Design of drinking water facilities

Nearly half of the schools with water (42.5%) reported problems with the design of their drinking water facilities. Difficulty reaching taps or operating the source was an issue for 12.5%, as well as poor drainage and inconvenient location. A variety of other issues, displayed in Text Box 2, were reported.

Text Box 2: Reported problems with design of drinking water facilities

- Foundation is not stable due to construction on soft soil
- Water only comes in the rainy season
- Water tap is not built in the view of the guard
- There is not enough power
- Source only worked once and then stopped
- There are not enough taps for the high number of students
- Taps are of poor quality thus break easily and frequently
- Main pipe has burst four times in the same place due to high pressure of water supply
- Water is dependent on wind power

Source: Interviews with school leadership in all sampled schools

At most schools visited, children drink both from the tap and bring their own *highlands* from home to collect water. Only five schools visited provide cups for their students to drink from. A small portion of schools (12.5%) possessed large, covered containers in which to store drinking water, such as *rotos* or medium-sized containers. Most schools (77.5%) reported that drinking water is not treated at the school. Only two schools actually had a water treatment product on site during the visit, but do not currently have water so do not use it.

Management, maintenance, and payment for repairs of drinking water facilities

When asked who is responsible for the management of the daily provision of drinking water, more than half of interviewees said that teachers are primarily in charge. School directors and school guards were also

mentioned as having a large role to play in provision of water. Table 3 provides a full list of responsible parties, ranked from most to least frequently mentioned by interviewees.

Table 3: Who is responsible for daily provision of drinking water?

Responsible Party	Frequency of reporting by schools
Teachers	60%
School director	30%
Guards	33%
No one	15%
PTA	13%
Students	13%
Head teacher	10%
KETB	10%
School club	8%
Community	0%

Source: Interviews with school leadership in all sampled schools

When it comes to maintenance of the water system at the school (Table 4), the PTA was mentioned more frequently (40%). The government (25%) and the community (7.5%) seem to have a much greater role to play in maintenance than in management.

Table 4: Who is responsible for maintenance of drinking water facilities?

Responsible Party	Frequency of reporting by schools
PTA	40%
School director	37.5%
Government	25%
KETB	22.5%
Teachers	10%
Guard	7.7%
Community	7.5%
Head teacher	2.5%
NGO	2.5%
Students	2.5%
No one	0%
School club	0%

Source: Interviews with school leadership in all sampled schools

Finally, school leadership was asked who is responsible for payment of repairs should they be needed. Unsurprisingly, the PTA and school director were the clear front-runners for this responsibility, being mentioned at 57.5% and 20.5%, respectively. The school budget is managed by the PTA, with the school director usually acting as the facilitator of any actions to be taken regarding the school. Interestingly, 15% of the time, the government was mentioned as having a responsibility to pay for repairs of water supply while the community was only mentioned 12.5% of the time (please refer to Table 5).

Table 5: Who is responsible for payment for repairs of water facilities?

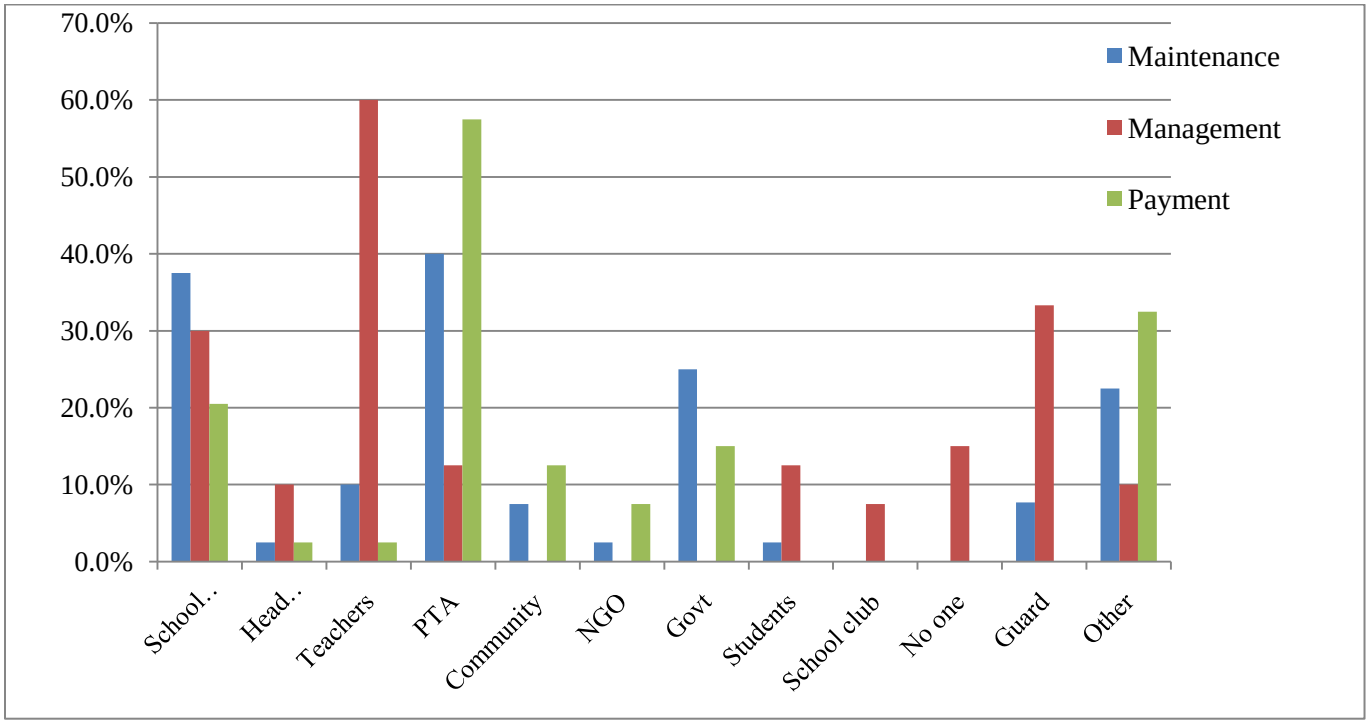
Responsible Party	Frequency of reporting by schools
PTA	57.5%
School director	20.5%
Government	15%
Community	12.5%
NGO	7.5%
Head teacher	2.5%
Teachers	2.5%

Source: Interviews with school leadership in all sampled schools

From these figures, it is evident that at least in terms of management and maintenance of water, head teachers do not seem to have any more significant a role than all teachers in general. Figure 6 on the following page compares the respective responsibilities of different actors with regards to management, maintenance, and repair of drinking water facilities.

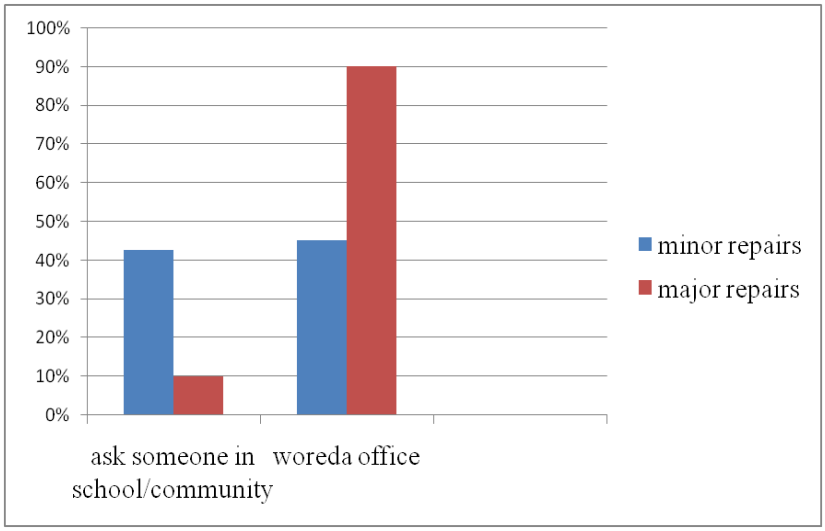
When asked what they do if water facilities are in need of minor repairs, 42.5 % said they would ask someone in the school or community to fix it, while 45% said they would directly report to the woreda water office. 5 people reporting 'other' said they would contact the police, CSPP, a technician, or the KETB water head. For major repairs, the responses differed. Only 10% of schools reported that they would ask someone in school or community to fix a major problem, while 90% said they would report to the woreda water office (Please see Figure 7). This is likely reflective of the lack of local people with adequate tools, skills, or knowledge to make repairs. For both major and minor repairs, the most common course of action reported was for the school director to inform either the PTA and/or the KETB representative of the problem such that it could be discussed. If the problem is deemed to be beyond the capacity of the school staff or surrounding community, it is agreed that a woreda office (usually water or education) be contacted. The director at one school said he would report a problem to the woreda education, water, and rural agriculture offices.

Figure 6: Roles in management, maintenance and payment for repairs of water facilities



Source: Primary data collected at all sampled schools

Figure 7: Course of action taken for minor and major repairs



Source: Primary data collected at all sampled schools

Many school staff complained that even if they were to report the need for repairs to the woreda water office, there are not enough workers or resources in the office to respond to their needs. One school had been waiting

for the local water office to address their needs for more two months after the office said that they would send someone to take a look at the problem.

At nearly all schools with piped water and multiple faucets, children were observed crowding around and drinking directly from the taps, with many children pulling on taps and even leaning on them in their attempt to get some water amidst the crowd. Regular wear and tear with this added pressure of improper use is probably a contributor to water sources becoming non-functional in relatively short periods of time. Recognizing this, many schools have intentionally removed some of the faucet handles and store them in the director's office to 'save' them. Having fewer faucets available to the large volume of children, however, only serves to put increased pressure on the few operational ones. Addressing the behavior of the children by creating a mechanism for better supervision and orderly line up for water would perhaps be a more sustainable approach.

Text Box 3: Learning from successes in sustainability of drinking water provision

Hidar 2 General Primary School, located in the South Wollo zone of Amhara region, has had a functioning water source for the past 13 years. This school has the good fortune of being located within Kombolcha Town Administration, and thus has access to piped water from the municipal water supply. There is one drinking water station with six taps, though not all are currently functional. A positive practice observed at this school involved the organization around provision of drinking water. The school guard is in charge of managing the drinking water station, and children must line up in an orderly fashion to drink from the tap, which is operated only by the guard. He is instructed to report to the school staff if there is a problem, but otherwise the responsibility of providing water is his.

Breakage of taps is a common problem hindering sustainability of water facilities. Careful supervision of the use of faucets by children may help to increase the duration that faucets and tap handles are functional.

The majority of schools have a guard or watchman, thus there is potential for all schools to place greater responsibility of managing water provision on these individuals. Most children report drinking water only at break time, therefore the time required on the part of the guard is not substantial.

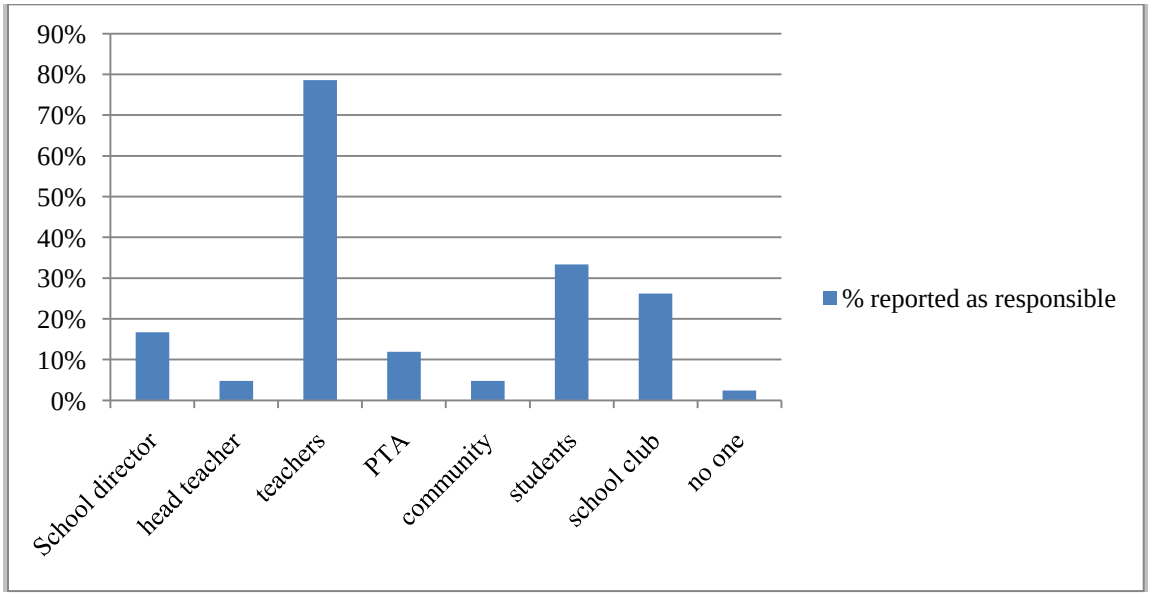
4.2 Hand-Washing facilities

The importance of hand-washing

Child nutritional status and morbidity have been observed to be significantly correlated with cleanliness of a child, the caregiver, and the surroundings. The practice of hand-washing has been shown to considerably reduce the incidence of diarrheal disease and acute respiratory infections in children. The majority of the schools visited (91%) had some form of hand-washing facility, whether it was a tap connected to a piped water supply or a jerry can. Dedicated hand-washing stations (an apparatus designated for hand-washing only) were observed at 85.4% of all schools visited.

Responsibility for making sure that students wash their hands after visiting the latrine and before eating most commonly lies with teachers (77.2%) and the students themselves (31.8%). A quarter of schools also reported having a school health and/or sanitation club which has responsibilities for ensuring that students wash their hands. Figure 8 displays the role played by various entities at the school level in hand-washing.

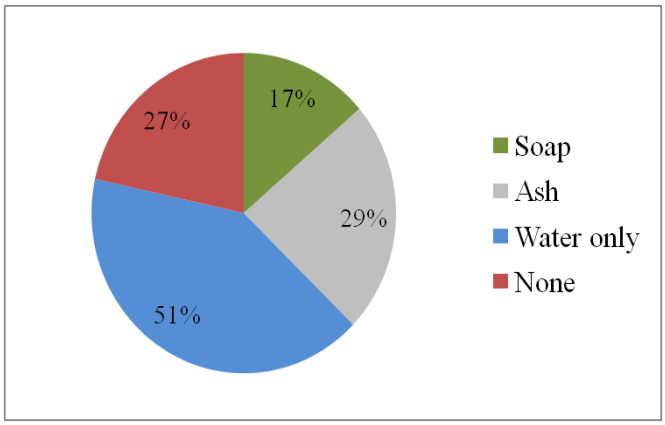
Figure 8: Who is responsible for making sure students wash their hands?



Source: Primary data collected at all sampled schools

Most schools had only water present for hand-washing. Less than one third had ash present, with even fewer providing soap. There were some schools, as shown in Figure 9, which had hand-washing facilities but did not have them filled with water and thus were not being used on the day of the visit.

Figure 9: Observed hand-washing materials

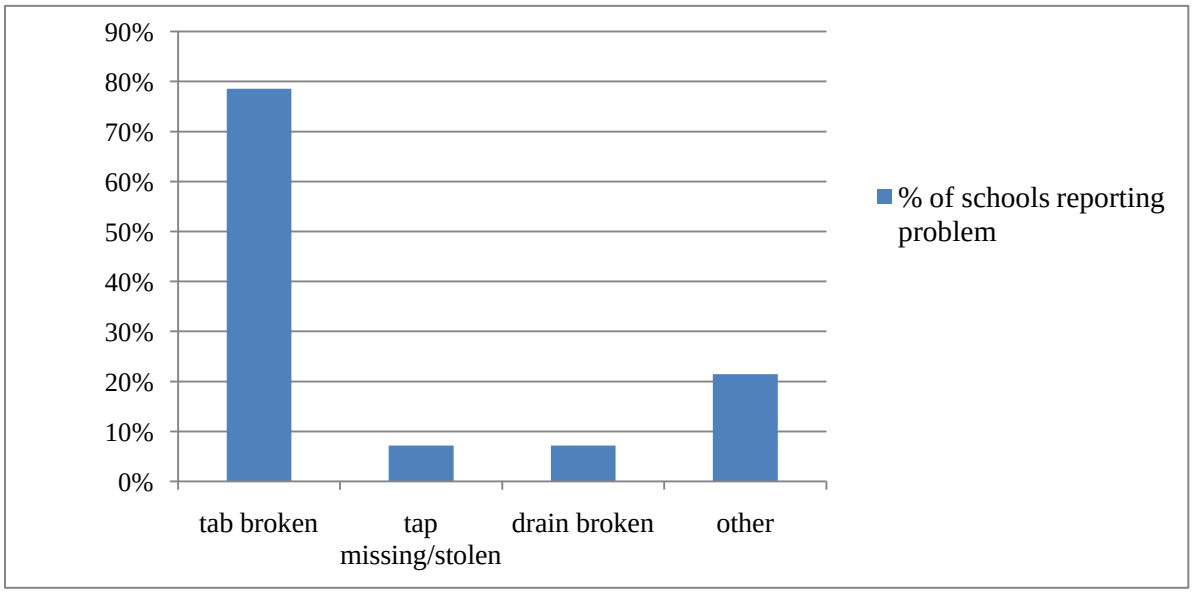


Source: Primary data collected at all sampled schools

Design of hand-washing facilities

The most common form of hand-washing apparatus was a jerry can with a tap (46.2%). A variety of other containers with a tap attached, both plastic and metal, were also observed. Only 38.5% of schools reported a problem with the design of the hand-washing facilities. The reported problems were difficulty for small children reaching and remembering to close the tap, clogged drains, inconvenient location, easily-broken taps, and dripping. As far as functionality, 36.8% of schools needed one or more of their hand-washing stations repaired. As shown in Figure 10, the most prevalent problem by far was broken taps (78.6%). Other repairs needed included welding of the tap to the water container and repair of the stand that holds the container.

Figure 10: Repairs needed to hand-washing facilities



Source: Primary data collected at all sampled schools

Text Box 4: Learning from child-friendly hand-washing solutions

One school setting an excellent example of how creativity and innovation can be used to encourage hand-washing behavior is Gejaba, located in Wensho woreda of Sidama zone, SNNPR. The school director and teachers at this school have invented an interesting variation on a hand-washing station. Rather than using a jerry can with a tap as most other schools do, they have used rope and some locally-collected branches to create a system in which a child need only step on one end of a branch to tilt a jerry can filled with water to release a small stream of water. Upon lifting the foot from the 'foot pedal', the jerry can returns to an upright position, stopping the release of water.

There are three such hand-washing stations located at this school, and all were observed to have a container of ash next to them. Children at this school reported that they like washing their hands because it was fun and easy using the apparatus created for them by the school director. The advantage this method holds over the conventional jerry can with tap, is that it eliminates the need to use easily-damaged faucets that are difficult for many schools to replace or repair. There is simply a small hole created in the jerry can using a nail, through which the water flows in a sufficient amount for hand-washing when the jerry can is tilted. Furthermore, there is no need for children to handle the jerry can itself, thus creating the potential for jerry cans to last longer.

Creative solutions such as this one should be shared and encouraged in other schools.

4.3 Latrines

Inadequate sanitation for safe disposal of human feces encourages the transmission of disease. The construction of segregated latrines holds benefits not only for health and the surrounding environment, but also on the psychosocial well-being of children who are otherwise shy or scared to urinate or defecate while at school due to a lack of privacy. Unlike drinking water and hand-washing facilities, latrines were present at each and every school visited.

When asked whether or not *all* boys and girls use the latrines, 32.61% of interviewees honestly reported that not all students are using them. The most common reasons for this, from the point of view of school leadership, are as follows:

- There are too few pits for the number of students (especially girls)
    - "The number of children, especially girls, is very high and they only have 15 minutes break time and 6 pits. So some students go outside in the field because they do not get a chance to use the latrine."
- Cultural reasons
    - "Girls are ashamed to enter latrines."
    - "Girls are afraid to use around boys."
    - "In our culture, it is preferable that males and females not even eat together." (Gambella)
- Some students don't feel the stimulation to use latrines at school and prefer to do so at home.
- Lack of awareness because parents did not teach children about latrines.
- Grade 1 kids do not use because they do not have a toilet at home.
- "Small children have lack of awareness and there is a shortage of control by teachers."
- Some prefer going in the forest where it does not smell bad.
- "Small children fear the hole. So they will use outside the hole but still inside the latrine."

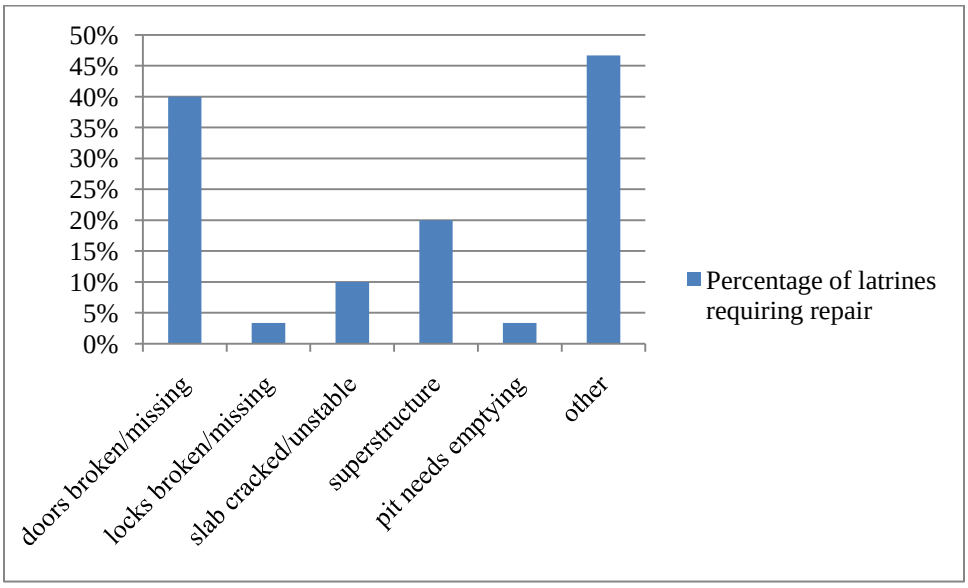
Overall, interviewees expressed that there have been notable improvements in use of latrines, but they are gradual. Before having latrines built, open defecation far away from the school was normal. Now, this happens occasionally but students are gradually gaining awareness as a result of weekly hygiene lessons during flag ceremonies and following the examples of teachers who use the latrines.

Design of latrines

Most school staff (87%) claimed that students find the latrines easy to use. The problem, according to most, is lack of awareness and inconsistency due to not having latrines at home rather than a problem with the design of latrines. However, 63% did report problems with the design of latrines at their school. The most commonly reported problems with latrines were lack of doors/privacy (34.5%), poor quality of construction (31%), not enough distance between male and female latrines (27.6%), pits too small for big children (13.8%), too dark (13.8%), bad smell (13.8%), pits too large for small students (10.3%), and difficulty cleaning (10.3%). Other problems included lack of footrests, and awkwardness using latrines due to the pit being positioned too close to the corner.

The needs for repairs to latrines were also assessed. Greater than half (63%) of schools needed repairs at the time of the visit. As with all other facilities, this was reported during interviews and confirmed by observation. The types of repairs needed are shown in Figure 11.

Figure 11: Types and frequency of repairs needed to latrines



Source: Primary data collected at all sampled schools

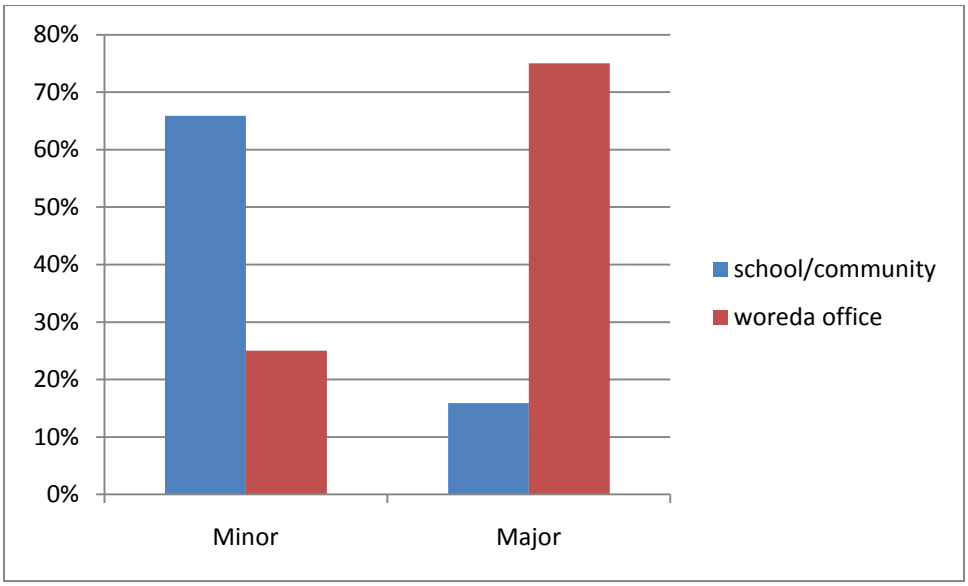
It is evident that many schools reported needing ‘other’ repairs. These are provided in Tex Box 5. Despite a wide variety of repairs needed, 33.3% of schools reported that they do not have any plans to fix the necessary problems. The unanimous reason for this was lack of money, though 10% also reported that latrine repairs were not a school priority.

Text Box 5: Other repairs needed to latrines

- Corrugated tin needs replacement due to rusting or other damage (3 schools)
- Hand-washing station needs to be fixed on to latrine structure
- Not enough pits for volume of students
- Metal roof sheet blown off during the summer rains (3 schools)
- Latrine sinking due to soil type
- Pour-flush style latrine is difficult to maintain within school resources -feces does not just sink into pit like other latrines and lack of water is a problem (Somali)
- Needs cementing (4 schools)
- Raw material/thatch walls need patching

Figure 12 compares the courses of action school staff choose when latrines are in need of minor versus major repairs. The process is similar to that reported for water point repairs. In the case of sanitation, the woreda office that schools report to is the Education Office, as the Water Office does not involve itself in matters of latrines. Many school directors emphasized that community mobilization to raise funds or local materials for repairs would be a first step.

Figure 12: Course of action taken for minor and major repairs

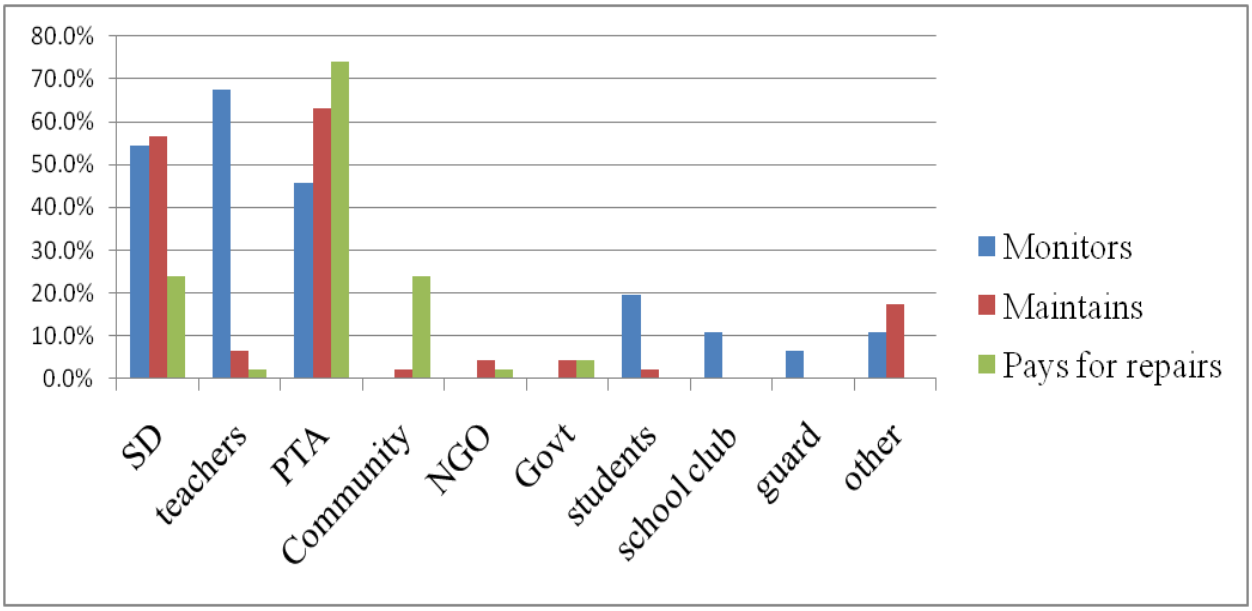


Source: Primary data collected at all sampled schools

Monitoring, maintenance, and payment for repairs of latrines

The responsibility for regular monitoring of latrine conditions was found to rest primarily with teachers (67.4%), school directors (54.3%), and the PTA (45.7%). When it comes to responsibility for ensuring that latrines are repaired and/or improved as necessary, the PTA was the most common answer (63%), followed by the school director (56.5%). Finally, the main party considered responsible for paying for such repairs and/or improvements is the PTA (73.9%). The community and school director were both reported 23.9% of the time as being responsible for payment. Figure 13 displays a comparison of the responsibilities held by different entities for the various tasks discussed here, as reported by school leadership.

Figure 13: Roles in monitoring, maintenance and payment for repairs of latrines



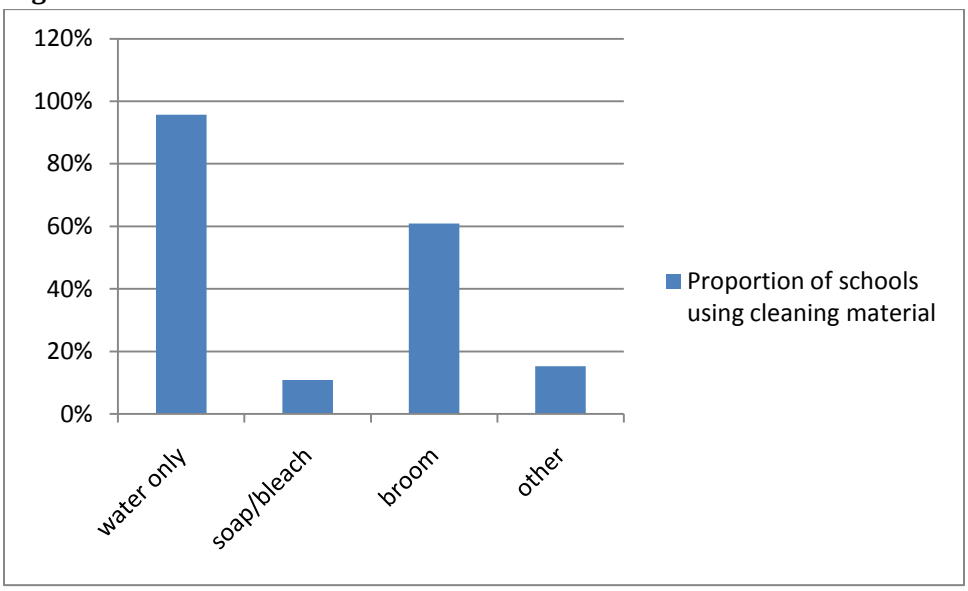
Source: Primary data collected at all sampled schools

Cleaning of latrines

Cleanliness of latrines holds important implications for both public health and sustained use of the facilities by students. Highly unsanitary conditions pose a health risk, particularly to students using latrines with bare feet and in schools where soap, ash, and/or water are not available for washing. Furthermore, children are less likely to use latrines with a large build up of fecal matter that attracts many flies and holds a strong smell. A variety of conditions were observed, with both extremely clean, well-maintained latrines and remarkably dirty latrines being present in each region visited. A variety of questions pertaining to the cleaning of latrines were posed to both school leadership and students to gain an understanding of potential predictors of clean latrines.

More than half of the sample (52.2%) had a duty schedule for cleaning the latrines, and the majority (63%) reported cleaning latrines at least once a week. A smaller proportion (34.8%) claimed to have a daily cleaning schedule, but observations did not seem to support this claim. The vast majority, (96%) clean their latrines with only water, and many use a local broom or brush (61%). Only 11% had soap or bleach to disinfect latrine areas. Other materials used included tree branches, leaves, ash, and expired cement because it is good for counteracting the bad smell (Figure 14).

Figure 14: Materials used to clean latrines

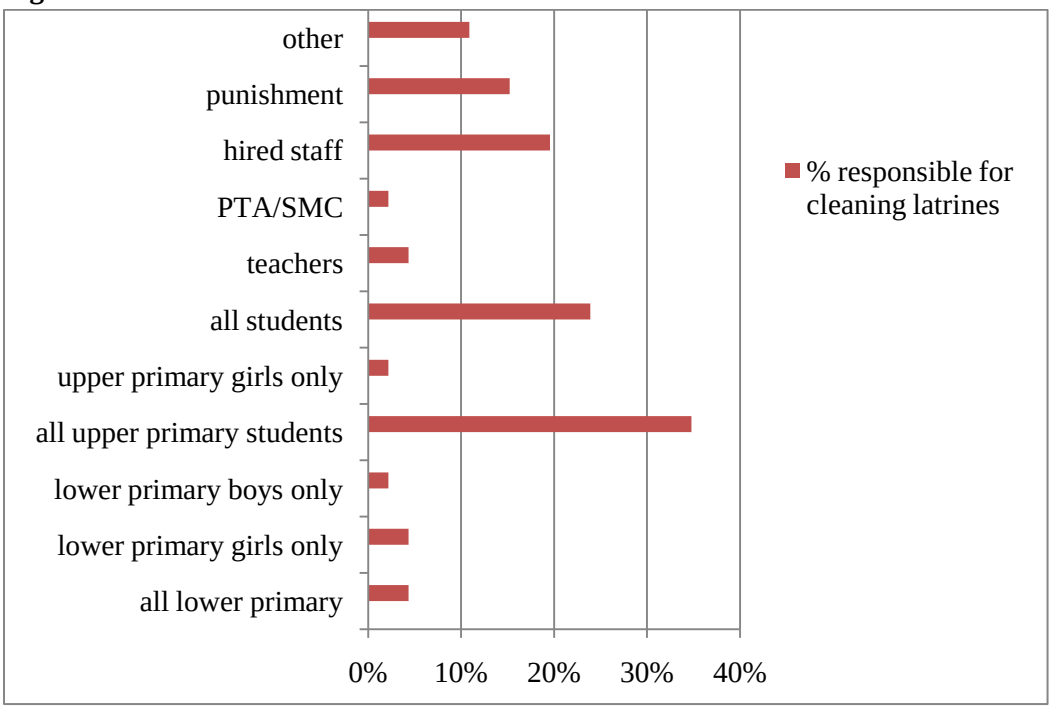


Source: Primary data collected at all sampled schools

As Figure 15 on the next page illustrates, most schools designate responsibility for cleaning latrines either to all upper primary students (34.8%) or to all students (23.9%). Hired staff was available in only 19.6% of all schools, but it was observed that these schools tended to have cleaner latrines. Schools in the 'other' category had some funds available to pay the guards a small amount to clean latrines, and 15.2% reported using cleaning of latrines as a punishment for latecomers.

When school staff were asked what they think the single greatest challenge to the sustained use of latrines is, 22.7% responded that cultural and family practices were the greatest problem, while 20.5% stated that lack of money for cleaning and maintenance was the most salient issue. Other barriers to long-term use are listed in Text Box 6.

Figure 15: Who cleans the latrines?



Source: Primary data collected at all sampled schools

Text Box 6: Reported barriers to sustained use of latrines

- Too few latrine pits for large volume of students, especially at break time.
- Latrines are built on 'black soil', which means the land sinks and latrines may collapse.
- Latrines are already filling up and there is no money to empty them or build new ones.
    - "Latrines might fill fast because there are too many students. When they are full it will be a headache."
- Mite problem in lowland areas may lead to superstructure damage or destruction (West Arsi).
- Lack of monitoring by the community to ensure that sanitation is maintained. If follow-up is weak, condition of latrines will worsen.
- The latrines are near to the road. In the future, if the road needs to be expanded, latrines may be torn down (Sidama).
- "There is no rain or water source; children use sticks and stones to clean themselves and this is ruining the latrines."
- Not constructed with strong materials.
- Not enough space for digging new latrines when current ones are full.
- Lack of ownership by the students. "They damage the latrines and don't care for them. We are advising them to take care but we need to do more."
- Surrounding communities are not using latrines so children are confused.
- Toilet is not comfortable due to raw material and lack of doors.

- Water is the biggest challenge; due to absence of water when the floor was cemented, the slab has large cracks.
- Wooden floor under cement might break with seepage, which is dangerous.
- Latrines are not segregated so girls do not want to use.

Unclean latrines were a common theme throughout school visits, and the most frequent comment from students about what would make them like using their latrines better was related to cleanliness. Often, older children blamed the younger children in the school for not using the facilities appropriately and not cleaning up after themselves. Text box 7 provides an example of a school that is succeeding in maintaining very clean latrines.

Text Box 7: Learning from good examples of maintaining hygiene

Belay Kelemu has been the director of Nigat Kokeb school in Jamma woreda of South Wollo zone, Amhara region for the past six years. Her school is an extremely well-organized example of how it is possible to maintain spotless latrines and be able to provide soap and water to students for hand-washing despite not yet having a functional water source in the school compound. Her secret to success lies in giving greater accountability to students and school staff. According to the director, "software is more important than hardware," which is why there is a strong emphasis placed on the school health committee to continuously provide education about the importance of hygiene to all students.

There are student members of the health committee in each class, who are responsible for escorting younger children to the latrines and ensuring that they use the facilities properly and clean up after themselves using the water and brooms provided. Students know that if they do not clean the latrines after use and then wash their hands, their names will be recorded on a list that will be handed to the school director each day. Mechanisms such as this encourage disciplined use of the latrine and hand-washing facilities.

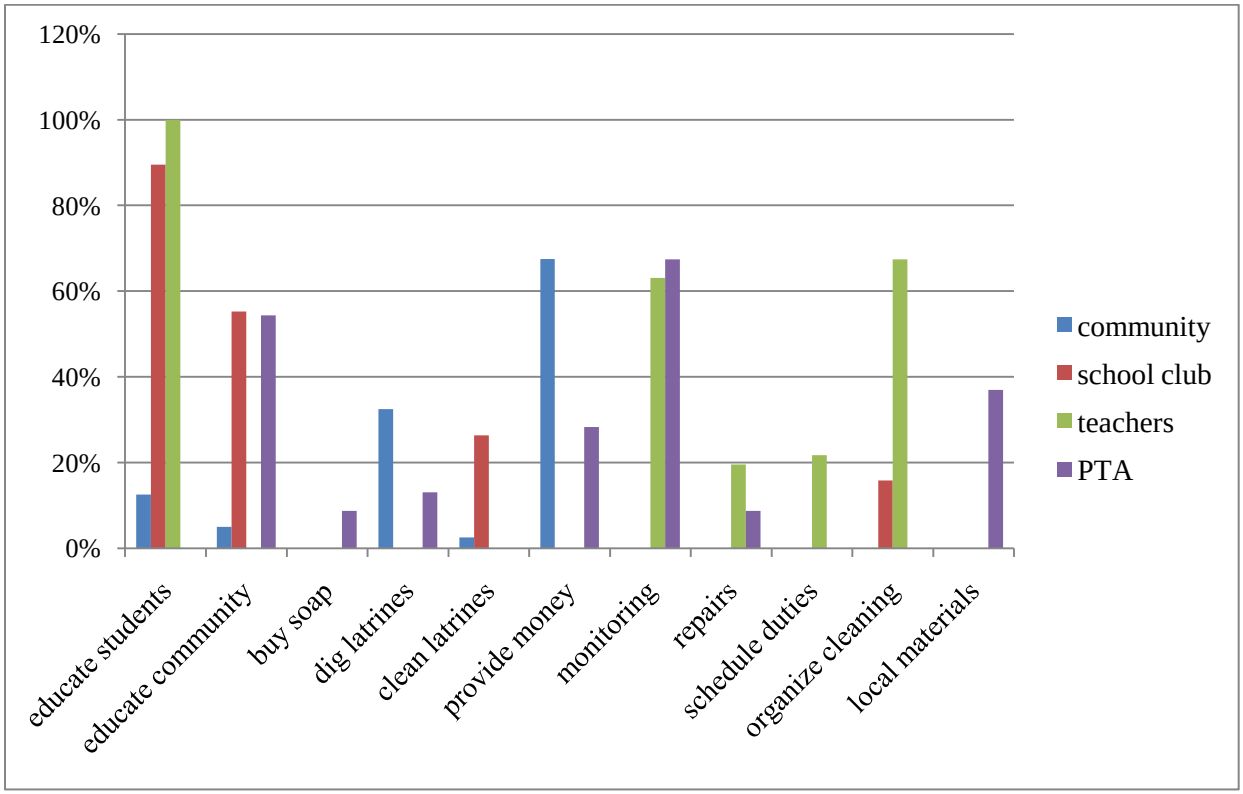
Soap is also provided for children for hand-washing. A system for ensuring the accountability of the school guards has been put in place so that there is careful monitoring of latrines as well as hand-washing. There is a registry books just for guards, and each guard is given points out of 100 along with comments related to how they perform their duties. Due to the careful supervision by guards, problems that are commonly reported in other schools, such as soap going missing or being broken into pieces, and latrines not being used and/or cleaned properly are not an issue at this school.

Although the materials for establishing a pipe extension to the Jamma town water supply have been purchased, the school is awaiting the release of water from the town. In the meantime, the school director has been having students fetch water for hand-washing from her very own home. Using *highlands* and jerry cans, students and teachers take turns filling hand-washing stations with water throughout the week to ensure there is always enough for students to wash their hands.

4.4 The role of school and community in WASH

Having water and sanitation infrastructure in place is not, in itself, enough to create the behavior change necessary for improved health and education outcomes. Such outcomes are determined in large part by cultural factors, involvement of different stakeholders, and a constant effort to promote best practices for hygiene and water use. Referring back to the sustainability chain (Carter et al., 1999), motivation encompasses the buy-in from all stakeholders to ensure that all water and sanitation activities at the school-level are supported. Figure 16 shows the level of participation by different groups in WASH activities. Most schools visited (82.6%) have a school health or sanitation club that promotes WASH in school and often in the community as well. As many as 91% of schools reported receiving some form of contribution to WASH activities from the community.

Figure 16: Contributions to WASH by community, clubs, teachers, and PTA

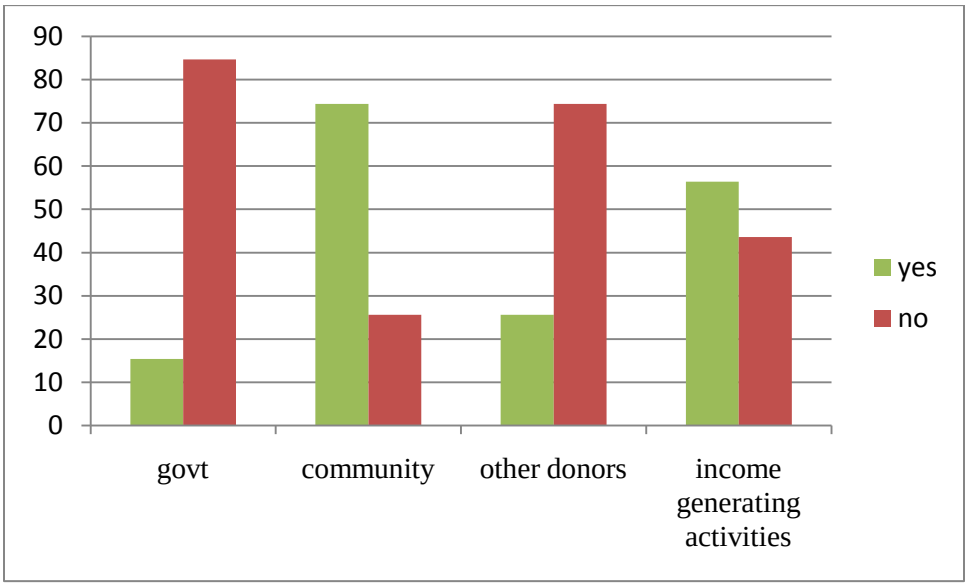


Source: Primary data collected at all sampled schools

Cost recovery

The most successful community WASH projects tend to be those in which water user committees are established and adopt the 'user pays' principle (Gatti, 2007). Since in the case of school WASH, children cannot be expected to pay for the use of the facilities, other mechanisms need to be in place to finance maintenance that is inevitably required. More than 72% of schools reported that they never have enough funding for WASH on a yearly basis. Figure 17 shows the important role played by the community and income-generating activities in raising funds for WASH. Income-generating activities should be encouraged to raise funds for maintenance and improvement of water and sanitation facilities. A variety of income-generating activities were observed throughout each region visited: coffee and tea clubs, school gardens growing everything from maize to peanuts to papayas, and auctioning of old text books and school desks.

Figure 17: Percentage of schools receiving money for WASH



Source: Primary data collected at all sampled schools

Promotion of WASH

In the majority of schools visited (93%), WASH material is included as a part of regular science classes. Dated lesson plans for weekly 40 minutes sessions about health and hygiene were observed to confirm these reports. According to students, flag ceremonies are frequently used as a platform for promotion of hygiene behavior as well. FGDs indicated a strong awareness among students in all regions about the benefits of hand-washing and latrine use in particular. Most schools (73.9%) did not have any visual promotion of WASH behavior. Of the 26% that did, it was the form of a poster demonstrating hand-washing behavior or awareness about trachoma.

5. Conclusions and Recommendations

Many schools are extremely limited in their resources, making it necessary to make strategic choices to allocate money for the best possible outcome. Investing extra effort from the beginning of water development through to the use of the facilities by students to ensure that mechanisms to prolong the life and use of facilities are in place is worthwhile. This starts with ensuring that the ideal type of technology is chosen according to the local conditions and the needs of the school community. Children and teachers should be a part of the entire process, by being consulted about the design and location of facilities such that a sense of ownership is fostered among the targeted users.

The findings show a variation in responsibilities for different aspects of management and maintenance of water and sanitation facilities. Having a specific group of people charged with all matters related to water and sanitation is advisable, such as a 'water sub-committee' of the PTA. Responsibilities should be clearly outlined to increase accountability for ensuring the timely maintenance and monitoring of facilities. This study provides a cross-sectional look at the current condition of drinking water, hand-washing, and latrine facilities as well as challenges to sustainability. In order to get a better idea of trends over the long-term, school administration should be responsible for keeping a record of water and sanitation activities. For example, a dated record of problems encountered, repairs needed, and actions taken to solve the problem. In this way, common problems and the frequency with which they occur can be identified on a larger scale, and appropriate solutions devised.

A common theme that emerged was a paucity of training, skills, or knowledge in the school and community to make basic repairs to facilities. Dependence on the Woreda Water offices, which are themselves often under-resourced, does not seem to yield timely solutions to non-functional facilities in most cases. This indicates a need for strengthening capacity at both the school and the woreda level. Basic trainings on operation and repair should be provided to multiple school staff upon completion of water development. Similarly, development of water sources should occur after it is determined whether or not the local Woreda Water office is familiar with and equipped to maintain that particular type of facility. Although this is not always possible, it is likely to enhance the sustainability of facilities and thus an effort should be made. Operation and maintenance plans should be made from the outset of water development.

Organization and accountability on the part of school administration seems to play an important role in how well facilities are maintained. In many schools the high volume of students makes close supervision of facilities use a challenge. Break time is when greatest use of WASH facilities occurs, but break time is also a

chance for teachers to rest. It was found that the awareness level of children has no correlation with satisfactory use of latrines and hand-washing practices. Some teachers explained that although the students are taught about the importance of using latrines and washing their hands in school, many of them are not able to practice the behaviors at home. This disconnect indicates a role for organizations such as Save the Children and Health Extension Network workers in raising community awareness, though it also highlights the need to identify barriers families face to putting awareness into practice. Despite receiving advice on both water and hygiene practices, many people expressed an inability to act on it due to both financial and cultural constraints. These impediments to reconciling current best practices with current patterns of use of drinking water, hand-washing, and latrine facilities, and the ways in which they can be effectively addressed, deserve further study. Specific recommendations of best practices based on observations of successful approaches are provided below.

Recommendations

Opportunities for improvement of existing strategies

- *The records kept regarding school activities should be expanded to include WASH*
  School registries should include a section on water and sanitation. A recording space for broken facilities, date of occurrence of the problem, and action taken would serve to increase accountability as well as to provide a record of challenges to sustainability over the long-term.

- *Income-generation at the school-level should be encouraged to contribute towards WASH*
  Many schools have adopted income-generating activities but are not prioritizing maintenance of WASH facilities with the money they raise. School staff should consider maintenance and repairs and purchase of soap among other needs.

- *The full potential of all school staff, including guards, should be utilized to increase supervision of WASH facility use*
  Nearly every school visited has a guard or watchman. As demonstrated by some schools in this study, guards can play an important role in ensuring the proper use of facilities and soap, and should be given the responsibility to do so.

- *Continued promotion of WASH in school and the community*
  Flag ceremonies should be used as a daily platform for promoting hand-washing and latrine use. Many schools have painted educational images such as maps and biology diagrams on the walls of the school; images depicting good hand-washing behavior and latrine use are generally not present and should also be included so there is visual reinforcement of good WASH practices.

- *Formal communication processes with relevant woreda offices should be established for support*
  There should be a standard reporting process for interaction with Woreda Water, Health, and Education offices to facilitate timely responses and support for WASH.

- *SDCs should be carefully monitoring conditions of water and sanitation facilities in addition to their other responsibilities during school visits*
  Regular visits to schools provide the opportunity to act as a link between larger support structures such as CSPP ZCs and RCs as well woreda-level officials. This is particularly important in the case of very rural schools that may otherwise have difficulty accessing support for maintenance and repairs.

- *In-depth studies to explore the disconnect between knowledge and practice should be commissioned*
  The obstacles that prevent traditional practices and beliefs from accommodating acquired modern knowledge with regards to use of latrines should be identified.

Best practices for sustainability of drinking water facilities:

- *Water source development should occur under the guidance of a qualified professional such that a technology appropriate for the setting is selected*
  In many cases latrines and/or water sources had been built on unsuitable soil which led to premature collapse or dysfunction. Site selection and development should jointly occur with the school staff and a trained professional such that facilities are built to last.

- *Seasonal timing of construction/development should be taken into consideration*
  Roof water catchments should be built prior to the start of the rainy season, such that new equipment is not left empty and to rust for months before any water is accumulated.

- *Water designs that are prone to clogging should be avoided*
  For pipeline extensions, a basin structure should be avoided, as drains tend to get clogged and accumulated water provides a breeding ground for mosquitoes and parasites, posing health risks to

children. What seems to be working well for many schools are taps that run on to a flat concrete block such that excess water runs off the edges and ideally into a small irrigation canal that feeds the school gardens.

- *Access to taps should be limited to staff or designated student club leaders who facilitate drinking*
  A few schools do not allow children access to the taps at all. Rather, rubber hoses are attached to the faucets and run beyond the fenced area. School staff, usually the guard, operates the taps and children fill their personal containers or drink directly from the end of a hose. This is a clever way to prevent or at least slow damage to taps.

- *Containers for daily storage of safe drinking water should be used if possible to minimize wear*
  For hand pumps, which seem to break frequently, individual use should be limited by filling a large covered container with water every morning from which the children can collect water throughout the day under supervision of a teacher or guard.

- *Measures to protect facilities from theft and damage should be taken*
  Many schools have built a fence around the main water source and lock it during evenings and weekends. Mobile hand-washing containers should be brought in to the SD's office at the end of each day.

- *Orderly use of facilities by children should be encouraged*
  Designating the school guard or a teacher to organize children into lines before drinking from taps encourages proper use of handles and may minimize premature damage.

Best practices for sustainability of hand-washing:

- *Creative solutions for long-lasting hand-washing stations should be encouraged*
  Jerry cans or other containers with attached faucets are by far the most common form of hand-washing, yet were frequently found to be non-functional. Alternatives that do not require taps which break easily and are difficult or costly to replace should be explored, such as the example provided of a school creating a faucet-free jerry can hand-washing station that is much more likely to be sustainable.

- *An effort should be made to leverage community contributions for regular provision of soap*
  One school visited collects a minimal amount of money from parents every few months to fund the

regular purchase of soap.

- *More schools should be providing and encouraging the use of ash for hand-washing where soap is not affordable.*

- *A schedule for WASH tasks should exist*

There should be a duty schedule or clearly designated staff member such as school guard to ensure that hand-washing containers are filled with water at the beginning of each shift. Observations revealed that many schools that had functional hand-washing containers, but did not have them filled with water.

- *Teachers should set a good example by washing their hand with soap or ash after using latrines and before eating*

  Along with usual lessons about health and hygiene given at flag ceremonies, teachers should make a conscious effort to model good latrine and hand-washing behavior.

Best practices for sustainability of latrine use:

- *If latrines are built without doors, temporary solutions to provide more privacy should be encouraged*

  At some schools that have latrines without doors, they have improvised by hanging materials such as burlap sacks or sheets of plastic to provide children with more privacy.

- *Using cleaning of latrines as a punishment for latecomers is not recommended*

  Cleaning of latrines should be promoted as a collective responsibility of the school community and proper use and cleaning should be encouraged at the individual level.

- *Encouraging ownership of latrines*

  Giving a student club responsibility to promote proper use of latrines amongst young children is a good way to encourage students to have ownership over the facilities as well as easing the need for constant teacher supervision. One school, for example, has a system in which older students are responsible for recording the names of any students not using latrines properly or failing to clean up after themselves and handing the list of names to a teacher.

- *Water should be kept inside or near latrines for continual cleaning if available*

  Schools that do have a water source on the compound should keep one or more medium to small containers inside the latrines for students to wash the latrine after use.

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