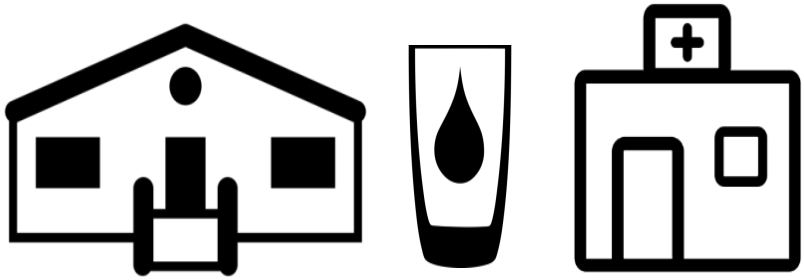
Technical Brief: Point-of-use Water Treatment in Non-Household Settings

Contents



1 Introduction

Access to safe water, sanitation, and hygiene (WASH) at home is not enough to ensure behaviour change and to prevent diarrheal disease. WASH at home is essential for improved health, but most people also spend long periods of time in other places that could lack basic WASH facilities, like schools, workplaces, and other public institutions (IRC, 2014). Drinking unsafe water for only a few days of the year can nearly cancel the health benefits of drinking from an improved source at home (Hunter, Zmirou-Navier, & Hartemann, 2009).

In many developing countries, there is an urgent need for better WASH services in non-household settings. A lack of safe water and sanitation in these settings can have negative impacts on health, education and productivity (Cronk, Slaymaker, & Bartram, 2015). Safe water, good hygiene practices, and sanitation at all locations (not only the household) are important for preventing diarrheal diseases.

Researchers have identified six types of non-household settings in which better implementation and monitoring of WASH services is very important (Cronk, Slaymaker, & Bartram, 2015). These settings are:

- Schools (e.g., daycares, nurseries, primary and secondary schools, universities)
- Health care facilities (e.g., hospitals, health centres, clinics, maternal health facilities)
- Workplaces (e.g., farms, municipal buildings, offices, factories)
- Temporary use settings (e.g., restaurants, hotels, bus stations, markets, places of worship, public facilities)
- Mass gatherings (e.g., public events, sporting competitions, festivals)
- Dislocated populations (e.g., internally displaced person camps, refugee camps, prisons, orphanages, shelters)

Point-of-use (POU) water treatment can be a strong entry point for implementers seeking to bring WASH education and infrastructure to these non-household settings. Introducing safe drinking water to these locations in a sustainable way requires careful planning and implementation. The end goal is to ensure correct, consistent, and continued use of POU water treatment.

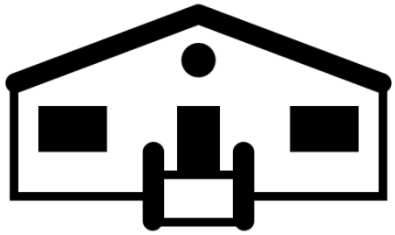
This Technical Brief introduces the importance of safe water in non-household settings and the multi-barrier approach to reduce the risk of drinking unsafe water. It also provides considerations, guiding questions and examples to support you in designing and implementing a sustainable POU water treatment system.

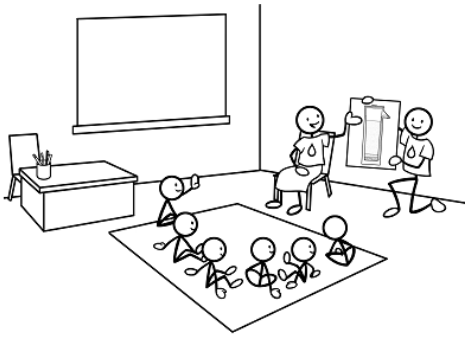
2 Importance of Safe Water in Non-Household Settings

Safe water is critically important in all settings where water is used for human consumption. A well-implemented POU treatment project in non-household settings will:

- Reduce the risk of diarrheal disease transmission—which is particularly important for the vulnerable groups that visit institutions like primary schools and health clinics.
- Raise awareness among the users of the institution about the importance of WASH in all settings, including their homes.

2.1 Schools

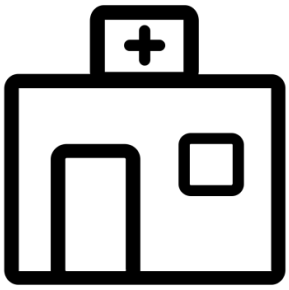




Increasing WASH access in schools is critical for children's health, education, and full participation. A lack of WASH at schools contributes to illness, gender inequality, and decreased school attendance (UNICEF, 2012). If children do not have access to safe water when they need to drink, they are more vulnerable to diarrheal diseases. This can cause them to miss school because of illness. Early childhood diarrhea can also make children more likely to experience malnutrition and to have reduced school performance (UNICEF, 2012). A lack of WASH facilities at schools also increases absenteeism among adolescent girls, who need appropriate facilities during menstruation.

Bringing safe water and other WASH interventions to schools can be a catalyst for healthier habits in the broader community. Students spend much of their time at school, so there is a great opportunity for them to learn about safe drinking water, share their knowledge with family members at home, and develop lifelong healthy habits (Vojdani, 2008).

2.2 Health Care Facilities



WASH services are severely lacking in health care facilities of low and middle-income countries. 38% of these facilities lack access to improved water sources. Even when improved water sources are available, they are sometimes unreliable (not consistently functioning) or unsafe (not consistently free of contaminants) (WHO and UNICEF, 2015). Safe water coverage is particularly low in primary health care facilities in rural areas—places intended to provide the first point of care for disease outbreaks (WHO and UNICEF, 2015).

Without basic WASH coverage in health facilities, there are increased risks to maternal and child health. 1 in 5 babies who die in their first month in the developing world could have survived with clean water and hygienic conditions in place for their birth (WaterAid, 2015). Insufficient safe water and hygiene in health care facilities not only puts mothers and babies at greater risk, but also makes mothers less eager to seek health care when needed (WaterAid, 2015).

In addition to mothers and children, health centres serve other populations with lower immunity to disease, such as people living with HIV/AIDS and elderly people. These people will be less at risk during their visits to health facilities if safe water and handwashing are consistently used.

Providing POU water treatment in health care facilities also gives opportunities for education and outreach. Health care staff can demonstrate water treatment and safe storage practices, encouraging community members to take action to prevent diarrhea (Parker, et al., 2006).

2.3 Other Public Settings

The full health benefits from safe water at home will only be achieved and sustained if people are also drinking safe water at their places of work, gathering, and temporary residence. WASH efforts have been almost exclusively focused on households, schools, and health care facilities. There is growing recognition that these efforts must expand to other public settings, such as workplaces, temporary use settings, mass gatherings and dislocated populations (Cronk, Slaymaker, & Bartram, 2015). For example, investing in WASH in workplaces results in healthier and more productive employees and reduces risks to an organization's reputation (IRC, 2014).

Like health centres, many other public spaces (for instance, day care centres, seniors' residences, orphanages, etc.) serve populations with higher vulnerability to disease. For more information about the importance of safe water for vulnerable groups, refer to CAWST's Technical Brief: Reproductive, Maternal, Newborn and Child Health and the Importance of WASH and CAWST's Technical Brief: Importance of Safe Water for People Living with HIV/AIDS.

The WASH Pledge: Business Action for WASH in the Workplace

Many international businesses have operations, employees, contractors and customers in countries lacking access to WASH. Through the WASH Pledge led by the World Business Council for Sustainable Development (WBCSD), businesses are recognizing the importance of water and sanitation for their workforce. Investing in safe WASH for employees leads to: a healthier and more productive workforce, increased brand value, lower reputational risks and more secured social license to operate, expanded and more vibrant markets, and demonstration of leadership in supporting global objectives.

By signing the WASH pledge companies commit to: implementing access to safe water, sanitation and hygiene at the workplace at an appropriate level of standard for all employees in all premises under their control within three years after signature.

(WBCSD, 2015)

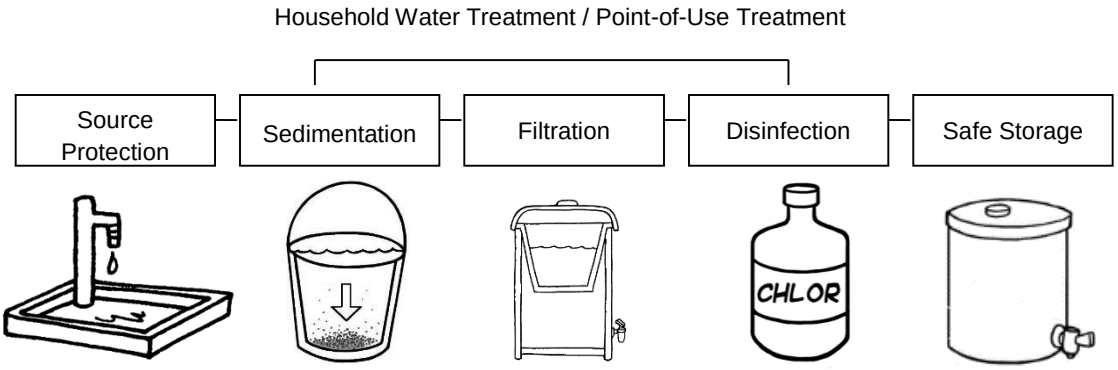
3 Point-of-Use Water Treatment and the Multi-Barrier Approach

Point-of-use treatment is primarily focused on removing pathogens from drinking water – the biggest water quality issue around the world. While improving the microbiological quality, there are some technologies that may also be able to remove certain chemicals as a secondary benefit, such as arsenic and iron.

In household and non-household settings alike, using the multi-barrier approach is the best way to reduce the risk of drinking unsafe water. Each step in the process, from source protection to water treatment and safe storage, provides an incremental health risk reduction.

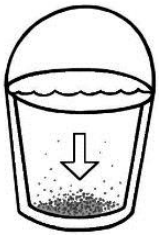
Both centralized, point-of-use and household systems follow the same basic water treatment process: sedimentation, filtration and disinfection. The main difference is the scale of the systems that are used by individuals, institutions, and communities. In households, POU approaches are also referred to as household water treatment (HWT).

Figure: Multi-Barrier Approach to Safe Water

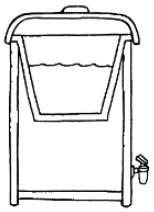


When centralized systems are not available or reliable, institutions can use POU approaches to manage drinking water quality. POU options include any methods used to treat water after collection or after distribution to the location where the water will be used. Point-of-use treatment methods include:

- Sedimentation (e.g., settling, coagulation)
- Filtration (e.g., biosand filters, ceramic filters, membrane filters)
- Disinfection (e.g., chlorine, solar, ultraviolet, pasteurization, boiling)



Sedimentation is a physical treatment process used to reduce the turbidity of the water. This could be as simple as letting the particles in the water settle for some time in a small container such as a bucket or pail. The sedimentation process can be quickened by adding special chemicals or native plants, also known as coagulants, to the water. Coagulants help the sand, silt and clay join together and form larger clumps, making it easier for them to settle to the bottom of the container. Sedimentation may not always be necessary if the source water has low turbidity (e.g., deep ground water wells).



Filtration is commonly used after sedimentation to further reduce turbidity and remove pathogens. Filtration is a physical process that involves passing water through filter media such as sand, ceramic, or a synthetic membrane. Pathogens and particles are trapped by the media while water passes through. Some filters are also designed to grow a biological layer that consumes pathogens and improves the removal efficiency.

The last step in water treatment is to remove or kill any remaining pathogens through disinfection. Chlorine can also provide a residual disinfectant, which is important if there is a risk of contamination after the treated water is distributed. When water has high levels of turbidity, pathogens "hide" behind the suspended particles and are difficult to kill using chemical, SODIS and UV disinfection. Reducing turbidity by sedimentation and filtration will improve the effectiveness of these disinfection methods.

Even after the water is treated, it should be handled and stored properly to keep it safe. If it is not stored safely, the treated water quality could become worse than the source water and may cause people to get sick. Recontamination of safe drinking water is a common issue and has been documented in many cases around the world.

More often than not, people focus on a particular technology that is directed towards one step rather than considering the water treatment process as a whole. As shown in the following table, there are few POU technologies that can completely remove or inactivate pathogens from water. While individual technologies can incrementally improve drinking water quality, the entire multi-barrier approach is essential in providing the best water quality possible.

Table: Effectiveness of POU Options for Waterborne Pathogens

POU Option	Very Effective For:	Somewhat Effective For:	Not Effective For:
Biosand Filter	Bacteria, Protozoa (e.g., *Cryptosporidium*)	Viruses	-
Ceramic Filters (Pot or Candle)	Bacteria, Protozoa (e.g., *Cryptosporidium*)	Viruses	-
Chlorine	Bacteria (except *M. avium)* and Viruses[1]	*Giardia*[2] and some protozoa	*Cryptosporidium*, *Toxoplasma*
Flocculation & Chlorination	Bacteria, Viruses, *Cryptosporidium*[3]	-	-
Solar Disinfection (SODIS)	Bacteria, Viruses[4]	*Cryptosporidium*[3]	-
Boiling	Bacteria, Viruses, Protozoa (e.g., *Cryptosporidium*)	-	-

[1] High ammonia levels can result in "combined chlorine" being formed instead of "free chlorine" which significantly reduces virus inactivation
[2] Depends on temperature, pH and contact time
[3] Data not available for most other protozoa
[4] Only somewhat effective for Adenoviruses

It is often recommended that water for hospitals, health centres and feeding centres should be treated with chlorine or another residual disinfectant (Sphere Project, 2011). While chlorine is important to maintain a disinfect residual, it should not be relied on alone to treat water.

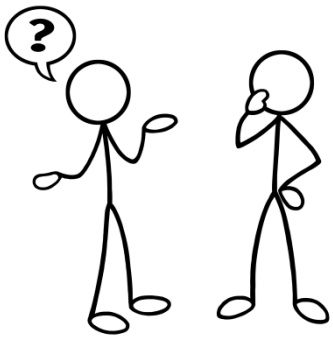
First of all, the water needs to have a low turbidity (less than 5 NTU) for chlorine to work most effectively. Turbid water that is to be chlorinated should first be settled and filtered. Secondly, chlorine alone it is ineffective for some pathogens, like the *Cryptosporidium* protozoa. As part of the multi-barrier approach, sedimentation and filtration options can first be used to remove *Cryptosporidium*, and chlorination can then disinfect any remaining pathogens. This would provide the safest water quality possible for sick and vulnerable populations. For more information, see CAWST's Technical Brief: Chlorine Disinfection of Drinking Water and Technical Brief: Importance of Safe Water for People Living with HIV/AIDS.

For more information about the multi-barrier approach, including details about different technologies, refer to CAWST's HWTS Manual and the HWTS Knowledge Base (www.hwts.info).

4 Designing an Appropriate POU System

Many people want to be told the "best" technology for POU treatment. Unfortunately, there is no easy formula that will answer this question. Water treatment is a process (i.e., sedimentation, filtration and disinfection), not a single technology. Many factors affect which combination of technologies is the most appropriate. Many measures have the potential to reduce diarrheal disease, each with its advantages and limitations depending on the local circumstances.
For POU systems to be successful in non-household settings, they must be:

- Able to provide enough water to meet the demand
- Able to treat the available source water to the required quality standard
- Locally available (including spare parts and servicing)
- Locally acceptable
- Easy to use and maintain
- Financially sustainable for the institution



The following sections will provide guiding questions and considerations to help you select an approach that will be effective for your local context. CAWST also offers educational resources and consulting support. Contact CAWST for help identifying an appropriate solution for your context (resources@cawst.org).

4.1 Assessing the Institution's Needs and Resources

Before implementing POU treatment, it is important to ensure that you first design an appropriate system for your institution. Bring together all stakeholders and jointly assess your resources and needs.

The following table provides some guiding questions to help you assess your water treatment needs. You may want to follow a more formal approach to assessing your institution's needs, such as a small-scale water safety plan. See CAWST's Technical Brief: Integrating Household Water Treatment into Water Safety Plans for more information.

Table: Guiding Questions and Guidelines for Assessing Needs

Topic	Guiding Questions	Guidelines

Water Demand	• How many people will be using the water on an average day?
	• How many people will use the water at peak times of day?
	• What will the water be used for? (drinking? preparing food? washing?)
	• What is the total volume of water you will require each day?
		• Recommended targets:
		  ○ Schools: 0.5 litres/person/day (Vojdani, 2008) to 5 litres/person/day (Cronk, Slaymaker, & Bartram, 2015)
		  ○ Health centres: 5–400 litres/person/day. This is a large range because outpatient care requires relatively little water, but operating theatres and delivery rooms require much more (WHO and UNICEF, 2015)
		  ○ Workplaces: 5 litres/person/day
		  ○ Places of residence (e.g., prisons, orphanages, boarding schools, etc.): 20 litres/person/day
		• Some POU systems are designed to treat a limited volume of water per day. To make these systems applicable for larger institutions, you may need to run multiple systems in parallel.

Water Availability	• Is the water source able to reliably provide the quantity of water you require?
	• Do you have an easy way of collecting and transporting water to your institution?
		• If you do not consistently have enough water available, consider what you can do to access a different source.
		• In the absence of centralized infrastructure, here are some ideas for transporting water to your institution:
		  ○ Pumping water from the source
		  ○ In schools, asking students to collect 1 bucket of water each
		  ○ Water collection and POU operation can be the responsibility of the caretaker, club or committee. Plans should be in place to ensure redundancy and sustained use in case of turnover (see “Roles and Responsibilities”).

Water Quality	• What are the main contaminants of concern in your water supply? • Is the water source centrally treated before distribution/collection? If so, how reliable/consistent is the treatment? • How variable is the water quality?	• Some technologies are more effective than others at removing specific contaminants. Refer to CAWST’s HWTS Fact Sheets for detailed information about different technology options. • Every country has national water quality standards. Ensure that the POU treatment system can meet your country’s water quality standards. • Consider how you can address all stages of the multi-barrier approach to reduce the risk of contamination. • For health centres: Drinking water should be treated with chlorine or another residual disinfectant as part of the multi-barrier approach (Sphere Project, 2011).

4.2 Criteria for Selection

There is no single "best" POU solution for all contexts. There are five main criteria that you should take into consideration when deciding which POU systems are most suitable:

1. **Effectiveness:** How well does the POU system perform? Does it provide sufficient water quality and quantity to meet the demand?
2. **Appropriateness:** How well does the system work within the structures and processes of the institution? Are the technologies locally available? What are the institution's responsibilities to operate and maintain the technology? Is it easy and convenient for people to use the technology? How long will the technology last before it needs to be fixed or replaced?
3. **Acceptability:** What will people think of the system? What benefits will the technology give to people?
4. **Cost:** What are the costs for the institution? Consider up-front costs and also ongoing costs for purchasing consumable products, maintenance, user education, etc.
5. **Implementation:** What is required to get the system into the institution? What is required to ensure continued use and maintenance?

4.3 Location and Access

When you are selecting your POU system, consider where it will be located and how users will access the treated water. There are many different approaches that can be used for location and access, depending on the objectives of your project.

How you locate your POU system will affect how much risk there is that water could be re-contaminated after it is treated. For systems that require water to be stored after treatment, it is often best to use a centralized storage container with taps. Decentralized safe storage containers with taps (for example, one per classroom or meeting room) may also be used. There should be a person responsible for safeguarding it and ensuring that the container remains clean.

If you intend to use your POU system as a means to educate the broader community, consider where the components of your system will be located and how users will be able to interact with it to enhance their learning.

Example: Strategically Locating Safe Storage in the Classroom

In a Bangladesh School Health and Nutrition program, each classroom received a safe storage container and students assumed responsibility for filling and cleaning the container on a regular basis. This strategic placement helped them to practice the safe storage and hygiene principles they learned in their health education classes.

(Save the Children, 2009)

5 Implementing POU Systems

After selecting an appropriate POU system, there are many things to consider as you plan and implement your project. Who will you involve in the project? How will you ensure ongoing capacity development, monitoring and financial sustainability so that the POU system will be used correctly and consistently?

5.1 Roles and Responsibilities

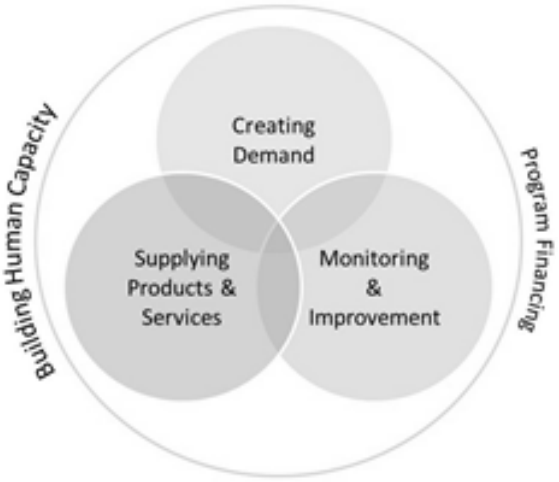
Clear roles and responsibilities are critical for the success of any project. Regardless of the institution, it is essential that ownership of the technology resides locally (in the institution or closely-affiliated organizations or individuals). Here are some considerations for ensuring clear roles and responsibilities:

- If the institution is not the main project implementer (for instance, an NGO, local business or government is responsible for the POU system), it is still crucial that the institution is involved in planning.
- A signed agreement should be developed to detail who is responsible for providing, operating, maintaining, and replacing components of the system and for providing training and monitoring.
- It is beneficial to have an “in-house champion” of the POU system. Examples include: a head nurse who actively oversees all staff using and serving treated drinking water; janitors who monitor the POU system as part of their regular routine; or a group of enthusiastic teachers who oversee a School WASH Club and monitor the POU system.
- Identify ways to ensure ongoing monitoring, training, and follow-up if there is turnover in staff, students, volunteers or organizations involved in the project.

5.2 The Project Implementation Framework

Most successful projects have carefully considered and addressed the following components:

- Creating demand
- Supplying the required products and services to meet the demand
- Monitoring and continuous improvement of project implementation



Two supporting components are also essential for the successful planning and implementation of a project:

- Building human capacity
- Ensuring sustained financing

Considering these five components and how they fit together will increase your likelihood of success. It will also improve your ability to have positive impacts on the broader community outside your institution.

5.3 Creating Demand

Positive health impacts from using safe water are more likely to occur if communities make safe water a priority in both household and non-household settings (IRC, 2014). People are more likely to demonstrate correct, consistent, and continued use of a water treatment system if they believe it is effective and appropriate for them. Your institution's POU system will have the greatest chance of continued success if there is demand for it within the community. There are two strategies you can use to create demand for safe water within the broader community:

1. **Start at the household level:** Start with implementation at a household level to build trust in your POU system, and then expand to implementation in institutions. If people are using a particular POU product at home, it will be easier for them to recognize the value of using POU treatment in workplaces, schools and public facilities.
2. **Start with the institution:** Use implementation in an institution (like a school, gathering place, health clinic, workplace) to generate interest and demand about the POU product. Many institutions are natural gathering spaces in which ideas can easily be shared and promoted.

Example: Starting with the Household

Abundant Water has installed ceramic filters in 12 schools over the last two years in Laos. Their ceramic filter projects started small. They began by implementing in households through close connections with local NGOs and community members. Demand for filters increased as news of their value spread through the community. Eventually, Abundant Water and their local partners (including Community Development and Environment Association) received requests for more filters and a version that could be used in schools. Abundant Water fits its school implementation into a broader health and sanitation program with extensive education. The organization now has a vendor program with five entrepreneurs who sell and service filters to their communities.

(Skinner, 2015)

Example: Starting with the Institution

In Kenya, handwashing and safe drinking water systems were introduced in health centres to increase demand and uptake in the broader community. A program was initiated in 2005 to install water stations for handwashing and safe drinking water in 109 health facilities. Health workers in the facilities were trained on water treatment and hygiene and were encouraged to share their knowledge with clients.

In 2008, an evaluation found that nearly all of the facilities still had water stations in use, and 59% were still actively using chlorine to treat their water. 45% of client visitors to health centres reported hearing about chlorination products for water treatment at their health facility, and nearly 50% were using the treatment process in their homes.

(Sreenivasan, et al., 2014)

5.4 Supplying Products and Services

Institutions will need both the POU products and support services to ensure proper and consistent use over the long term. This requires significantly more effort on the service component or “software” than has traditionally been the case in the water and sanitation sector.

Supply chains that use locally available resources, supply routes, and people (for labour, education and follow up) are often successful. This is because people and supplies are locally available for ongoing operation, maintenance, troubleshooting and education.

When you are selecting your POU approach, consider the affordability and availability of spare parts, labour, and training required to ensure ongoing functionality and use. For consumable POU products, is the supply consistently available and affordable? For durable and consumable products, how will you obtain and pay for replacement parts such as new filter components, buckets, or valves over time?

What is the Difference between Consumable and Durable Products?

Consumable products, such as chlorination tablets or flocculent/disinfectant powder, need to be replenished on a regular basis. As such, they have recurrent costs, but lower initial costs.

Durable products are occasional or one-time purchases (e.g. ceramic filter elements need to be replaced every 1-2 years, biosand filters can potentially last a lifetime). They have a relatively higher initial costs than consumable products, but minimal recurrent costs.

5.5 Monitoring for Improvement

Monitoring is essential for ongoing improvement of implementation. It is important to identify and address any barriers to correct and consistent use of the POU system before there are negative effects on public health. A good monitoring system will help you identify potential problems and continually improve your project and impact.

What you choose to monitor will depend on the type of institution and the nature of your project activities. You may wish to monitor some or all of the following project elements:

- Water quality
- Use
- Management
- Education
- Impact

Collecting data is not useful unless if you use your findings to make adjustments and improvements. It is important to create a simple and useful system for keeping track of your data and identifying trends over time.

Selecting Appropriate Indicators

The key to successful monitoring is to keep it simple, meaningful and within the means of the organization. Rather than collecting unnecessary and overwhelming amounts of data, try carefully selecting a small number of indicators. The indicators you select should be helpful for answering two questions:

1. Are activities going according to plan?
2. Are activities creating the desired results?

Here are some examples of indicators you may choose to monitor for your POU project:

- Number of POU systems installed
- Number of people educated about the POU system
- Number of litres of water treated and used per day
- Number of times per week that the POU system is cleaned or checked by caretakers
- Cost per month for operation and maintenance
- Number of people with access to safe water
- Number of people experiencing health benefits, such as reduced diarrhea

5.6 Building Capacity

Education is central to most effective projects. Consider how you can formally or informally educate people about the importance of safe water at all stages of implementation. Additionally, consider what each stakeholder needs to know and what skills they will need to support the project effectively. The following table gives guiding questions to consider as you decide how to incorporate capacity development into your project.

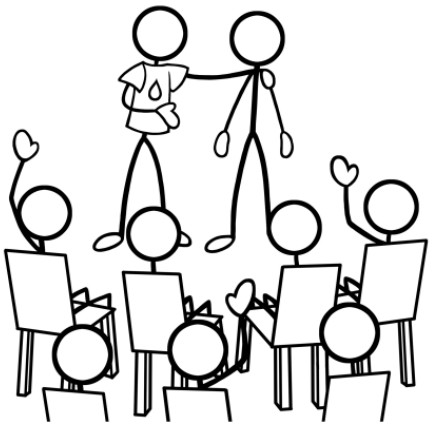


Table: Guiding Questions for Incorporating Capacity Development

Activity	Guiding Questions
Building capacity for operation and maintenance	• Are there people at the institution who already have the knowledge and skills required to operate and maintain the POU system? If not, how will you build capacity locally? • What kind of training is required? • How will you provide follow-up support? • How will you ensure that knowledge and skills will reside locally if the person responsible for operation and maintenance leaves?
Educating users	• Who will be the main users of the technology (Staff? Community members?) • How will users be educated on proper use and maintenance? • What existing WASH education programs or outreach activities occur at the institution? Can you use them to support the success of your project? • How will you ensure ongoing capacity development of users so that they understand the importance of the multi-barrier approach to safe water?
Educating the broader community	• How can you use behaviour change approaches and tools (e.g., posters, demonstrations, role plays) to educate others and create demand? • How can you support users to share their knowledge about POU systems with their home and community?

Building Capacity to Connect WASH and Other Disciplines

In some institutions, leadership and coordination will be required to help people understand the importance of safe water and how it relates to their roles and responsibilities. In health centres, for example, education is often required to help staff understand the connection between aspects that fall within the sphere of typical health sector roles (such as handwashing by health providers) and those that do not (such as appropriate and reliable water and sanitation systems).

(Bartram, et al., 2015)

Example: Importance of Building Capacity within the Institution

A research team conducted an evaluation of 55 primary schools two and a half years after a safe water system was implemented. They found that none of the schools were still continuing all project activities (such as treating drinking water, providing safe storage, providing water and soap for handwashing). The schools with the highest level of continued activities had very high institutional capacity and support, with at least one of the original trained patrons still present at the school. The most successful schools had active school management committees that were carrying out WASH-related education or advocacy.

(Shadi Saboori, 2011)

5.7 Financing

Financial planning and management are very important for continued use of POU systems. The costs of implementation are highly institution-specific. Consider how the institution will fund maintenance, repair, and replacement of parts over time, as well as monitoring, training and education activities. In your planning, it is important to distinguish between costs of:

- Durable products (for example, a biosand filter which may last for 10 years) versus consumable products (for example, chlorine which you need to regularly restock)
- Initial costs (to install the system and train the relevant stakeholders) versus ongoing costs (to maintain the system and to support ongoing education and training)

Financing depends on the institution's legal structure (e.g., public institution, government, for profit business) and its implementation strategy. Public institutions often need a combination of funding sources from local and international donors, government and earned revenue to cover their expenses. Some options to consider for financing include:

- Partial cost recovery: In some cases, users can be charged for treated water, or excess water can be sold to members of the broader community. Requiring payment may discourage use of safe water, so it is important to assess people's willingness to pay.
- Fundraising: When there is demand for the POU system a public space, fundraising could be an effective financing option. Ask each member to contribute a small sum to help finance the POU system with the added benefit of increasing community ownership for the system.

5.8 Regulatory Environment

A wide range of international standards and guidelines exist for WASH in non-household settings. The international regulatory environment is summarized by Cronk et al. (2015).

The World Health Organization (WHO), UNICEF and Sphere Project have created international guidelines that apply to specific institutions, particularly schools and health centres. It is important to be aware of these guidelines; they are listed in the Additional Resources section of this Technical Brief. Other settings, such as hotels, bus stations, public facilities, orphanages, and marketplaces, do not have international WASH guidelines.

Additionally, every country has national drinking water quality standards. These are often based on the WHO Guidelines for Drinking Water Quality (2011). Ensure that your selected POU system can meet your country's water quality standards.

What is the Difference between a Guideline and a Standard?

Guideline: A recommended limit that should not be exceeded. Guidelines should be viewed as best practices that are not usually requirements, but are strongly recommended.

Standard: A mandatory limit that must not be exceeded. Standards often reflect a legal duty or obligation.

6 Additional Resources

CAWST resources on: household water treatment and safe storage (HWTS), WASH for maternal and child health, safe water for people living with HIV/AIDS. Available at: http://resources.cawst.org

- CAWST offers free and open content education and training resources including technology fact sheets, technical briefs, position papers, training manuals and case studies.

International Committee of the Red Cross (ICRC). Water, Sanitation, Hygiene and Habitat in Prisons. Available at: www.icrc.org/eng/resources/documents/publication/p0823.htm

- This book aims to improve the conditions of inmates in places of detention. Detailed drawings present solutions in such areas as water supply, sewage and waste disposal, food preparation, vector control, general hygiene and health.

Sphere Project. The Sphere Handbook: Humanitarian Charter and Minimum Standards in Humanitarian Response. Available at: www.sphereproject.org/handbook/

- This handbook is a widely regarded set of international principles and minimum standards for humanitarian response. It outlines basic standards for water supply and water quality for disaster situations. Many of these standards can also be helpful for development contexts.

Sustainable Sanitation and Water Management (SSWM). Point of Use Water Treatment. Available at: www.sswm.info/category/implementation-tools/water-purification

- This website provides an overview of many point of use (POU) treatment options, along with information and links to resources about "software" required to support water treatment projects.

UNICEF. WASH in Schools. Available at: www.unicef.org/wash/schools/

- This website provides up-to-date information on events, resources and news about water, sanitation and hygiene education in schools and features video interviews with WASH in Schools experts from UNICEF and its partners.

Water Sanitation Programme (WSP). Toolkit on Hygiene, Sanitation and Water in Schools. Available at: www.wsp.org/schoolsanitation

- This toolkit includes practices and approaches that are likely to yield positive results to improve sanitation and hygiene in schools.

WHO and UNICEF. (2015). *Water, sanitation, and hygiene in health care facilities: status in low- and middle- income countries and way forward.* Geneva: World Health Organization. Available at: www.who.int/water_sanitation_health/publications/wash-health-care-facilities/en/

- This report provides an overview of the importance of WASH in health facilities and shows the pressing need in low- and middle-income countries. Case studies and summary documents are also available from the same website.

7 References

Bartram, J., Cronk, R., Montgomery, M., Gordon, B., Neira, M., Kelley, E., & Velleman, Y. (2015). Lack of toilets and safe water in health-care facilities. *Bulletin of the World Health Organization*, 210. Retrieved from http://dx.doi.org/10.2471/BLT.15.154609

Cronk, R., Slaymaker, T., & Bartram, J. (2015). Monitoring drinking water, sanitation, and hygiene in non-household settings: priorities for policy and practice. *International Journal of Hygiene and Environmental Health, Article in Press*. Retrieved from http://dx.doi.org/10.1016/j.ijheh.2015.03.003

Hunter, P. R., Zmirou-Navier, D., & Hartemann, P. (2009). Estimating the impact on health of poor reliability of drinking water interventions in developing countries. *Science of the Total Environment*, 2621-2624. Retrieved from http://dx.doi.org/10.1016/j.scitotenv.2009.01.018

IRC. (2014). *The need for water and sanitation in schools, health centres and at the workplace.* The Hague. Retrieved from www.ircwash.org/resources/need-water-and-toilets-schools-health-centres-work-place-and-prisons

Parker, A., Stephenson, R., Riley, P., Ombeki, S., Komolleh, C., Sibley, L., & Quick, R. (2006). Sustained high levels of stored drinking water treatment and retention of hand-washing knowledge in rural Kenyan households following a clinic-based intervention. *Epidemiology and Infection*, 1-8. Retrieved from http://dx.doi.org/10.1017/S0950268806005954

Save the Children. (2009). *Improving water and sanitation in schools and communities: successes and lessons learned from Nasirnagar, Bangladesh.* Washington. Retrieved from www.washinschools.info/page/1233

Shadi Saboori, A. M. (2011, October). Sustained school hand washing and water treatment programmes: Lessons learned and to be learned. *Waterlines, 30*(4), 298-311. Retrieved from www.ircwash.org/sites/default/files/Saboori-2011-Sustaining.pdf

Skinner, T. (2015, 03 15). Field Work Advisor, Abundant Water. (N. Mahaffy, Interviewer)

Sphere Project. (2011). *The Sphere Handbook.* The Sphere Project. Retrieved from Humanitarian Charter and Minimum Standards in Humanitarian Response. Retrieved from www.sphereproject.org

Sreenivasan, N., Gotestrand, S., Ombeki, S., Oluoch, G., Fishcher, T., & Quick, R. (2014). Evaluation of the impact of a simple hand-washing and water-treatment intervention in rural health facilities on hygiene knowledge and reported behaviours of health workers and their clients, Nyanza Province, Kenya, 2008. *Epidemiology and Infection*, 1-8. doi:10.1017/S095026881400082X Retrieved from www.ncbi.nlm.nih.gov/pubmed/24865584

UNICEF. (2012). *Water, Sanitation and Hygiene (WASH) in Schools: a companion to the Child Friendly Schools Manual.* Retrieved from www.unicef.org/publications/index_49574.html

Vojdani, J. D. (2008). *Implementing safe water and hygiene programs in schools.* Centers for Disease Control and Prevention. Retrieved from http://aje.oxfordjournals.org/content/174/suppl_11/S23.full

WaterAid. (2015). *Healthy Start: the first month of life.* Retrieved from www.wateraid.org/what-we-do/our-approach/research-and-publications/view-publication?id=02c3b5d6-4ffd-4844-8d5a-0083e8e522ff

WHO and UNICEF. (2015). *Water, sanitation, and hygiene in health care facilities: status in low- and middle- income countries and way forward.* Geneva: World Health Organization. Retrieved from www.who.int/water_sanitation_health/publications/wash-health-care-facilities/en/

CAWST (Centre for Affordable Water and Sanitation Technology)
Calgary, Canada
Website: www.cawst.org Email: resources@cawst.org
Wellness through Water.... Empowering People Globally
Last Update: November 2015