

Technical Brief: Water Safety Plans (WSPs) and Household Water Treatment and Safe Storage (HWTS)

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1 Introduction

When you pour yourself a glass of water, how do you know if it is safe to drink?

People's health can be at risk when **pathogens** (microorganisms that cause disease) or other contaminants (like arsenic, fluoride and nitrogen) enter their drinking water. This contamination can occur at any point in the water supply system: at the water's source, while it is being transported, or while it is being used and stored in a household. Even water that looks clear and comes from an improved source may not be safe to drink by the time it reaches your glass (Bain et al., 2014).



Water safety planning is a preventative, risk-based approach to improving the safety of drinking water. The goal of creating a water safety plan (**WSP**) is to protect households from contaminants that could get into their water at any point from the catchment to consumer. The WSP approach involves:

- Describing the **water supply system**
- Identifying risks to water safety from **catchment** to consumer
- Developing and implementing a plan to manage risks
- Monitoring on a continued basis to make sure the water safety plan is working effectively



In the WSP approach, team members prioritize and implement **barriers** (control measures) to keep drinking water safe from pathogens. These barriers sometimes include **household water treatment and safe storage (HWTS)** practices. HWTS is a general term for activities people do in their homes to treat and safely store their drinking water.

This Technical Brief introduces the importance of WSPs for small communities. It describes the benefits of including HWTS solutions in a WSP, and it explains how the WSP approach can improve HWTS implementation. It then provides an overview of the six water safety planning tasks for small communities, with considerations for integrating HWTS throughout the tasks.

This resource is for anyone responsible for HWTS or WSP implementation in small communities: members of governmental organizations, nongovernmental organizations, community-based organizations, and communities. The purpose of this Technical Brief is to explain how water safety planning and HWTS can be used together. This document is not a complete guide for creating and implementing a WSP, or for selecting appropriate HWTS solutions. To learn more about WSPs and HWTS, refer to the resources listed at the end of this document.

CAWST supports water, sanitation, and hygiene (WASH) practitioners who are implementing household-based WASH solutions in low-income, non-networked communities.

2 Why are Water Safety Plans Useful in Small Communities?

Water safety plans were jointly introduced in 2004 by the World Health Organization (WHO) and the International Water Association (IWA). WSPs are now used throughout the world as a proactive way to manage risk (Bartram, 2009; Davison et al., 2005).

Water quality testing alone does not guarantee safe drinking water. Testing can detect problems after they occur, but does not prevent them from happening (UNICEF, 2008). As well, water quality testing can be expensive and requires equipment and skills, so it is not always easy to perform regularly or routinely.



Portable water quality testing kit

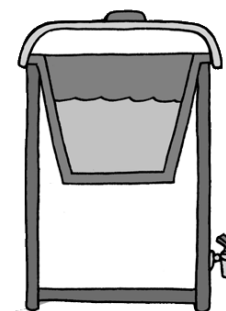
WSPs were first used in large communities with centralized water treatment and distribution systems. WSPs are equally helpful, in smaller communities, where networked systems may not exist and regular water quality testing is often not possible. Using a WSP in a small community can help you proactively identify and manage risks to drinking water quality before problems happen. This is better than waiting for people to get sick from water contamination and then dealing with it after the fact. In small communities, a WSP team can follow the six tasks of a simplified water safety planning process, to effectively manage their water supply (Rickert et al., 2014; World Health Organization [WHO], 2012).

3 What is Household Water Treatment and Safe Storage?

Household Water Treatment and Safe Storage (HWTS) refers to activities in which people treat water and store it in their homes. HWTS approaches are also referred to as managing water at the point-of-use (POU). Most low-cost HWTS solutions are focused on removing fecal pathogens—the biggest public health threat. Some HWTS technologies may also be able to remove certain chemicals, such as arsenic or iron.

HWTS includes any of the following treatment and storage activities:

- Sedimentation (for example, settling, coagulation)
- Filtration (for example, straining through a cloth, biosand filters, ceramic filters, membrane filters)
- Disinfection (for example, chlorine, solar, ultraviolet, pasteurization, boiling)
- Safe storage (for example, clean container with a lid, tap or narrow opening)



Ceramic pot filter

The same water treatment steps (sedimentation, filtration, and disinfection) are used in community-scale systems. Combining these three steps makes water treatment systems more effective at removing pathogens. At a household level, it is also helpful to consider HWTS as a system: you can combine multiple barriers (sedimentation, filtration, disinfection, and safe storage) to increase water safety.

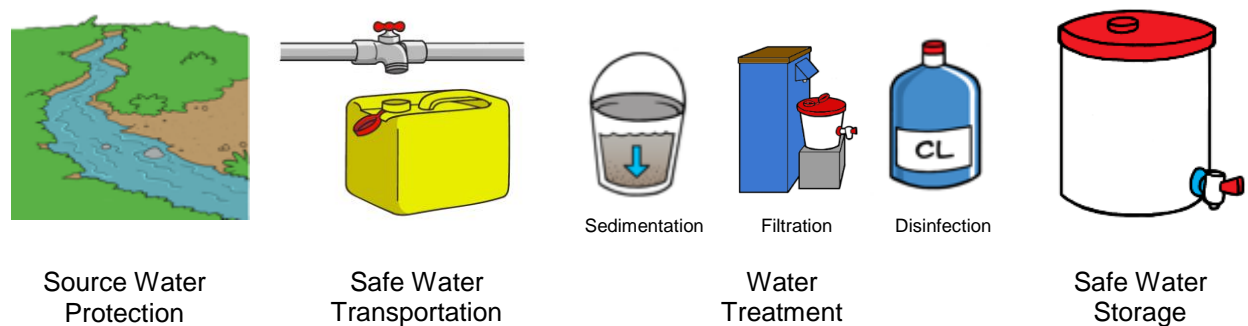
4 Water Supply Systems and the Multi-Barrier Approach

Water goes through many steps before it gets to a person's drinking glass. When it falls in a **catchment** area, rainwater replenishes the water source(s) used by a community. These sources may include rivers, lakes, wells, boreholes, reservoirs, and rainwater harvesting tanks. Water from these sources is transported (sometimes in piped networks and sometimes in containers) to people's homes, where it is stored and used. In some cases, water also goes through a centralized or household water treatment system. This combination of sources, transportation methods, treatment systems, and storage practices in a community is referred to as the **water supply system**.

All community water supply systems have multiple steps at which contaminants could enter the drinking water supply. Water safety planning helps communities adopt a **multi-barrier approach** to prevent and remove contamination. The WSP team assesses risks along the water supply system and implements barriers to ensure that if one barrier fails, the water stays safe. The **multi-barrier approach** uses a combination of technologies and behaviours to:

- *Protect the water source* from contaminants – for example, by properly siting latrines, restricting animal access to the water source, and using safe waste disposal methods.
- *Transport the water safely* to the home and within the home – for example, by monitoring distribution networks, adding residual disinfectants, using clean containers with lids, and handling water safely every time it is transferred to a glass or another container.
- *Treat the water* to remove contaminants – for example, by using centralized and/or household water treatment systems. Regardless of the scale of the system, multiple barriers (sedimentation, filtration, and disinfection) can be applied based on the identified risks.
- *Store the water safely* to prevent contamination before and after treatment – for example, by regularly monitoring and maintaining any water storage tanks, and by using a clean container with a lid and tap to store treated water in the household.

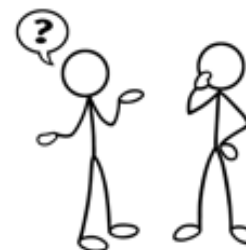
Figure: Multi-Barrier Approach to Safe Water



For more information about the multi-barrier approach and HWTS options, see CAWST's HWTS resources (<https://resources.cawst.org>) and HWTS Knowledge Base (<https://hwts.info>).

5 How do HWTS and WSPs Support Each Other?

HWTS and WSPs support each other in the following ways:



5.1 HWTS adds Value to WSPs.

People often focus on community-level infrastructure when they talk about water safety. However, household water treatment and safe storage (HWTS) practices are important barriers to risk for many communities.

Household practices affect a community's water safety. Household practices are a very important part of the water supply system: how people collect, transport, treat, and store water must be considered within a water safety plan. Focusing on risks and solutions at the household level is necessary to make sure water remains safe from catchment to consumer.

HWTS gives households control over their water quality. In many rural communities, centralized water treatment and distribution systems do not exist or are unreliable. Even where these systems are working properly, water is often recontaminated during distribution, collection, and storage (Wright et al., 2004). HWTS practices add additional barriers to risk, and give households more ownership for and confidence in the safety of the water they drink.

HWTS is an affordable step towards safe water. After creating a WSP, many communities need to find money to repair or upgrade their water supply systems. They may lack the funding and expertise to immediately do all of the needed improvements. Introducing simple household solutions can increase water safety immediately, even while the community is raising funds for other improvements.

5.2 WSPs add Value to HWTS.

Many project implementers focus on HWTS without considering the entire water supply system. HWTS solutions will be most effective if they are used alongside other barriers, with a plan for ongoing monitoring and improvement.

WSPs include other barriers in addition to HWTS. Household water treatment and safe storage should be used alongside other barriers, such as source water protection and safe transportation of water. In many cases, people know about contaminants in their water, and may even know about actions they can take at home to improve their water quality. However, many people do not have community-level plans for reducing the likelihood and impact of contaminants entering their drinking water supply. Water safety planning helps communities consider ways to protect their water from catchment to consumer (Greaves & Simmons, 2011). It also helps communities assess and address cases where available HWTS systems cannot remove certain contaminants, such as chemicals from agriculture or industry.

WSPs help communities select appropriate solutions. Sometimes, implementing organizations come to a community with a pre-determined technology, without taking time to first understand the local context. This can result in solutions that are not appropriate or desirable for households in the community. The WSP approach helps the community identify its most important risks to water safety and choose appropriate barriers. This can increase the sustainability of the solutions implemented. Note that after creating a WSP and identifying the need for HWTS, a team will need to do more work to select an appropriate HWTS system and

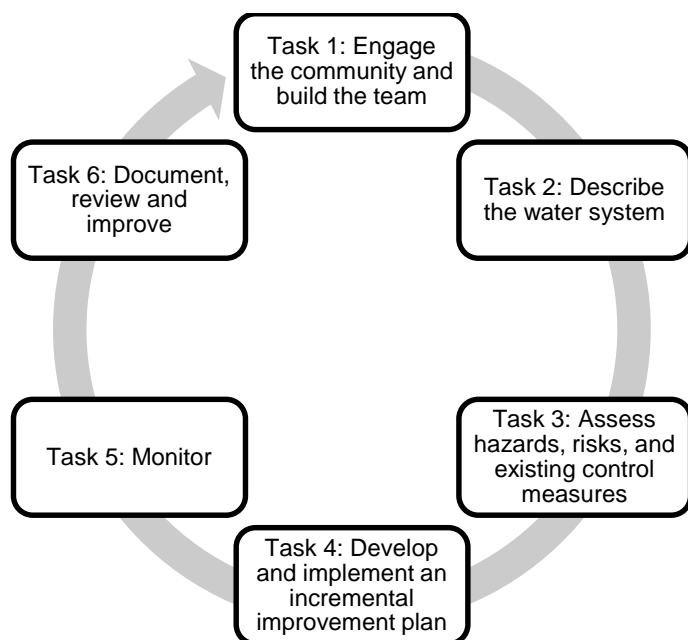
implement it effectively. For more information about HWTS selection, refer to CAWST's HWTS materials.

WSPs encourage collaboration for ongoing monitoring and improvement. Water safety planning requires ongoing monitoring and improvement over time, which is important for the continued success of HWTS implementation. A WSP team will regularly monitor the community's water supply system and will use the information it collects to improve barriers and reduce risk. Regular monitoring is an important way to ensure that households are correctly, consistently, and continuously using their HWTS systems.

6 The Six Tasks of Water Safety Planning: Considering HWTS

Including HWTS in WSPs requires a basic understanding of the WSP approach. The WHO (2012) has outlined six tasks for water safety planning in small communities. These tasks represent a simplified version of the 11 modules for larger-scale WSPs (Bartram, 2009).

Figure: Six Tasks to Develop and Implement a WSP for Small Communities



(Adapted from WHO, 2012)

6.1 Selecting HWTS Systems for WSPs

HWTS can be included in a WSP by:

1. *Considering household practices throughout the WSP process.* Existing HWTS practices should be carefully considered during all tasks of the WSP, including system assessment, risk ranking, and monitoring.
2. *Introducing HWTS where it is not currently practiced.* New HWTS practices can be added as barriers to address identified risks.

To introduce new HWTS systems, you will need to consider factors that are not included in most WSP guidance documents. First, you will need to select an appropriate system. This system may include a combination of sedimentation, filtration, and disinfection methods or technologies. There are five main criteria to take into consideration when deciding which household water treatment systems are most suitable:

1. *Effectiveness* – How well does the system perform?
2. *Appropriateness* – How well does the system fit into people’s daily lives?
3. *Acceptability* – What will people think of the system?
4. *Cost* – What are the costs for the household?
5. *Implementation* – What is required to get the system into people’s homes?

After selecting an appropriate system—or when planning improvements to the implementation of existing HWTS technologies in the community – also consider how to:

- Create demand for HWTS in the community
- Supply the HWTS systems, replacement parts, and services
- Monitor the HWTS systems and make improvements
- Build capacity to use, monitor, and maintain the systems
- Finance the promotion, distribution, and monitoring of the HWTS systems.

The following sections outline the six tasks for water safety planning in small communities, with considerations for including HWTS throughout the process. For more details about these tasks and how to facilitate the WSP process, refer to the WSP Portal (<http://www.wspportal.org/>). For more information about selecting and implementing appropriate HWTS solutions, refer to CAWST’s HWTS materials (<https://resources.cawst.org>).

6.2 Task 1: Engage the Community and Build the WSP Team

A WSP should be created and implemented by a team who understands the water supply system and cares about making water safe to drink (Greaves & Simmons, 2011; WHO, 2012). There are two goals to achieve during this task:

1. *Engage the community.* A successful WSP involves the community throughout the process and, ideally, is led at the community level. Community members should be engaged throughout each of the tasks of water safety planning (WHO, 2012).
2. *Assemble a team.* This team should include people who:
 - Have knowledge of the water supply (at least some team members should use the water source(s) every day).
 - Will be affected by the decisions made (for example, farmers who graze animals near the water source).
 - Have influence and can encourage others to take action (for example, community leaders and teachers).

- Have authority to make decisions.
- Are able to identify risks and control measures (see task 3).

Incorporating HWTS During the Team Building Task

Team members should include people who are responsible for transporting, treating and storing water in their homes. If possible, include several people who are familiar with water collection and HWTS practices. The team will be better able to assess and identify the risks associated with household practices. They will also be able to propose household-level solutions that are practical and easy to manage.

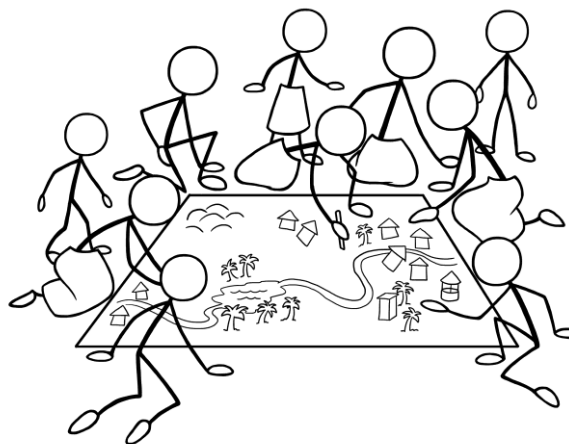


6.3 Task 2: Describe the Water System

Team members will begin working together to describe the entire water supply system. They will also identify the different users and uses of the water.

Water supply systems in small communities can be very diverse (Davison et al., 2005). Most communities have a variety of water sources, transportation methods, treatment systems, and storage practices.

The system can be described by using existing maps and records, or by working together to draw the community and its water supply system. The team should not rely only on reports and records. Some important details can only be identified through direct observation and discussion with community members.


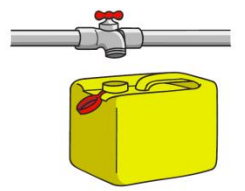

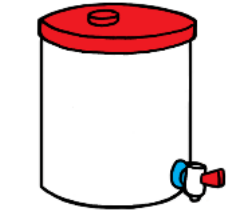


Mapping the community water supply system

In this task, the team will identify all components of the water supply system that affect water quantity and quality. This includes land use practices, water sources, current treatment systems, and household behaviours. The guiding questions in the following table can help to describe components of a water supply system. Also refer to the resources by the WHO (2012) and Greaves & Simmons (2011) for simple tools and examples.

In addition to describing the physical water supply system (where the water comes from and how it gets to a user's glass), the WSP team should consider national water quality standards and relevant government plans or strategies for water supply.

Table: Guiding Questions for Describing the Water Supply System

System Component		Guiding Questions
 <p>Catchment / Source</p>	<p>Community members may all use water from the same source (such as a river, borehole, open well, or piped distribution system), or they may have multiple water sources. These sources may change seasonally or may be used for different purposes (for example, drinking water vs. bathing water).</p>	<ul style="list-style-type: none"> • What types of water sources are used in the community? Include groundwater, surface water and rainwater. • During rainfall, which areas have runoff that enters the water source(s)? What activities occur in those areas? • In each season, which water sources are used? Who uses them, and what are they used for? • How are the groundwater and surface water sources connected? Include springs, wetlands, and other areas where the two may interact.
 <p>Transportation</p>	<p>Water can be transported to people's homes in many different ways, such as piped distribution systems, pumps, buckets, or jerry cans. Different community members may access and transport their water in different ways.</p>	<ul style="list-style-type: none"> • How is water withdrawn and distributed in the community? • If there is a distribution network, how old is it and what are the pipes or trenches made of? • Who is responsible for water collection and transportation? • What containers do community members use to transport water to their homes? • How is water transported and handled within the home?
 <p>Treatment</p>	<p>Some communities already have water treatment processes in place. Water may be treated centrally, or people may treat water in their homes through HWTS.</p>	<ul style="list-style-type: none"> • Are multiple barriers (sedimentation, filtration, disinfection) used in treatment? • If a centralized system exists, how does it work? Who is responsible for operation, maintenance and monitoring? • What HWTS systems are commonly used in the home? • If household systems are used, how do people operate and maintain them?
 <p>Storage</p>	<p>Water is sometimes stored before treatment and/or use. Bulk storage is when water is stored directly from the source, in tanks or cisterns. Final storage is when water is stored in buckets or other containers after treatment and before drinking.</p>	<ul style="list-style-type: none"> • Is water stored in community tanks or cisterns directly from the source? How are these filled, maintained, and emptied? • How is water stored in the home? Who fills, maintains, and monitors the storage containers? • Is water stored in different containers before and after treatment? • Who is responsible for keeping water storage containers clean? • What actions are taken to protect recontamination during storage after treatment?

(Adapted from WHO, 2012)

6.4 Task 3: Assess Hazards, Risks, and Existing Control Measures

After describing the system, the team is ready to identify hazards, hazardous events, risks, and existing control measures. These terms are summarized in the following table.

Table: Risk Assessment Terms for Water Safety Plans

Term	Definition	Examples
Hazard	Anything that can cause harm to public health.	<ul style="list-style-type: none"> • Pathogens from human or animal feces (manure, open defecation) • Chemicals in runoff from agricultural or industrial sites • Pathogens on dirty water storage containers
Hazardous Event	Any event that can introduce a hazard or increase its impact.	<ul style="list-style-type: none"> • A large storm could cause contaminants to be carried in runoff to a water source. • A child could contaminate water by dipping dirty, unwashed hands into a water storage container.
Risk	The possibility of a hazard causing harm or injury, and the degree of harm or injury it could cause.	<ul style="list-style-type: none"> • The risk of illness from pathogens in human feces may be higher if a latrine is sited too close to a water source. • The risk of contaminants entering the water supply may be higher during the rainy season. • The risk of illness from a pathogen may be higher for pregnant women, children, and people with lower immunity.
Control Measure (Barrier)	Activity or step taken to remove a hazard or reduce the risk associated with a hazard.	<ul style="list-style-type: none"> • Protect the source water by keeping animals away and covering open wells. • Use a clean, covered container to transport water. • Treat water in the community and/or household. • Store water in a clean, sealed container away from pets and children.

(Adapted from WHO, 2012)

Hazard identification involves noting actual and potential dangers and their causes. This should be based on community knowledge, recurring local events (like flooding during heavy rainfall), checklists, sanitary inspections, and expert advice. The key questions to ask are: “What can go wrong? How, when, where, how often, and why?” (WHO, 2012).

Next, the team will identify any existing control measures (also called barriers or mitigation measures) that are already in place. For each hazard or hazardous event identified, what is already being done to prevent it or to reduce its impact?

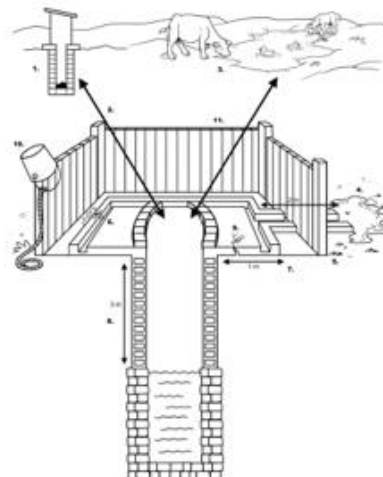
These barriers could be:

- Technical (like water treatment systems in the community or household),
- Infrastructural (like building a fence to keep animals away from the water source)
- Behavioural (like using clean containers to collect water).

Don’t assume that any existing barriers are working properly. They should be checked for their effectiveness (WHO, 2012).

Sanitary Inspections

Sanitary inspections are simple, inexpensive, and practical methods for assessing hazards to water supplies. A sanitary inspection is an on-site inspection of a water supply to identify potential sources of contamination. Standardized forms can be used for observations and interviews, to help the team identify potential sources of contamination. Example sanitary inspection forms for different water sources and for safe storage containers are available at <https://resources.cawst.org> and in the Rickert et al. (2014) resource listed at the end of this document.



Now, after identifying hazards and hazardous events and checking the effectiveness of existing barriers, there are several approaches the team can use to rank or prioritize **risks**. For each identified hazardous event, the team will decide how likely the event is to occur and how severe its impact would be. This combination of likelihood and impact will help to prioritize the risks that must be managed. The WHO (2012) document listed in the Additional Resources gives tools for assessing and ranking risks.

Household Hazardous Events and Control Measures

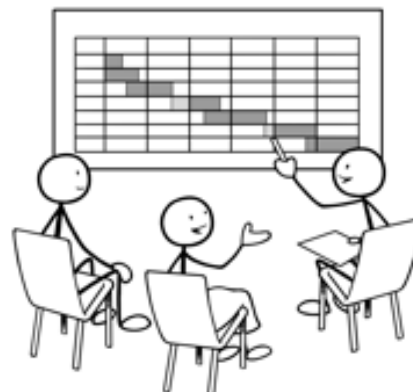
How water is managed in the home can increase or decrease the risk of water contamination. While evaluating the entire water supply system, HWTS practices should be included.

- Some household practices may be considered hazardous events. For example, do people collect water in unclean containers? Do they dip dirty bowls into storage containers to get drinking water? These behaviours could cause contaminants to enter the water, and should be addressed.
- HWTS can be an effective **control measure**. For example, do people settle, filter and/or disinfect their drinking water to remove pathogens? Do they use safe storage containers that are clean and have tight-fitting lids? These activities reduce the risk of contamination, and should be encouraged as barriers. For more information about selecting HWTS solutions, refer to CAWST's HWTS materials.



6.5 Task 4: Develop and Implement an Incremental Improvement Plan

After identifying and ranking risks, the WSP team considers its available time and resources, and develops a plan for implementing barriers to risk (Greaves & Simmons, 2011; WHO, 2012). This plan will start with improvements that are highest priority or easiest to accomplish. This will allow time to plan, raise funds, and build capacity for more complex improvements. When selecting additional control measures needed, the team should consider the multi-barrier approach. A mix of technical, infrastructural, and behavioural barriers will be most effective in addressing the potential hazards that could impact a community's water supply.



HWTS as an Early Improvement in a Water Safety Plan

Consider introducing HWTS as one of the first steps of implementing your water safety plan. HWTS can be adopted immediately in the homes of vulnerable families to improve their drinking water quality. It has a high potential for household engagement and requires less technical knowledge than many centralized systems. While developing the WSP, include household and community education and follow-up to ensure that HWTS systems are used correctly, consistently and continuously. The team should also take time to select an HWTS system that is appropriate based on identified risks, household preferences, and local availability. For more information about HWTS options, refer to CAWST's HWTS Knowledgebase: www.hwts.info/.

6.6 Task 5: Monitor

Monitoring is essential to ensure that a WSP is working effectively. It helps to create a feedback loop for preventing problems and making improvements in a timely manner. It is important that the team takes ownership of the monitoring process. Monitoring should actively involve the people who will be responsible for follow-up (such as maintenance of technologies and community education) (Greaves & Simmons, 2011; WHO, 2012).



A good monitoring plan includes operational monitoring and verification monitoring.

Operational Monitoring: This is regular monitoring to ensure that barriers are in place and working effectively on a day-to-day basis. Operational monitoring is usually led by community members. The key to successful operational monitoring is to keep it simple and within the ability of the team. Information should be easy to collect and record, and should help the team identify what can be improved. Depending on the barriers they have implemented in their community, the WSP team may choose to monitor some of the following:

- Water quality (for example, turbidity or chlorine residual at the source and household)
- Sanitary conditions and practices (using sanitary inspection forms)
- Performance and use of HWTS (used consistently and correctly)

The team should identify the target conditions they expect to see when they monitor (for example: water storage container must be clean and in a safe location). They should also include corrective actions required if the target is not met (for example: advise household members on safe storage and check again the following week). For specific indicators that can be used to monitor HWTS, refer to CAWST's HWTS materials, available at <https://resources.cawst.org>.

Verification Monitoring: This is occasional monitoring to confirm that the WSP is working effectively. Examples of verification monitoring include: conducting water quality testing (also called compliance monitoring) for fecal pathogen indicators, performing an audit, and checking consumer satisfaction (WHO, 2012). Verification monitoring is often done by people external to the community, such as health officials.

Monitoring and Documentation of HWTS in WSPs: Example of Safe Storage

The WSP framework was applied in several communities in Bangladesh, where communities prioritized and implemented safe water storage education. Researchers found that after the WSP process, fewer people were dipping dirty hands into water storage containers and more people were covering their water containers during transportation (Mahmud et al., 2007). By monitoring these activities and conducting follow-up in the community, this team was able to verify that the WSP was effective in achieving better safe storage practices. The information they collected helped to guide further actions.

6.7 Task 6: Document, Review and Improve

A WSP is only useful if it is documented, followed, reviewed, and revised (Bartram, 2009). There are three parts to this final WSP task:

1. *Keep records and instructions.* It is very important for the team to keep records of roles, responsibilities, and protocols. When new members join the team or if anything goes wrong, there must be clear documentation that can provide guidance and support. This should include written (or visual) instructions for how to operate, monitor, and maintain any community or household-level systems. Instructions should be clear and kept up-to-date so the team remembers what to do if something goes wrong.
2. *Provide supporting activities.* The WSP team and other community members need the knowledge and skills to effectively implement and monitor the WSP. Supporting activities to build these skills and support WSP implementation could include:
 - Hosting training sessions for households to learn proper HWTS use and maintenance
 - Participating in monthly meetings to share monitoring findings, discuss challenges, and plan for changes
 - Hosting training sessions for caretakers of infrastructure



3. *Regularly review and revise.* The team will document and review successes and areas for improvement. Based on this review, the team will often need to change some of its barriers or supporting programs. In addition, they can compare notes with neighboring communities to share challenges, lessons learned, and ideas for supporting activities (Rickert et al., 2014).

Supporting Activities: Examples of HWTS Education Tools

Households are more likely to use and maintain HWTS systems properly if they have regular reminders about what to do. Education about HWTS practices can be in the form of:

- Training sessions
- Follow-up by community WASH promoters who visit households to check on filters
- Videos or live demonstrations of use and maintenance
- Posters or stickers to remind users what to do



CAWST has created examples of training programs and posters for teaching about different HWTS options (available at: <https://resources.cawst.org>). Another example of HWTS education materials are CAWST's biosand filter videos. These videos show how the filter works and how to maintain it. They are available on mobile phones to help households, WASH promoters, and WSP team members remember the key messages about the filter. They are available at: <http://bsfvideos.cawst.org/>

7 Challenges for HWTS and WSP Implementation

Small communities often have special challenges in developing and implementing a WSP and integrating HWTS. They may have limited WSP and HWTS expertise and experience, as well as low capacity for water quality testing and monitoring (Rickert et al., 2014; WHO, 2012).

The terminology and tasks of the WSP approach may be difficult to understand and fit into the local context, particularly for communities that lack centralized systems or want to prioritize HWTS. The technical language of the WSP process should be written into plain language that is clear and easy to understand for everyone involved. As well, the WSP approach should be adapted to fit the needs and capacity of each community.



There are knowledge gaps on how to implement HWTS and WSPs in small communities and rural settings. Training, capacity building, and sharing of experience are essential at all levels. This applies to the WSP team and the community members who are responsible for operating, maintaining and monitoring the water supply. In addition to understanding the WSP process, they need to be familiar with the various HWTS technologies that are used in the community.

Currently, there are no international guidance documents that specifically address how to integrate HWTS into a WSP. As more WSPs that fully integrate HWTS are created and lessons learned are shared, the sector will grow its capacity and knowledge. Over time, examples of HWTS implementation within the context of WSPs will be added to CAWST's HWTS knowledgebase (<https://www.hwts.info/projects>) and to the WHO/ IWA Water Safety Portal (<http://www.wspportal.org/>).

8 Summary

How do you ensure that each glass of water a community member drinks is safe? This requires a multi-barrier approach to address the multiple hazards that could affect a water supply. Water safety planning is an approach for assessing a water supply system, identifying and ranking risks, and planning, implementing, and monitoring multiple barriers to keep drinking water safe. Including HWTS in a WSP can promote greater ownership for water quality and can provide additional barriers against contamination.

9 Definitions

Barrier: See “control measure.”

Catchment: Also called a drainage basin. The area of land where all surface water and all rainfall runs into the same body of water. The catchment or source is the first component of a water supply system.

Control measure: Also called barrier or mitigation measure. Activity or step taken to remove a hazard or reduce the risk associated with a hazard.

Hazard: Anything that can cause harm or injury. In water safety planning, hazards are chemical, physical, or microbial contaminants that can cause harm to public health.

Hazardous event: Any event that can introduce a hazard or increase its impact. In water safety planning, hazardous events include anything that could introduce or fail to remove hazards (contaminants) in the water supply system.

Household Water Treatment and Safe Storage (HWTS): Activities in which household members treat and store water in their homes. Also commonly referred to as managing water at the point of use (POU).

Multi-barrier approach: Adding as many barriers (control measures) as possible to reduce the likelihood of drinking unsafe water. Each barrier incrementally reduces health risks.

Operational monitoring: Regular monitoring to ensure that barriers are in place and working effectively on a day-to-day basis. Operational monitoring is usually led by community members.

Pathogen: A microorganism that can cause disease.

Risk: The possibility of a hazard causing harm or injury, and the degree of harm it could cause. Risk is a combination of likelihood and impact for a given hazardous event.

Verification monitoring: Occasional monitoring to confirm that the WSP is working effectively. Examples of verification monitoring include: conducting water quality testing (also called compliance monitoring) for fecal pathogen indicators, performing an audit, and checking consumer satisfaction. Verification monitoring is often done by people external to the community, such as health officials.

Water Safety Planning: A preventative, risk-based, system-wide approach to ensuring that water remains safe from the catchment (source) to the consumer (household member). Also referred to as the WSP approach.

WASH: Water, sanitation, and hygiene.

Water supply system: the combination of practices used within the community for collection, transportation, treatment, and storage of drinking water. Water supply systems can be very diverse. Most communities have a variety of water sources, transportation methods, treatment systems, and storage practices.

10 Additional Resources

CAWST Resources. Available at: <https://resources.cawst.org>

- HWTS Manual and Materials: For implementers interested in starting or strengthening HWTS projects.
- HWTS Fact Sheets: Technical and implementation information on low-cost HWTS technologies for sedimentation, filtration and disinfection. Available in simplified and detailed versions.
- HWTS Poster Set: Posters showing proper use of different HWTS options, available for multiple languages and regions.
- Sanitary Inspection Forms: Standardized forms to quantify hazards to different water sources and storage containers.

Greaves, F., & Simmons, C. (2011). Water Safety Plans for Communities: Guidance for adoption of Water Safety Plans at community level. Tearfund.

Available at: www.ircwash.org/resources/water-safety-plans-communities-guidance-adoption-water-safety-plans-community-level

- Guidance, examples, and activities for facilitating the WSP approach in small communities.

Rickert et al. (2014) Water safety plan: A field to improving drinking-water safety in small communities. World Health Organization.

Available at: <http://www.wsportal.org/resource/water-safety-plan-a-field-guide-to-improving-drinking-water-safety-in-small-communities/>

- Describes the benefits of water safety planning in small communities. Includes an overview of the six tasks for small communities, along with templates and tools for going through each task. Developed for European countries, but can be applied worldwide.

Water Institute at UNC. Presentations from the HWTS Network Annual Meeting and Workshop on HWTS and WSPs. Nagpur, India: November, 2013.

Available at: <http://waterinstitute.unc.edu/network-annual-meeting-and-workshop-on-hwts-and-wsps-november-2013/>

- Archived presentations from the 2013 workshop on HWTS and WSPs.

World Health Organization & International Water Association. Water Safety Portal.

Available at: <http://www.wspportal.org/>

- Website with information about the WSP approach, including tools, case studies, and other resources for trainers and implementers of WSPs.

World Health Organization (2012). Water safety planning for small community water supplies: step-by-step risk management guidance for drinking-water supplies in small communities.

Available at: http://www.who.int/water_sanitation_health/publications/2012/water_supplies/en/

- Guidance for using WSPs at the community level.

World Health Organization (2011). Guidelines for Drinking-Water Quality, Fourth Edition. WHO, Geneva, Switzerland.

Available at: http://www.who.int/water_sanitation_health/dwq/guidelines/en/

- Recommendations of the World Health Organization (WHO) for managing risks that may compromise the safety of drinking water.

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