Household water treatment and safe storage

Surge training: Emergency WASH

Household Water Treatment and Safe Storage

Asia Pacific Surge Training: Emergency WASH

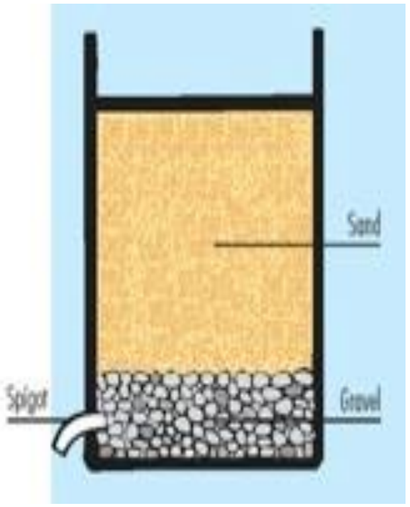
21 November 2022

Learning objectives

- What is household water treatment and safe storage (HHWT&SS)?
- What is a multi-barrier approach?
- What are the different methods of HHWT&SS?
- How and when to roll out a HHWT&SS programme?

What is HHWT&SS?

Household water treatment is any activity to improve water quality undertaken at the household level



Safe water storage is the use of clean containers with covers AND good hygiene behaviour that prevent contamination during water collection, transport and storage in the home

Pros and cons of HHWT&SS

Pros

- Relatively inexpensive
- Independent from institutional set-up or centralized systems
- Can be rapidly deployed and taken up by vulnerable populations
- Improves water quality and reduces contamination risk between water source and point of use
- Wide range of simple, low-cost technologies available

Cons

- High self-responsibility required from households
- Difficult to monitor the correct use and maintenance of the methods – could also be lead to a health risk
- Households have to be provided with knowledge on use and maintenance of technologies – could imply added cost and time
- Treated water may be lower quality than that offered by a well-designed, operated and maintained community system

HHWT&SS and Sphere

Water quality

- <10 CFU/100ml at point of delivery
- Turbidity less than 5 NTU
- ≥0.2–0.5mg/l free residual chlorine at point of delivery of delivery
- No negative effect on health
- Water treatment options used are effective in improving water quality, accompanied by appropriate training, promotion and monitoring
- All affected people drink water from a protected or treated source

Safe storage

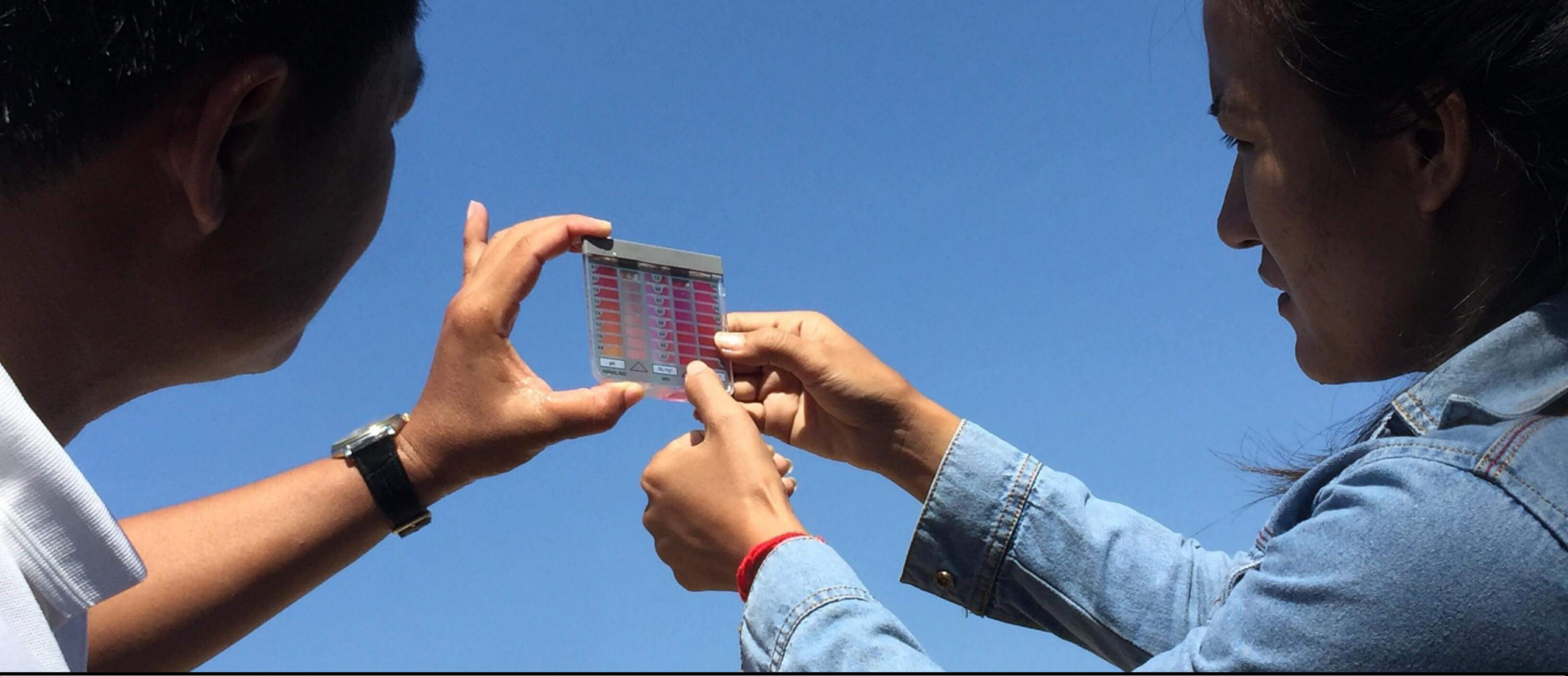
- 2 clean water collecting containers; 10–20 L/HH (for storage and transportation)
- Narrow necks and covers for storage
- Households need separate containers for collecting and storing drinking water

Important notes

- Use HWTSS when a centrally operated system is not possible
- Work with other sectors on household fuel requirements and access for boiling water
- Avoid introducing unfamiliar water treatment option in crises and in epidemics
- Effective use of HWTSS options requires:
  - Regular follow-up
  - Support
  - Monitoring

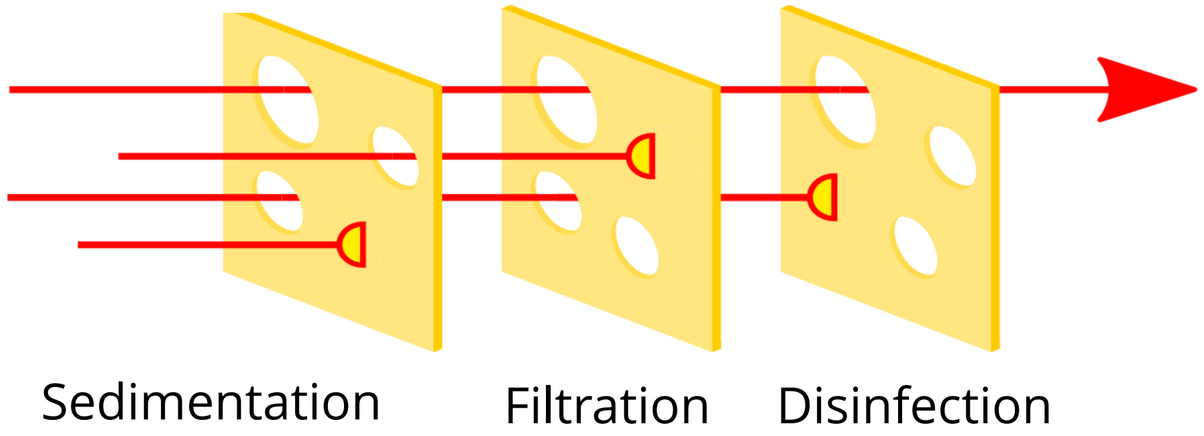
Source: Sphere handbook page 109-112

GOLDEN RULE #1: NO DISTRIBUTION WITHOUT TRAINING!



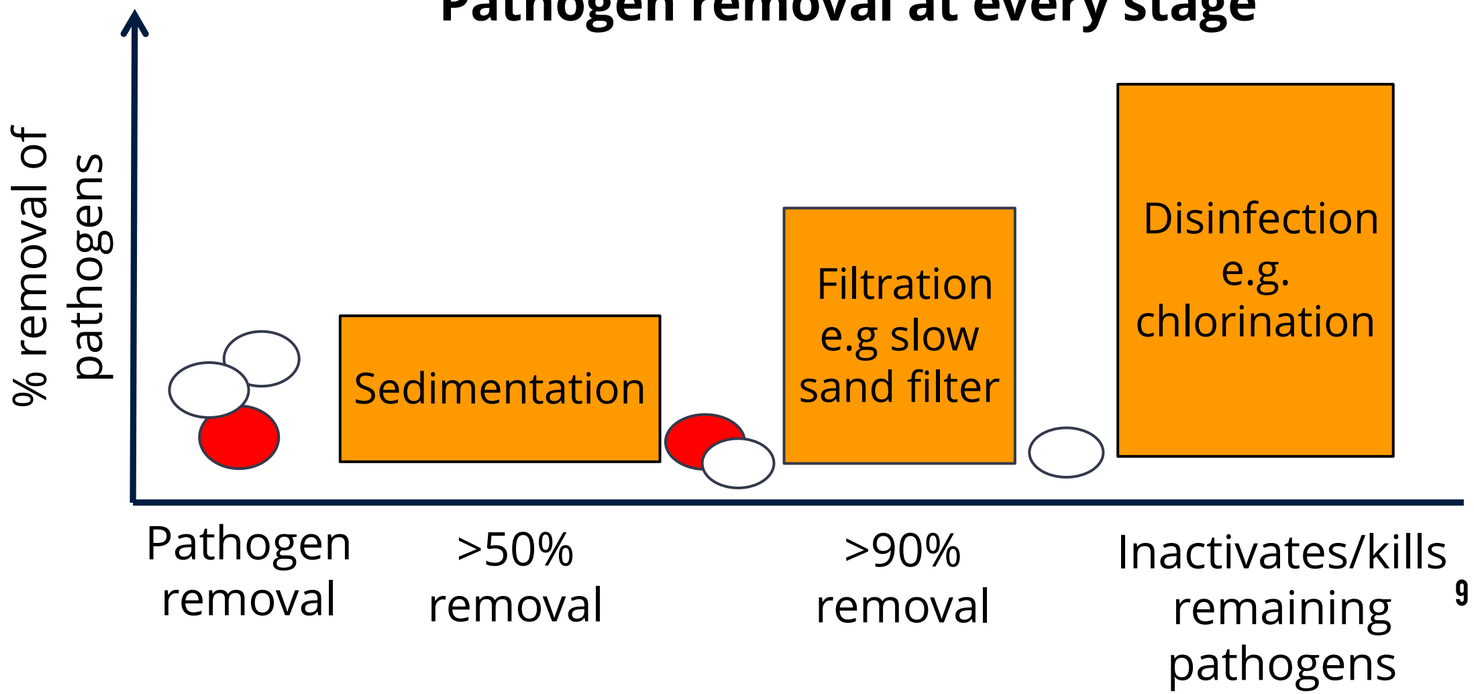
GOLDEN RULE #2: NO DISTRIBUTION WITHOUT MONITORING!

Multi-barrier approach



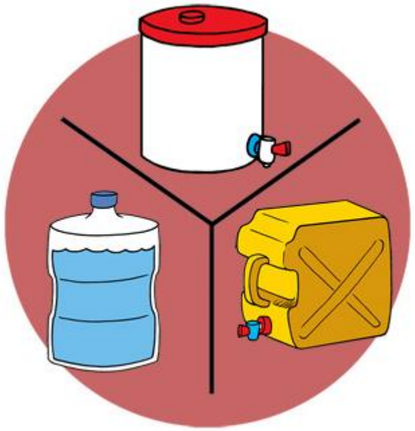
Swiss cheese model

Pathogen removal at every stage



Multi-barrier approach

- This approach is modeled after the multi-step process used by centralized water treatment systems
- Should be thought of as a system in its entirety, rather than giving focus to a single product/technology
- Each stage offers a “barrier” of protection against waterborne pathogens



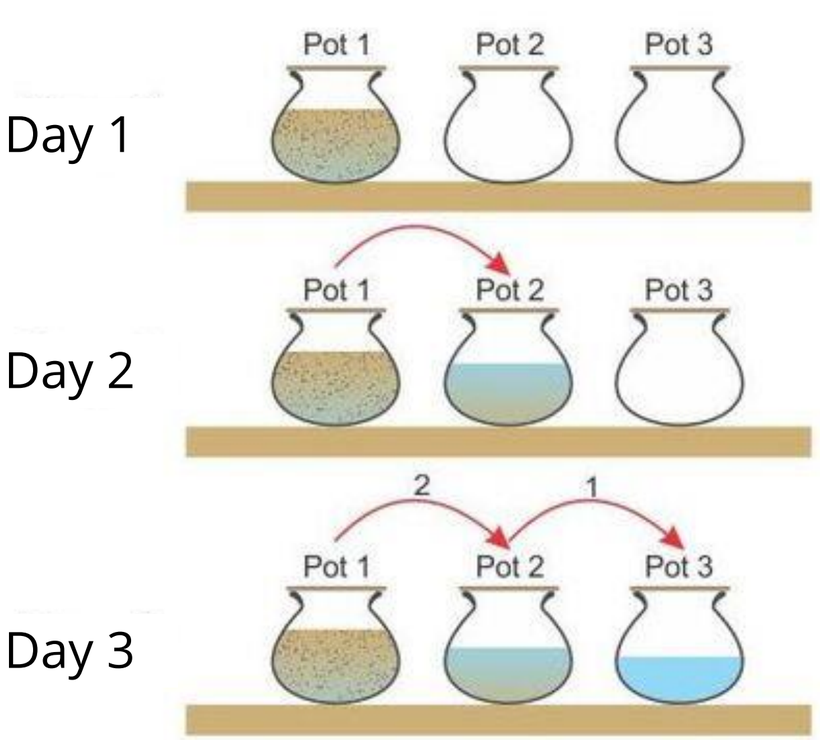
Source protection → **Sedimentation** → **Filtration** → **Disinfection** → **Safe storage**

Source: CAWST (2009)

Sedimentation

- Sedimentation is a physical treatment process allowing dirt to fall to the bottom of the water container over time or can also be achieved through the addition of chemicals
- Pathogens often attach themselves to large particles, therefore sedimentation can also remove some pathogens

Option 1: Settling using 3-pot method



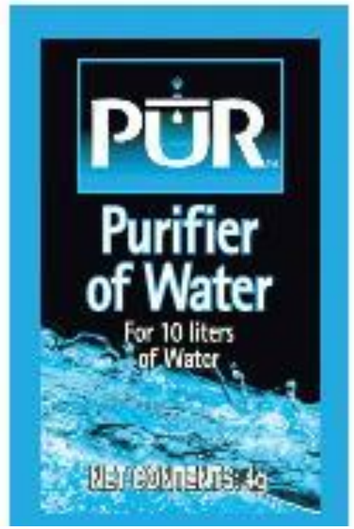
TIP

- Strain water using clean, fine cotton cloth
- Wash the cloth in between uses

Sedimentation

Option 2: Sedimentation (and disinfection) using chemical coagulants

- Watermaker/PuR sachets: coagulation + chlorination
- Alum (aluminium sulphate)
- Polyaluminium chloride – liquid alum
- Aluminium/iron salts i.e. ferric sulphate

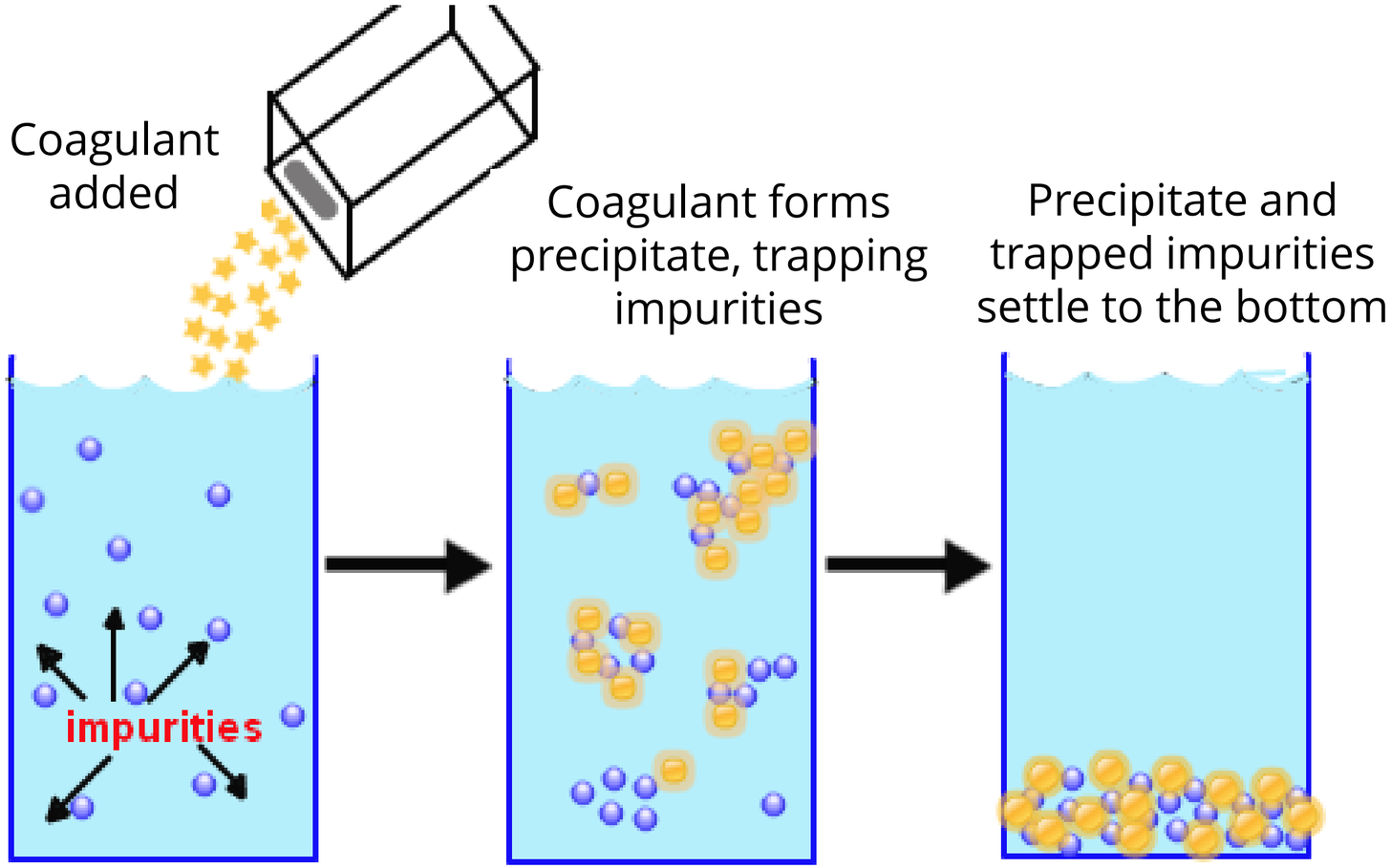


Sedimentation

Option 3: Sedimentation using natural/plant coagulants

- Moringa seeds (*Moringa oleifera)*
- Prickly pear cactus *(Cactus opuntia)*

Coagulants: How does it work?



TIP

- Use clear buckets for demonstrations
- Use straining cloth when pouring into containers

Source:chemistry.tutorvista.com

Multi-barrier approach

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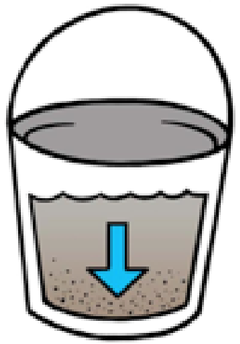
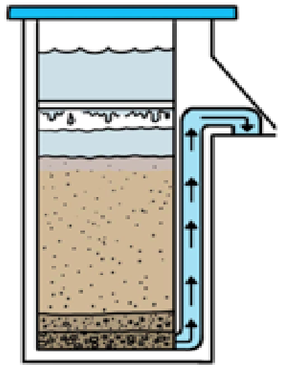
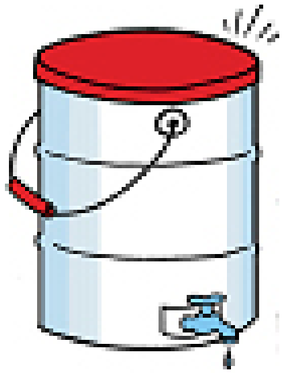






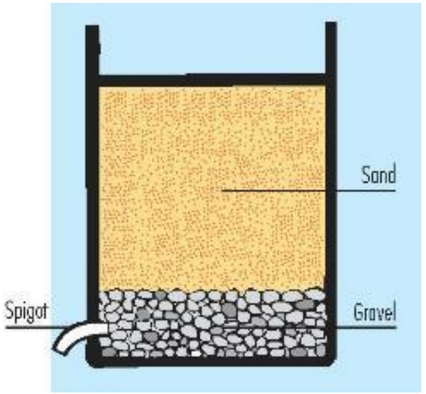
Source: CAWST (2009)

Filtration

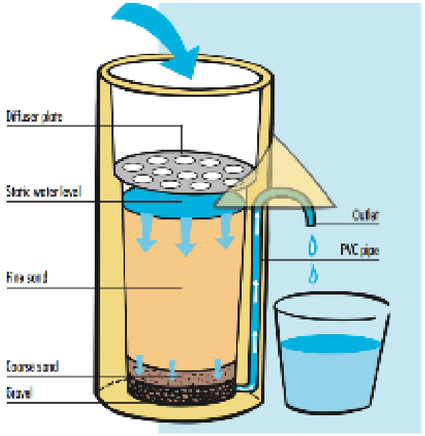
- Filtration is often used after sedimentation to further reduce turbidity and to remove pathogens.
- A physical process that involves passing water through filter media – cloth, sand, ceramic or membranes

Cloth filter

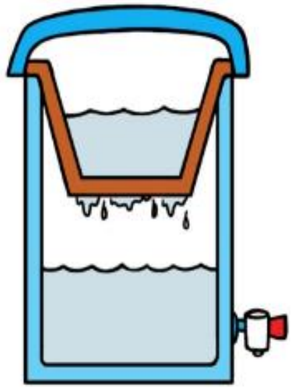
Sand filter



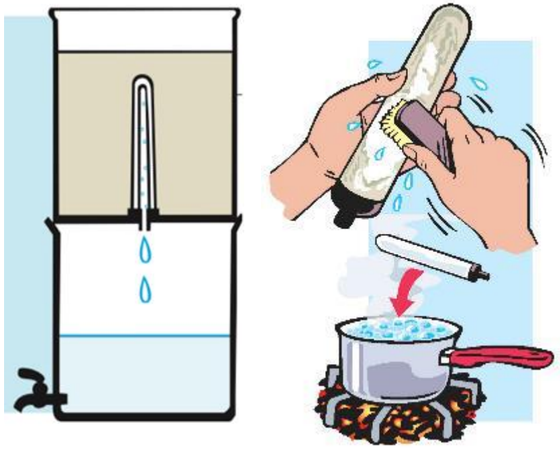
Biosand filter



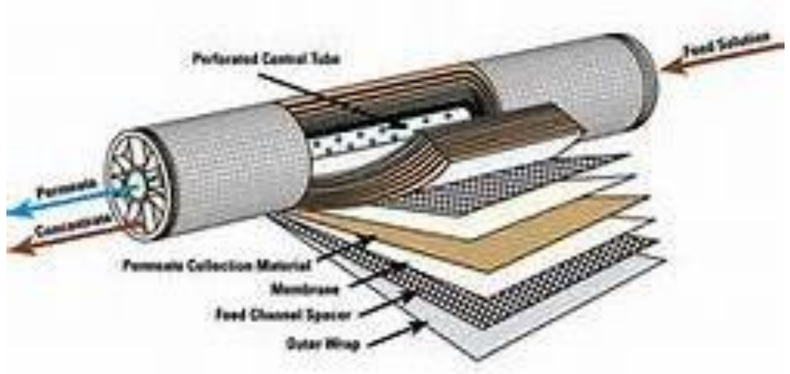
Ceramic pot filter



Ceramic candle filter



Membrane filter



Source: CAWST (2009)

Multi-barrier approach

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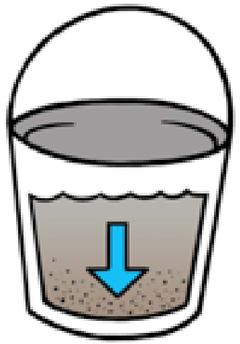
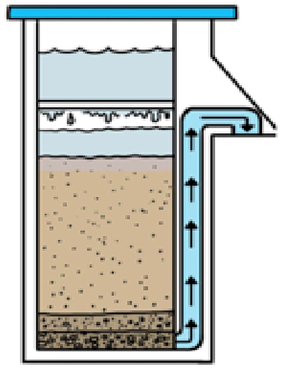
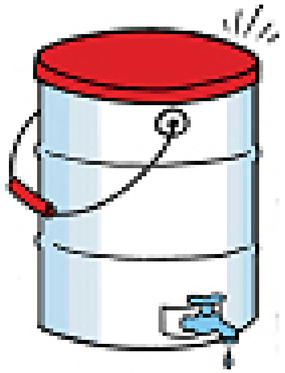






Source: CAWST (2009)

Disinfection

- Disinfection is a process cleaning something, especially with a chemical, to inactivate pathogens
- Disinfection is less effective when water is still turbid, therefore sedimentation and/or filtration before disinfection is a must

Boiling

Water must be brought to a rolling, bubbling boil

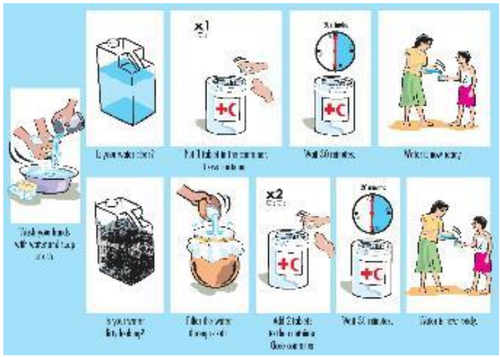
TIP Boiling will make water taste flat – this can be fixed with adding salt or shaking!

Solar disinfection (SODIS)

Exposing water to sunlight
Sunny – 5 hours; cloudy – 2 days

TIP Shake the bottle to speed the process up; also let the water cool before consumption

Chemical



Addition of chemicals such as chlorine tablets

TIP Chemical disinfection is not as efficient with dirty/cloudy water – use double dose if so

P&G™ Purifier of Water

- Purifier of Water contains 4g of powdered mixture: iron sulphate – remove suspended matter, protozoa and viruses; calcium hypochlorite – chlorine disinfectant to kills bacteria
- Removes 99.99999% common waterborne bacteria; 99.99% common waterborne viruses and 99.9% protozoa

Mix 1 packet of PuR into 10 L of raw water

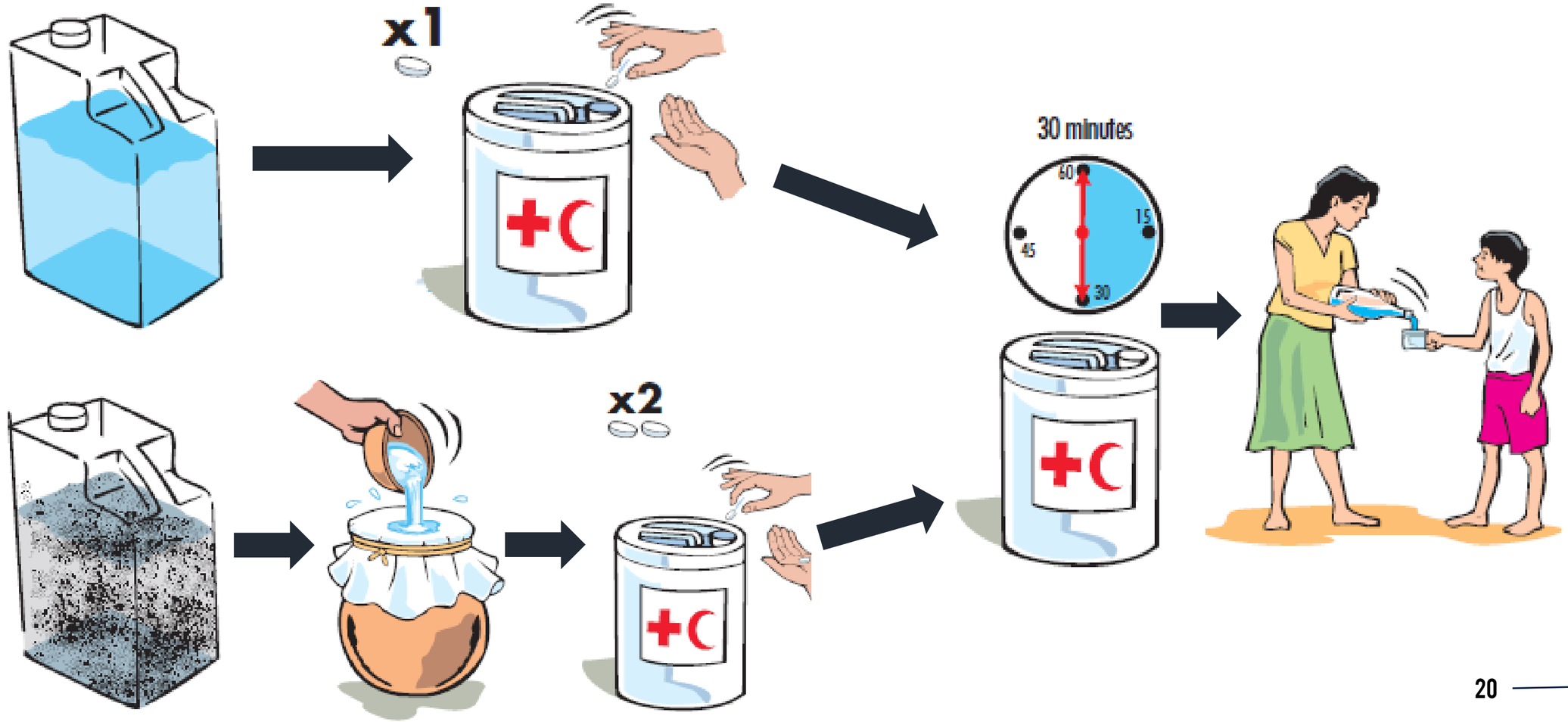
Stir well for 5 min, then leave for another 5 min

Filter through cloth; dispose floc away carefully

Wait for 20 min before consumption; store treated water safely

Aquatabs

1 tablet purifies 10 litres; each tablet contains 67 mg sodium dichloroisocyanurate



Multi-barrier approach

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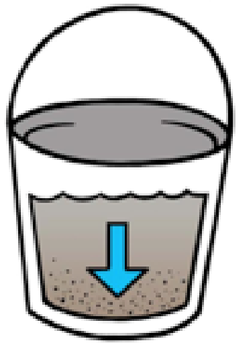
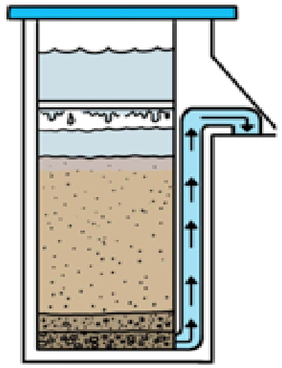
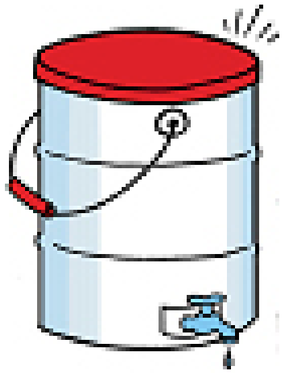




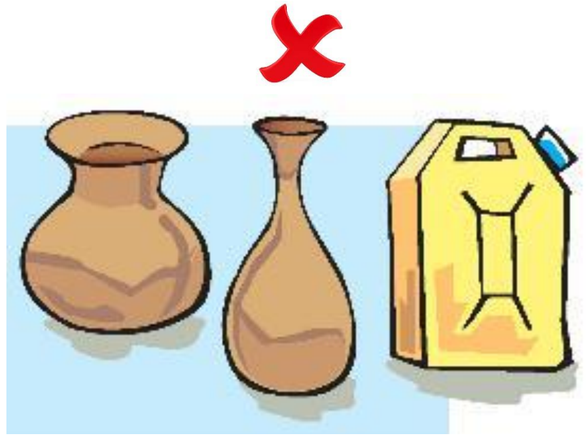


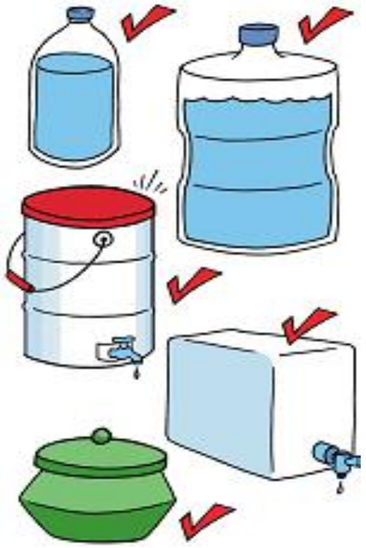
Source: CAWST (2009)

Safe water storage and handling

- All efforts to make water clean are pointless if the water is improperly stored or handled, especially at the household level

- Recommended water storage container features:
  - Tight fitting lid or cover
  - Tap or narrow opening
  - Stable base
  - Durable
  - Easy to clean
  - Locally available





TIP

- To clean narrow necked containers, use soap solution
- For wide necked containers, keep them covered and avoid coming into contact with water
- Use separate containers for transporting and storing water
- Avoid cross-contaminating drinking water
- Encourage handwashing prior to handling drinking water!

Key resources

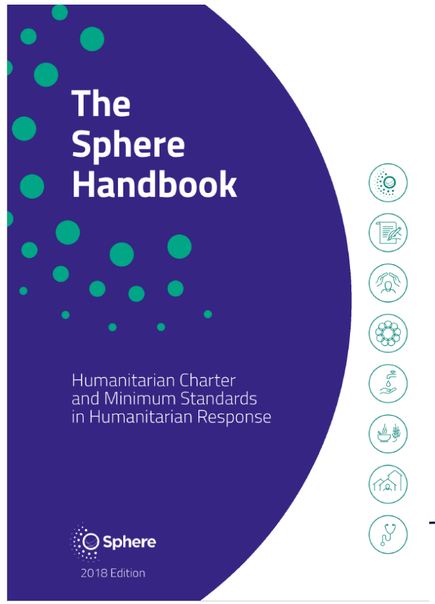
- Household water treatment and safe storage in emergencies: A field manual for Red Cross/Red Crescent personnel and volunteers
  - Download it at www.watsanmissionassistant.org/water

- Public health – Module 4: Household water treatment and safe storage (English)
  - Access it at https://ifrc.csod.com/ui/lms-learning-details/app/course/3fa34b66-850c-4419-b4b1-a1cd87f5d902

- The Sphere Handbook (2018) (under “Water supply” section)
  - Download it at https://spherestandards.org/wp-content/uploads/Sphere-Handbook-2018-EN.pdf

- P&G™ Purifier of Water - Official website

- Aquatabs - Official website



Key messages

- A **multi-barrier approach in HHWT&SS** is the most effective way to reduce health risks associated with contaminated drinking water. The approach recognizes that while each individual barrier may not be able to completely remove or prevent contamination, but together, the barriers work to provide greater assurance that water will be safe to drink over the long term.

- Involve/get feedback from **users** throughout the process.

- **No distribution without training!**

- **No distribution without monitoring!**

Thank you! Questions?