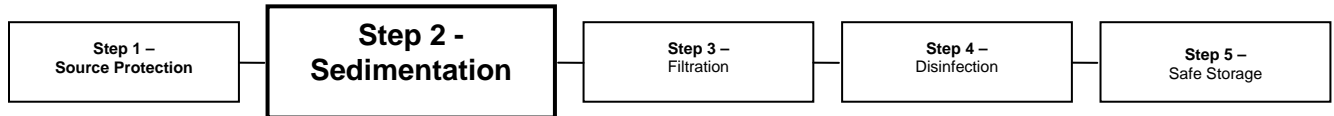


Household Water Treatment and Safe Storage Fact Sheet: Settling

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
	<ul style="list-style-type: none"> • Turbidity • Bacteria • Protozoa • Helminths • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Chemicals

How Does it Work?

Natural settling can be used to help remove turbidity and some pathogens from water. Let a container of water sit without moving for 24 hours and then pour the clear water into a clean container. This process can be repeated 2 to 3 times as needed.

Effectiveness

- Quality: Somewhat effective for removing turbidity and some pathogens
- Quantity: Depends on the size of container being used
- Local water: Can be used with any water source

Appropriateness

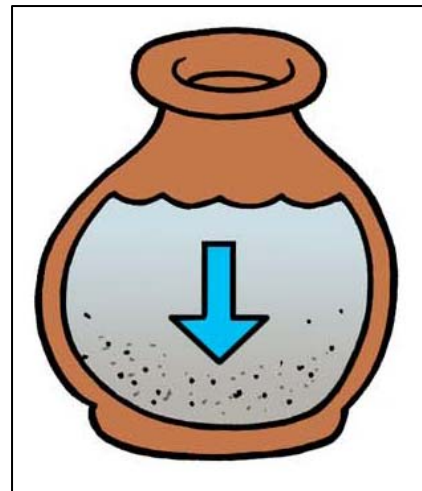
- Local availability: Can use any container
- Time: 24 hours
- Operation and maintenance: Simple; need to wash container afterwards
- Lifespan: Containers may need to be replaced

Acceptability

- Taste, smell, colour: May be improved
- Ease of use: Very easy

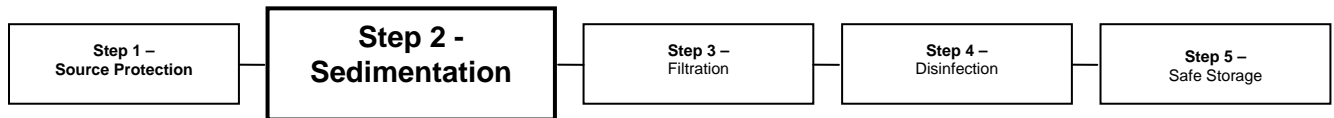
Cost

- Initial purchase cost: Free or low cost since households can use any container
- Operating cost: None



Household Water Treatment and Safe Storage Fact Sheet: Chemical Coagulants

The Treatment Process



Effectiveness

Highly Effective For:	Somewhat Effective For:	Not Effective For:
	<ul style="list-style-type: none"> • Turbidity • Bacteria • Protozoa • Helminths • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Chemicals

How Does it Work?

The sedimentation process can be quickened by adding special chemicals, 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.

Three common chemicals used are aluminium sulphate, polyaluminium chloride (also known as PAC or liquid alum) and ferric sulphate.

Effectiveness

- Quality: Somewhat effective for removing turbidity and some pathogens; varies depending on the water
- Quantity: Depends on the size of container being used
- Local water: Can be used with any water source

Appropriateness

- Local availability: Chemical coagulants are not always available; can use any container
- Time: 2+ hours
- Operation and maintenance: Follow manufacturer's instructions for specific products; need to wash container afterwards
- Lifespan: 6 months in liquid form and 1 year in solid form; containers may need to be replaced



Acceptability

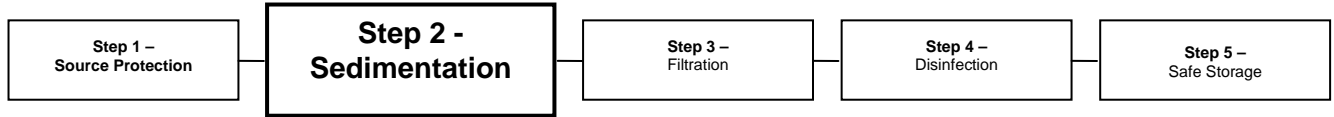
- Taste, smell, colour: May be improved
- Ease of use: Follow manufacturer's instructions for specific products

Cost

- Initial purchase cost: None
- Operating cost: On-going cost to buy chemical coagulants as they are used

Household Water Treatment and Safe Storage Fact Sheet: Natural Coagulants

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
	<ul style="list-style-type: none"> • Turbidity • Bacteria • Protozoa • Helminths • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Chemicals

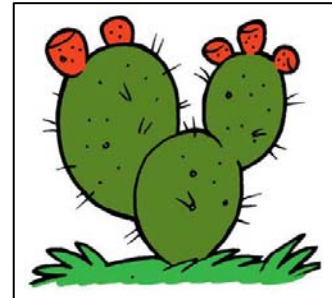
How Does it Work?

The sedimentation process can be quickened by adding natural **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.

There are a variety of natural products which have been used in Africa and Latin America to help with sedimentation, including moringa seeds, prickly pear and fava beans.

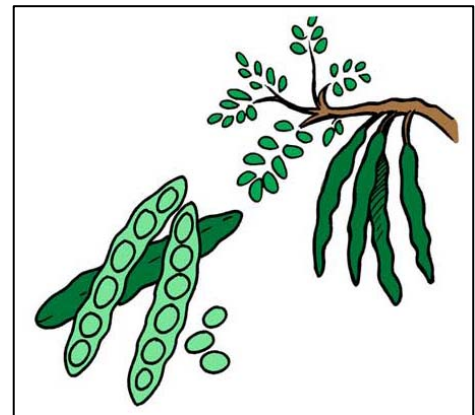
Effectiveness

- Quality: Somewhat effective for removing turbidity and some pathogens; varies depending on the water
- Quantity: Depends on the size of container being used
- Local water: Can be used with any water source



Appropriateness

- Local availability: Natural coagulants are not always available; can use any container
- Time: 2+ hours
- Operation and maintenance: Need to dry and grind seeds before adding them to water; need to wash container afterwards
- Lifespan: Dried beans and seeds can be stored for a long time; prickly pear cactus needs to be used before the sap dries; containers may need to be replaced



Acceptability

- Taste, smell, colour: May improve colour; may cause an objectionable taste
- Ease of use: Need to prepare natural coagulants beforehand; easy to add coagulants to water

Cost

- Initial purchase cost: None
- Operating cost: None

Household Water Treatment and Safe Storage Fact Sheet: Cloth Filter

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
	<ul style="list-style-type: none"> • Turbidity • Bacteria • Protozoa • Helminths • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Chemicals

How Does it Work?

A clean piece of cloth can be used to strain sand, silt, clay and some pathogens out of water. You can use any cotton cloth that is fine and tightly woven, such as a sari cloth. The cloth should be folded into a few layers and tied over a clean container. Afterwards, you should wash the cloth with clean water before using it again.

Effectiveness

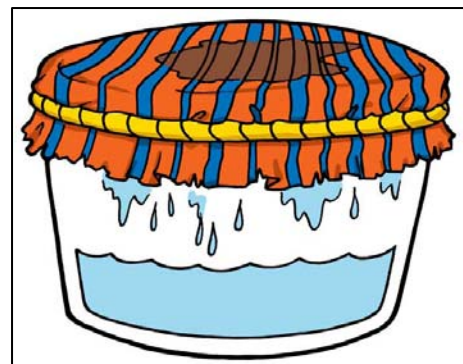
- Quality: Least effective filter for removing turbidity and pathogens
- Quantity: Depends on the size of container being used
- Local water: Can be used with any water source

Appropriateness

- Local availability: Cloth is available around the world, can recycle old clothes
- Time: Flow rate is fast
- Operation and maintenance: Simple; cloth needs to be washed with clean water
- Lifespan: Cloth may need to be replaced

Acceptability

- Taste, smell, colour: May be improved
- Ease of use: Very easy



Cost

- Initial purchase cost: Free or low cost since households can use old clothes as filters
- Operating cost: None

Household Water Treatment and Safe Storage Fact Sheet: Biosand Filter

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Bacteria • Protozoa • Helminths • Turbidity • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Iron 	<ul style="list-style-type: none"> • Chemicals

How Does it Work?

A biosand filter is a concrete or plastic box that is filled with layers of sand and gravel. Water is simply poured into the top of the filter and collected in a safe storage container. Pathogens and turbidity are removed by physical and biological processes in the filter sand.

Effectiveness

- Quality: Very effective in removing turbidity and pathogens
- Quantity: Can filter 12-18 litres each batch; recommend to use 1-4 times each day to ensure effective pathogen removal
- Local water: Can be used with any water source, may need to sediment water before filtering

Appropriateness

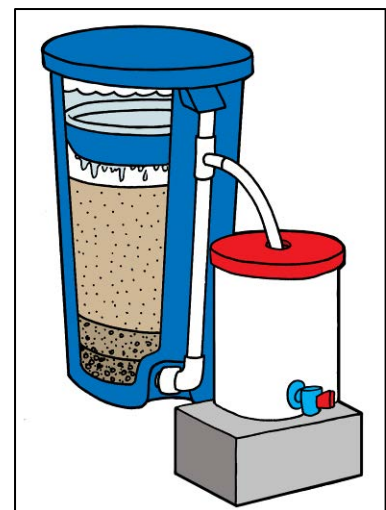
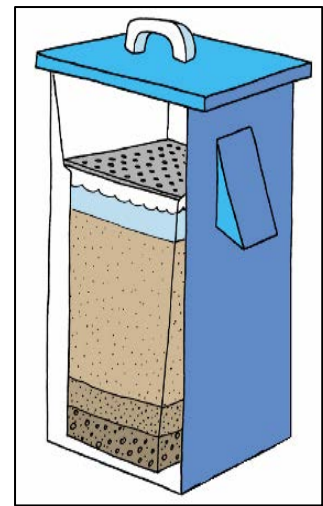
- Local availability: Concrete filters can be constructed any where in the world; plastic filters are imported from the United States
- Time: Concrete filter flow rate is 0.6 litres/minute; plastic filter flow rate is 0.8 litres/minute
- Operation and maintenance: Simple maintenance to clean sand when the flow rate slows down
- Lifespan: Concrete filters 30+ years; plastic filters 10+ years; lids and diffusers may need to be replaced

Acceptability

- Taste, smell, colour: Usually improved
- Ease of use: Easy for adults; may be difficult for small children to pour water into the filter

Cost

- Initial purchase cost: US\$12-30 for concrete filters; US\$75 for plastic filters
- Operating cost: None



Household Water Treatment and Safe Storage Fact Sheet: Kanchan™ Arsenic Filter

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Arsenic • Bacteria • Protozoa • Helminths • Turbidity • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Iron 	<ul style="list-style-type: none"> • Chemicals

How Does it Work?

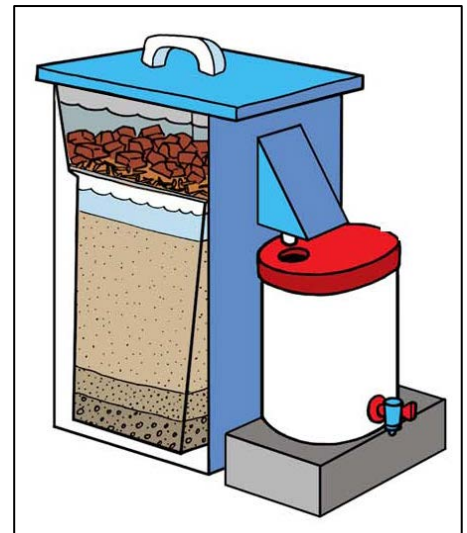
The Kanchan™ Arsenic Filter is an adaption of the biosand filter. It is a concrete or plastic box that is filled with layers of sand and gravel. There is also a layer of rusty nails, which remove the arsenic. Brick chips are used on top of the nails to keep them from moving around. Pathogens and turbidity are removed by physical and biological processes in the filter sand. Water is simply poured into the top of the filter and collected in a safe storage container.

Effectiveness

- Quality: Very effective in removing arsenic, turbidity and pathogens
- Quantity: Can filter 12-18 litres each batch; recommend to use 1-2 times each day to ensure effective arsenic removal
- Local water: Can be used with any water source; may need to sediment water before filtering

Appropriateness

- Local availability: Concrete filters can be constructed any where in the world; plastic filters are imported from the United States
- Time: Concrete filter flow rate is 0.6 litres/minute; plastic filter flow rate is 0.8 litres/minute
- Operation and maintenance: Simple maintenance to clean sand when the flow rate slows down
- Lifespan: Concrete filters 30+ years; plastic filters 10+ years; nails need to be replaced every 2-3 years to ensure effective arsenic removal; lids and diffusers may need to be replaced



Acceptability

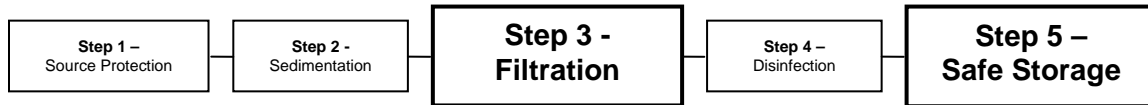
- Taste, smell, colour: Usually improved
- Ease of use: Easy for adults; may be difficult for small children to pour water into the filter

Cost

- Initial purchase cost: US\$12-30 for concrete filters; US\$75 for plastic filters
- Operating cost: None

Household Water Treatment and Safe Storage Fact Sheet: Ceramic Pot Filter

Treatment Type



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Bacteria • Protozoa • Helminths • Turbidity • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses • Iron 	<ul style="list-style-type: none"> • Chemicals

How Does it Work?

Ceramic pot filters are usually made from clay mixed with a combustible material like sawdust, rice husks or coffee husks. Colloidal silver is sometimes used to help with pathogen removal. Water is poured into a ceramic pot, and is collected in another container that has a tap at the bottom. This system also provides safe storage until it the water is used.

Effectiveness

- Quality: Very effective in removing turbidity and pathogens; provides safe storage to prevent recontamination
- Quantity: Can filter up to 8 litres each batch
- Local water: Can be used with any water source, may need to sediment water before using the filter

Appropriateness

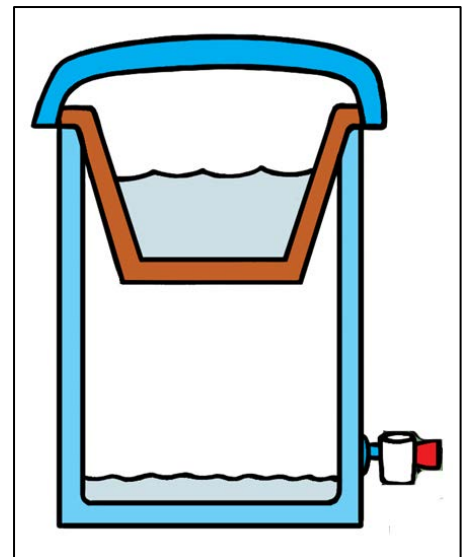
- Local availability: Can be manufactured and purchased locally
- Time: Flow rate is 1-3 litres/hour
- Operation and maintenance: Simple maintenance to clean the pot when the flow rate slows down
- Lifespan: Up to 5 years, generally 1-2 years; needs to be replaced if there are visible cracks

Acceptability

- Taste, smell, colour: Usually improved
- Ease of use: Very easy

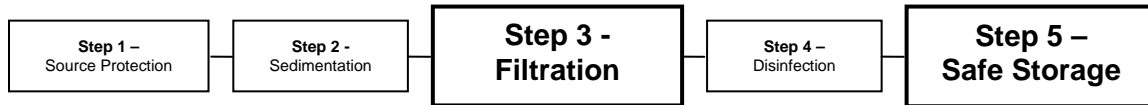
Cost

- Initial purchase cost: US\$12-25
- Operating cost: None



Household Water Treatment and Safe Storage Fact Sheet: Ceramic Candle Filter

Treatment Type



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Bacteria • Protozoa • Helminths • Turbidity • Taste, smell, colour 	<ul style="list-style-type: none"> • Viruses 	<ul style="list-style-type: none"> • Chemicals

How Does it Work?

Ceramic candle filters are hollow cylinders that are usually made from clay mixed with a combustible material like sawdust, rice husks or coffee husks. Colloidal silver is sometimes used to help with pathogen removal. One or more candles are attached into the bottom of a container. Water is poured into the container and flows through the candle, and is collected in another container that has a tap at the bottom. This system also provides safe storage until it the water is used.

Effectiveness

- Quality: Can be very effective in removing turbidity and pathogens; quality varies depending on the manufacturer; provides safe storage to prevent recontamination
- Quantity: Can filter up to 10 litres of water
- Local water: Can be used with any water source, may need to sediment water before using the filter

Appropriateness

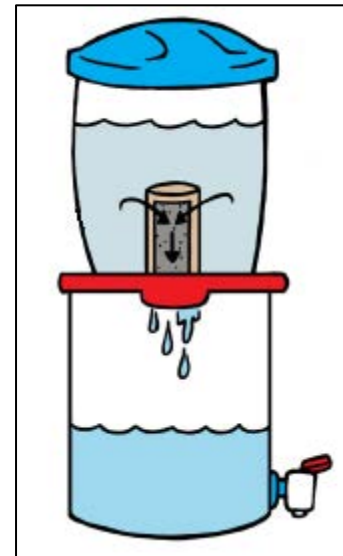
- Local availability: Can be manufactured and purchased locally
- Time: Flow rate is 0.1-1 litre/hour
- Operation and maintenance: Simple maintenance to clean the candle when the flow rate slows down
- Lifespan: Up to 3 years; usually 6 months to 1 year; candle needs to be replaced if there are visible cracks or leaks

Acceptability

- Taste, smell, colour: Filtered water has improved taste, smell and colour
- Ease of use: Easy

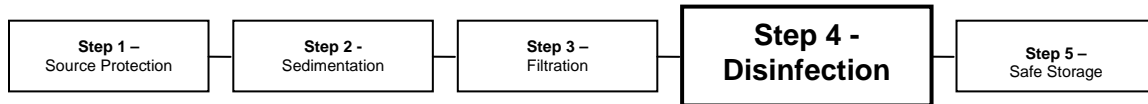
Cost

- Initial purchase cost: US\$15-30
- Operating cost: None



Household Water Treatment and Safe Storage Fact Sheet: Chlorine

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> Bacteria 	<ul style="list-style-type: none"> Viruses Most Protozoa Helminths 	<ul style="list-style-type: none"> Cryptosporidium Turbidity Chemicals Taste, smell, colour

How Does it Work?

Chlorine is a popular chemical used to disinfect drinking water. Sodium hypochlorite and NaDCC, also known as sodium dichloroisocyanurate or sodium troclosene, are different types of chlorine that are available. There are several different brands of chlorine products that have been manufactured specifically for household water treatment. Each product should have instructions explaining how to use it properly.

Effectiveness

- Quality:** Very effective in removing bacteria; not effective for certain types of protozoa; protects water against recontamination
- Quantity:** Depends on the size of container being used
- Local water:** Should only be used with clear water; may need to sediment and filter water before using chlorine

Appropriateness

- Local availability:** Available for purchase in most places
- Time:** Need to wait at least 30 minutes after adding chlorine
- Operation and maintenance:** Follow manufacturer's instructions for specific products; store chlorine away from children
- Lifespan:** Up to 5 years for tablets; liquid chlorine products should be used within 3 months of being manufactured



Acceptability

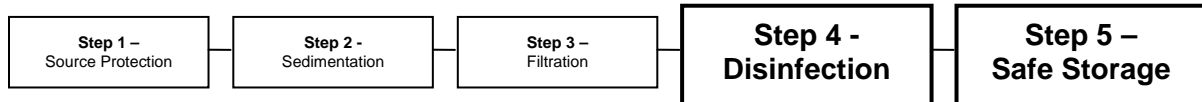
- Taste, smell and colour:** Some people do not like the taste or smell of chlorinated water; does not change the colour
- Ease of use:** Follow manufacturer's instructions for specific products

Cost

- Initial purchase cost:** None
- Operating cost:** On-going cost to buy chlorine products; US\$3/year

Household Water Treatment and Safe Storage Fact Sheet: Solar Disinfection (SODIS)

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Bacteria • Viruses • Protozoa • Helminths 		<ul style="list-style-type: none"> • Turbidity • Chemicals • Taste, smell, colour

How Does it Work?

SODIS uses the rays from the sun to kill pathogens in the water. It can be used to disinfect small quantities of water with low turbidity. Households fill transparent, non-coloured plastic bottles made from polyethylene terephthalate (PET) and place them in direct sunlight. Water can be used directly from the bottle to avoid recontamination.

Effectiveness

- Quality: Very effective in removing pathogens; provides safe storage to prevent recontamination
- Quantity: 1-2 litres/bottle
- Local water: Should only be used with clear water; may need to sediment and filter water before using SODIS

Appropriateness

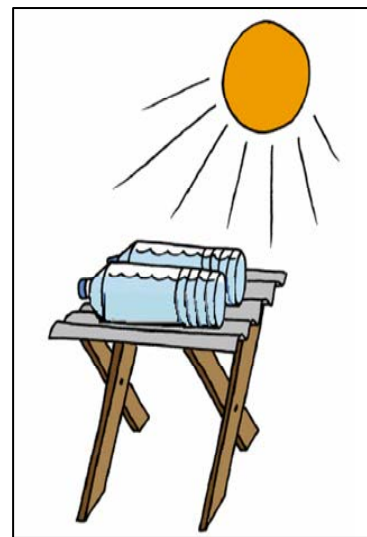
- Local availability: Plastic bottles are available in most places
- Time: 6 hours on a sunny; up to 2 days when cloudy; cannot use when raining
- Operation and maintenance: Simple
- Lifespan: Bottles need to be replaced if they have a lot of scratches

Acceptability

- Taste, smell, colour: People do not like to drink warm water; does not change smell or colour
- Ease of use: Easy

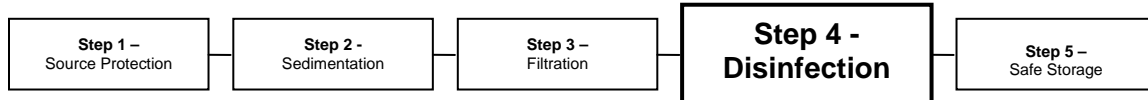
Cost

- Initial purchase cost: Free or low cost since households can use recycled plastic bottles
- Operating cost: None



Household Water Treatment and Safe Storage Fact Sheet: Boiling

The Treatment Process



Effectiveness

Very Effective For:	Somewhat Effective For:	Not Effective For:
<ul style="list-style-type: none"> • Bacteria • Viruses • Protozoa • Helminths 		<ul style="list-style-type: none"> • Turbidity • Chemicals • Taste, smell, colour

How Does it Work?

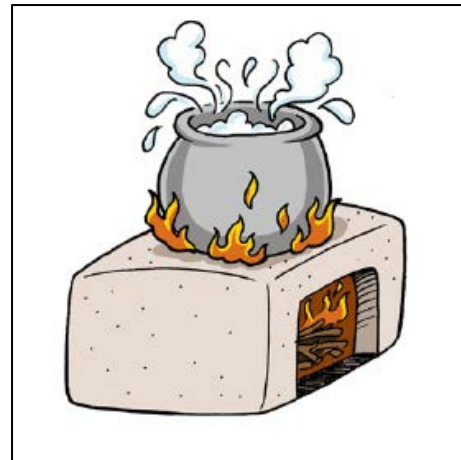
Boiling is considered the world's oldest, most common, and one of the most effective methods for disinfecting water. Pathogens are killed when the temperature reaches 100 degrees Celsius. CAWST recommends boiling water for 1 minute and adding 1 minute per 1000 metres of elevation.

Effectiveness

- Quality: Very effective in killing all pathogens
- Quantity: Depends on the size of pot being used
- Local water: Can be used with any water source

Appropriateness

- Local availability: Different fuel sources may be locally available (e.g. wood, charcoal, biomass, biogas, kerosene, propane, solar panels, electricity)
- Time: Need to heat water until it boils for 1 minute
- Operation and maintenance: Water is heated over a fire or stove until it boils; potential for burn injuries; cause of respiratory infections associated with poor indoor air quality
- Lifespan: Pots and stove may need to be replaced



Acceptability

- Taste, smell, colour: Some people believe that boiled water tastes flat; does not change smell or colour
- Ease of use: It may take a lot of time to collect enough fuel

Cost

- Initial purchase cost: Free or low cost since households can use existing pots
- Operating cost: On-going cost for fuel; cost varies depending on the type of fuel