

SMART Centres



Simple,
Market based,
Affordable,
Repairable
Technologies

Smart Hygiene Solutions

Affordable options for household level



www.smartcentregroup.com



The
SMART
Centre
Group

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The Smart Hygiene Solutions manual has details which can be best learned with practical training. Therefore it is highly recommended to use this manual in combination with practical hands on training that can be provided by a SMART Centre in Tanzania, Malawi, Mozambique, Zambia or in the future in other countries.

Please feel free to contact us via www.smartcentregroup.com

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3 Introduction

In this time of the Covid-19 virus, hygiene and safe drinking water are even more important than before. This document includes a range of affordable hygiene solutions with a focus on options for households that can be made with locally available materials. Options include Wash bottle, Wash buckets, Tippy tap, Dry racks, Soap dispensers etc. This document is additional to the booklet Smart Hygiene Solutions made by IRC, Plan Netherlands, Aqua for All and NWP.

Download this first booklet at

<https://nl.ircwash.org/sites/default/files/Roose-2010-Smart.pdf>



The SMART Centre Group has published other manuals about manual digging of wells and drilling of Tube wells/boreholes including topics like:

- Geology and Site Selection
- Well digging
- SHIPO drilling
- Making of SHIPO drilling set
- Mzuzu drilling
- Making of Mzuzu drilling set
- Rota sludge drilling
- Making of Rota sludge drilling set

On Pumps:

- Rope pump model 1 Standard model
- Rope pump model 2 Economy model
- Rope pump model 3 2 Pole model
- Rope pump model 4 1 Pole model
- Pump care taker training
- EMAS pump

On Business skills:

- Training of Drilling companies.
- Business, financial and marketing planning

4 Examples of Smart Hygiene Solutions



Wash bottle. A simple option, a 2 litre bottle with a large hole on the side and a small bottle with a small (3-4mm) hole at the bottom. Make the holes with a hot wire. This makes stronger rims. (less breakage)



Fill up the small bottle, and hang it on a nail in the stick. Then wash your hands **during 20 seconds** See also manual under



Always make a soak pit so splash water will not become a mud pool.



Make sure there is soap near a WASH bottle. A bar of soap can hang on a rope or inside a net. Or use liquid soap in a bottle.



Wash bucket. A 20 litre bucket with a faucet/tap placed on a stand made from a 10 or 12 mm round bar. This model is produced in Zambia by welders trained by Jacana SMART Centre



To limit the flow of water you can place a wood or plastic plug in the inlet of the faucet with a small 3 mm hole. While washing hands, clean the faucet/tap with soap to eliminate eventual viruses.



Wash bucket. Stand made of metal pipes with a platform for the liquid soap. Produced in Malawi



Soap dispenser. Made of a PVC pipe (2 or 3 inch), 1 or 2 end caps and a faucet (tap).



Soap dispenser mounted on a wall. The lower cap is glued.



CASWT handwash station. Using a car tire to pump water

Instructions how to make a hand wash station

<https://resources.cawst.org/instructions/eec5d730/handwashing-station-instructions>

5 Tippy Tap

Taken from the website www.tippytap.org

HOW TO BUILD A TIPPY TAP

Materials:

- 2M FORKED STICKS X2
- 1M STRAIGHT STICKS X2
- TOOLS TO DIG
- WATER CONTAINER
- GRAVEL
- SOAP
- NAIL & CANDLE
- 2 PIECES OF STRING

- DIG TWO HOLES 18IN DEEP AND ABOUT 2FT APART
- PLACE THE FORKED STICKS, ENSURE THEY ARE LEVEL
- FILL HOLES WITH SOIL & ROCKS, AND PACK TIGHTLY
- MAKE A HOLE IN THE SOAP AND THREAD STRING
- HANG CONTAINER AND SOAP ON CROSS STICK AND PLACE ON SUPPORTS.
- FILL CONTAINER WITH WATER AND ATTACH STRING.
- ATTACH OTHER END OF STRING TO FOOT LEVER STICK
- MAKE GRAVEL BASIN BETWEEN STICKS TO PREVENT MUDDY AREA

Logos: Watershed Management Group, tippytap.org (save water. save lives.), grampani



Tippy tap with soap in a plastic bag.



If possible install Tippy taps near latrines



Rope of a Tippy tap may damage fast with the UV sun rays. Instead of rope, one can also use 1.5 mm galvanised wire. That last much longer than rope



Dry rack. The sun kills germs on cups, pots, spoons etc.



Disinfect handles of hand pumps

Viruses like the Covid-19 virus can survive for a few hours up to a few days on paper, plastic or metal surfaces like doorknobs, handles at gas stations for cars, handles of hand pumps etc.

So make sure that handles, for example, of a hand pump are disinfected with some soap every time after use.

Manuals on how to build Tippy taps

- 1-page manual by Tippy tap.org as shown above, available from <http://www.tippytap.org/wp-content/uploads/2011/03/How-to-build-a-tippy-tap-manual.pdf>
- 7-page manual made by WOT Enschede. Include a sink pit or a gravel soakaway. Available from <https://www.wot.utwente.nl/publications/tippy-tap.pdf>

6 Dip Tap

Handwashing with 0.25 litres of water, at Zero cost

To wash hands; Fill up the Dip Tap with a little water to make hands wet
 Rub soap on your hands and wash and scrub for 20 seconds
 Now fill up the Dip Tap completely and rinse your hands



Dip Tap with a used plastic (small) water bottle



Holes in a plastic Dip Tap can be made with a hot wire, heated with a candle or other fire



Make a hole of around 5 cm (2 inch) with the hot wire or a knife



Make a hole of 10 mm in the top (strong) part of the bottle



Make a 3- 4 mm hole in the bottom.



Fill up the bottle by immersing it



Hang the bottle on a nail in a stick.



Option 2: Instead of a plastic bottle you can also use a tin can



Cut a 5 cm hole in the tin can



Make a hole in the bottom with a nail.



Hang the tin can on the opening ring or on a hole in the tin can



Hang a bar of soap on a rope or inside a plastic or cloth mesh

A 3mm hole flows 45 seconds
 A 4mm hole flows 25 seconds

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7 Making soap at the household Level

There are many you tube movies on making soap. Three different methods are described.

1. African Black Soap.

This is the simplest soap to make. Materials needed are potash, vegetable oil and water. Potash (Potassium ash) can be made from ash of hardwood or plants that contain potassium like banana peels, cacao pods, tamarind pods, etc. Plants are dried, roasted and ground into a powder. Oils that can be used include those from coconuts, oil palm, sunflower, groundnut, castor oil plant, moringa, jatrophia, etc.. Potassium is also found in mines as a mineral and is also called potash.



Potash can be made out of ash of hardwood, or materials that contain potassium like banana peel, banana leaves, tamarind pods, etc..



Pieces of African Black Soap

There are several recipes for making African Black Soap. The one in the following video uses potash made out of ash of hardwood. <https://www.youtube.com/watch?v=c2Ka0jrOa6A>

Steps to produce soap according to this video are:

1. Take a plastic bucket of 10 litre and make a small (6 mm) hole in the bottom
2. Put a layer of 6 - 8 cm of straw or hay on the bottom, eventually put some sand on top
3. Add ash (8-10 cm) on top of the straw
4. Place the bucket on top of another bucket of 5 or 10 litre
5. Pour 3 to 4 litres water on the ash, preferably rainwater (well water may have minerals)
6. Let the water filter through the ash.
7. The water you now have in the lower bucket is **lye water** (similar to caustic soda).
8. To reduce the concentration, boil this lye water in a stainless steel pan (not aluminium!!) for several hours. Be careful, the fumes of boiling are dangerous.
9. Test the concentration of the lye water with a raw egg. The egg should just be floating
10. Mix 4 parts of lye water and 1 part of oil and boil slowly while stirring until the liquid become like mayonnaise.
11. Eventually mix with colorants or flavour like lemon.
12. Pour the soap in a mould and let it cool down. After hardening, the soap can be used

2. Soap from ground Jatropha kernel

Soap can be made from grinded Jatropha kernel (no oil required) and potash. See : FACT Jatropha Handbook, Annex D5: <https://www.bioenergyforumfact.org/reports/fact-jatropha-handbook>

3. Soap from oil, lye and water

A more sophisticated method is to mix water, lye and vegetable oils in specific ratios.

Use a good weighing scale but if not available use a bottle or can with known contents (mentioned on the label) to measure the volumes.

"Lye" is another name for caustic soda (sodium hydroxide, NaOH) or potassium hydroxide (KOH). Soap made with potassium hydroxide is softer and dissolves more easily in water than soap made from sodium hydroxide.

There are many videos on how to make soap this way.

The one used is <https://tinyurl.com/vgy79zc>

The ratio of ingredients in this video is:

- Olive oil: 500 grams
- Coconut oil: 100 grams
- Water: 200 grams
- Lye crystals: 80 grams



Additives for colour or smell can be used but are not necessary

Adding more or less water changes the hardness of the soap. The best way to find out what you want is by trial and error. This concept will probably work also with other cheaper oil

Basic recipe:

1. Use a stainless steel pan.
2. Pour caustic soda gently in water and keep stirring. This causes a chemical reaction, the solution heats up a little.

Please note:- Lye is very aggressive so protect eyes and skin when mixing it. Always pour the Soda into the water, NOT the other way around!!

3. Pour the solution into oil (s) and stir, mix with a blender until it becomes creamy.
4. Eventually add flavour or colorants.
5. Pour the liquid soap in a mould.
6. Leave it 1 day or longer if needed.
7. Cut the hardened soap into blocks.



Set aside for 24 hours or more until it is stiff.

Making liquid soap from soap bars

At places like restaurants, markets, and hand pumps in rural areas it would be good to have a simple facility for hand washing. One way to reduce cost of soap is to make liquid soap from soap bars that you buy in the shop. From one 100g bar you can make 2 litres of liquid soap. Here is how to make liquid soap.

1. Cut (grate) a 100 gram soap bar into small pieces.
2. Boil 2 litres of water and put the soap pieces in the water.
3. Stir with a blender (or a hand drill or a fork), until all soap is diluted.
4. If available, add 2 teaspoons of glycerine to make softer soap.
5. Leave the liquid soap for 1 night, until it thickens.
6. Make the soap, liquid again with a blender or a hand whisk/drill with a "mix wire"
7. The liquid soap is ready to use.

Video showing how to make liquid soap out of soap bars <https://clark.com/family-lifestyle/make-liquid-hand-soap-bar-scraps/>

The Jacana SMART Centre in Zambia installs wash buckets at public places in Chipata. Each wash bucket has a bottle with liquid soap made from soap bars.



Liquid soap in a water bottle, with a 3 mm hole in the cap

Keep yourself and your friends safe, wash your hands here.

Need affordable water at your house?

 The SMART Centre Group
www.smartcentregroup.com

8 Good handwashing practices

Chapter taken from the book “Encouraging change”. 2004 By Sally Sutton.

ISBN 0954489438, 9780954489434 . Download for free at:

<https://healthbooksinternational.org/product/encouraging-change-format-download-pdf/>

INTRODUCTION.

In Sections 2.2 and 2.3 methods were described for looking at existing hand-washing practices. This used **pocket chart voting**. The results of those sessions can be used as a starting point for discussions on what changes people feel should be introduced.

PURPOSE.

To get participants to identify what is wrong with their present practices and in what ways they wish to change them. These changes should be designed to block transmission routes identified in Section 1.4.

TIME.

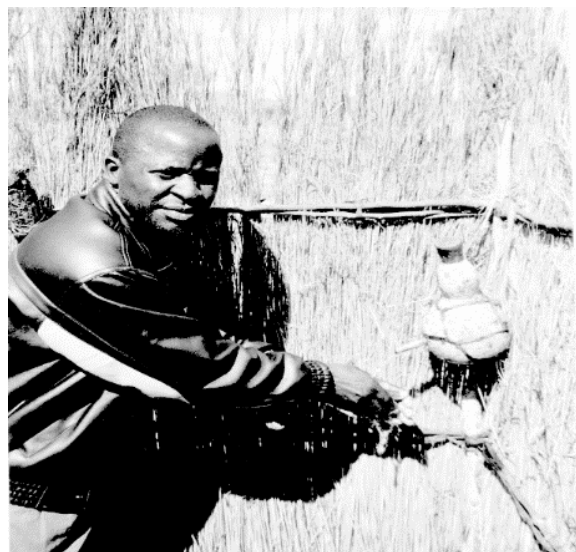
2 hours

MATERIALS.

Posters from Section 2.3 and notes from Sessions 2.2 and 2.3. Posters of hand-washing devices and/or materials to demonstrate construction of devices (see below)

METHOD.

1. Review what was found in previous discussions on what people do at present.
2. Ask people to decide what they would like to be the most acceptable practice in terms of **WHEN** and **HOW** hands should be washed. This will require a repeat of the previous ‘blind’ voting, using the same posters, but asking for voting on how people feel they should act in future
3. On presenting the results, ask people to explain why they voted as they did. What practices would they now regard as lazy or embarrassing and what is healthy, progressive, and makes one feel good?
4. Ask for any ideas of how water could be made more easily available for hand-washing by the latrine and in the house. Offer additional ideas from below if necessary, of methods which allow good hand-washing without requiring large volumes of water.
5. Get commitments from each householder present and from the community leaders as to what changes they want to achieve within two months and within half a year.



Just a gourd and a stick are enough to make a handwasher

DISCUSSION POINTS:

- If people know that washing after latrine and before food are important, for what reasons do they not follow such a practice? How can this be overcome?
- Should people be embarrassed to be seen sharing one bowl of water for all the family? Or washing hands after going to the latrine.
- When should soap be used most?
- Should there be a facility to wash hands at the water source before drawing water?
- How can children be encouraged /persuaded to wash their hands more often and why is it especially important?
- Who are the most respected people and can they be good examples for others to follow?
- What are the dangers of spreading dirt during handwashing

EXPERIENCES WITH HOUSEHOLD HANDWASHING.

- Since people began to see how dirty water gets when it is shared in the bowl, more and more are using a jug to pour fresh water over their hands. It is now common in eating houses/ restaurants
- With practice, little if any, more water is used when pouring rather than dipping hands into the bowl. It is also easier to rinse off soap, so that it does not make food taste soapy.

NOTE TO FACILITATOR.

The aim is to encourage change in practices, but also involves changes in attitudes or beliefs. Demonstrate the changes in practice as far as possible so that others can see exactly what is meant. Show people examples of hand-washing devices and discuss with them that it may not mean carrying more water home, but just using the quantities available more efficiently.

Try to make sure you are seen doing the same yourself.... You are an important role model! Make hand-washing devices for your home and clinic today!

BACKGROUND INFORMATION FOR FACILITATORS

Some idea of handwashing devices to put by latrines, water sources, or entrance to the house.

Calabash handwasher

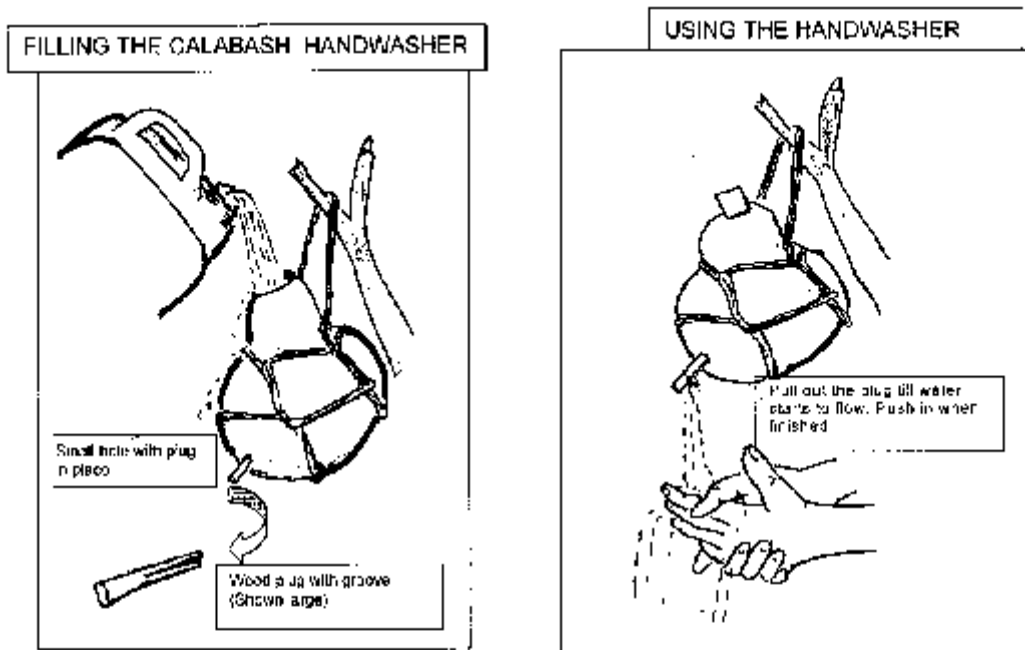
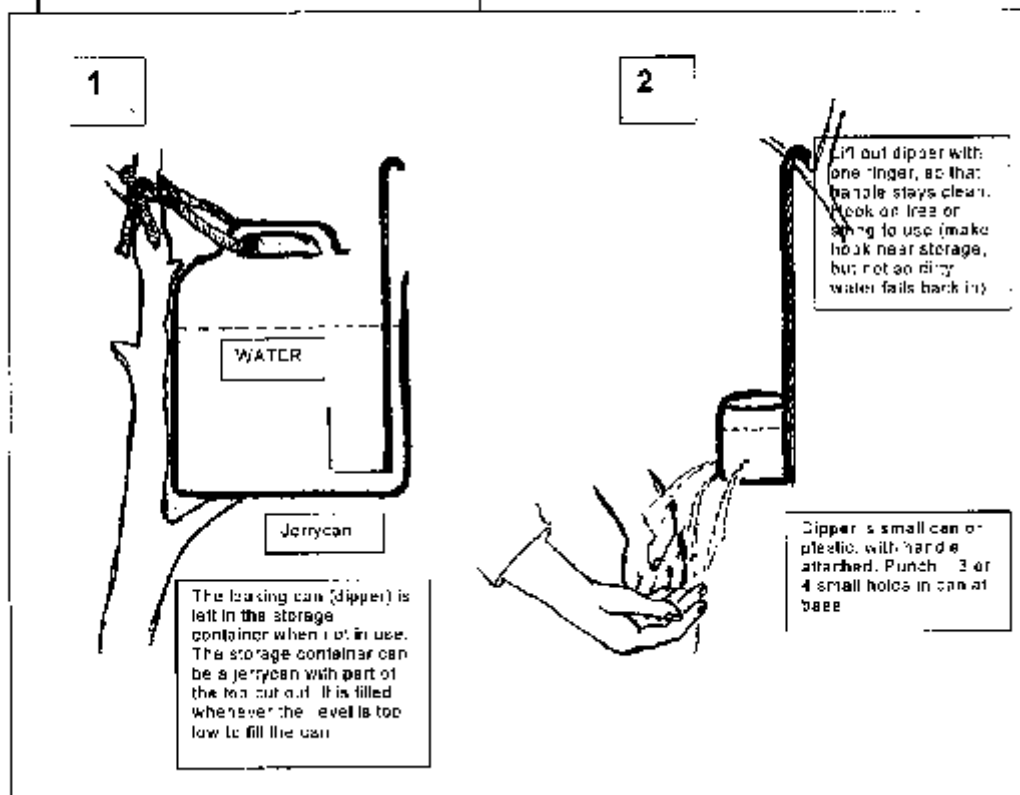
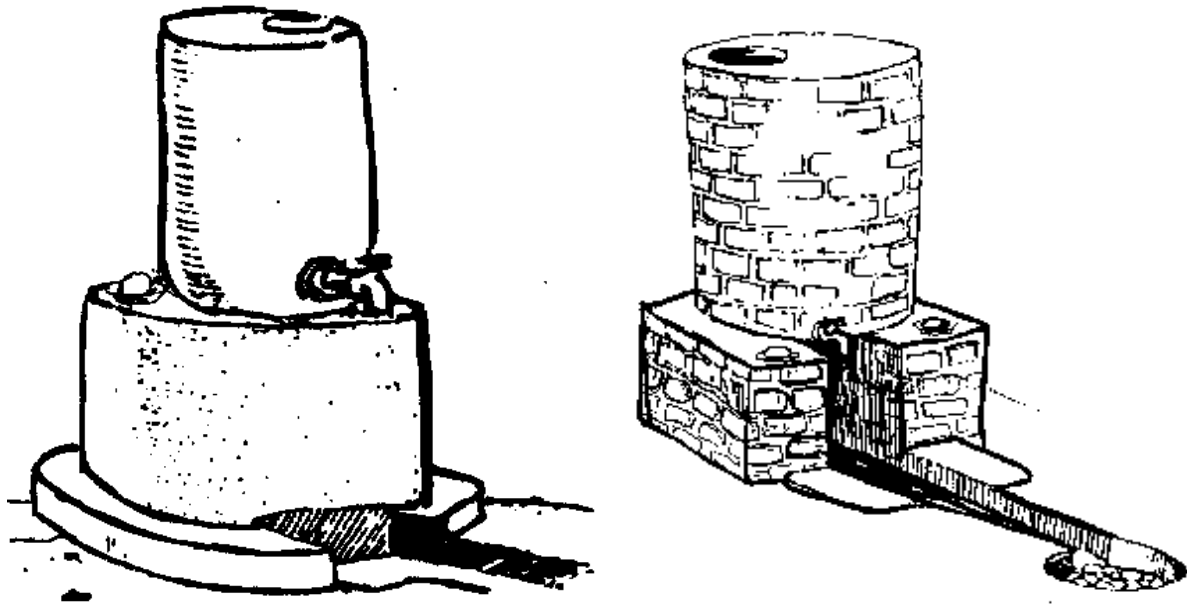


Fig 4.15 THE LEAKING LADLE (Dipper)



Handwashing for houses and schools.



Tips about handwashing

1. If water is collected when you have dirty hands then the water source will be made dirty. Even if there is only one bucket, this will carry dirt into the water. This means that people need to check that there is water in the house/ in the hand-washer, BEFORE going to the latrine or in the bush. Otherwise they will make the source dirty before they can make their hands clean after defecation.
2. Handwashing can spread disease if not done properly. If people all share the same water in a bowl, the last user may find their hands get dirtier not cleaner! The most effective way is to pour clean water onto hands, and collect the dirty water underneath in a bowl. This can then be used to water plants, or settle dust outside the house.
3. Also when using devices with taps or plugs, these should be handled as little as possible with dirty hands (tip; hook dipper with your little finger), or they will spread disease.
4. Soap helps to remove dirt and make people smell clean. It kills germs like Covid-19 and is especially helpful if used after going to the latrine or cleaning a small child/ handling napkins.
5. Children are the worst at washing hands, but also get most dirty and are most likely to get sick as a result, so encouraging them to wash hands and making it easy for them to do so, will have a big effect.... More days at school, fewer trips to health centres and traditional healers, less sleepless nights, less clothes washing.
6. Step 4 in handwashing it is especially important to clean nails.

2 scoop holes and 2 lined wells in Western Province always had more than 100 FC/100ml in the water. Users did not like this and installed hand-washing devices at each site and made rules for users. After one month the FC count had dropped to zero, throughout each day.

In more than nine out of ten households in four provinces, people said the whole family shared the same bowl of water for washing hands. Very few scooped the water out of the bowl, or poured water to avoid passing their dirt on to others.

9 Games for Hygiene Promotion

One of the ways of shaping hygiene promotion is through the use of games. One example of a game is the '4s' or foursome.

MetaMeta has developed a version with hygiene related messages specifically designed for the Ethiopian setting. The game can be extended, translated and adapted to the local circumstances. Currently translations in English and Arabic are available and Amharic and Afan Oromo are under development.

Contact MetaMeta through rveldman@metameta.nl or adeligianni@metameta.nl for more information and for the design files of the game. A sample of the game can be downloaded through [here](#).

The summarized rules of foursome are:

Play with 3 or 4 players. Age: 5 and up

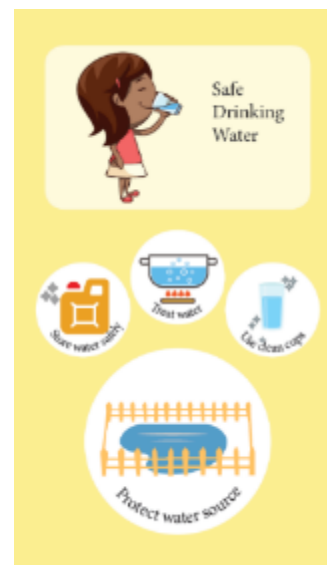
What is the goal?

To collect as many series of four cards, also called 'quartets', as possible.

Gameplay?

The cards are shuffled and dealt evenly between all the players and the cards get held face up in a players hand. The player to the dealer's left starts by asking another player if they had a certain card (example, card 'safe drinking water – store water safely'), which would help the player create a quartet. If the player does have the card, then they hand it over. If the player doesn't, then it becomes her or his turn to ask. When a quartet is created, or a complete quartet was dealt, then the cards creating the quartet are placed in front of the player.

The game ends when all the quartets have been created. The winner is the person with the most quartets.



4's

Play with 3 or 4 players. Age: 5 and up

What is the goal?
To collect as many series of four cards, also called 'quartets', as possible.

Gameplay?
The cards are shuffled and dealt evenly between all the players and the cards get held face up in a players hand. The player to the dealer's left starts by asking another player if they had a certain card (example, card 'safe drinking water – store water safely') which would help the player create a quartet. If the player does have the card, then they hand it over. If the player doesn't, then it becomes her or his turn to ask. When a quartet is created, or a complete quartet was dealt, then the cards creating the quartet are placed in front of the player.

The game ends when all the quartets have been created. The winner is the person with the most quartets.

Developed and designed by Lemacke Kassoop and Daria Krupic Kool

10 Further reading

Africa Ahead; Explanation of Covid-19 virus with simple posters, drawings.

https://www.africaahead.org/wp-content/uploads/2020/03/AHEAD-Corona-Virus-Toolkit_V2.pdf

CAWST; Centre Affordable Water & Sanitation Technologies. COVID-19 update

Can ash be used for handwashing? This and other questions answered on website

<https://vimeo.com/403090072>

<https://resources.cawst.org/>

SMART Centre Group; SMARTechs. Simple, Market-based, Affordable, Repairable Technologies. In general WASH technologies that can be produced with local materials

<http://smartcentregroup.com/wp-content/uploads/2018/02/SMARTech-Catalogue.pdf>

GIZ. UNICEF ; Handwash systems for schools

[http://www.fitforschool.international/wp-](http://www.fitforschool.international/wp-content/ezdocs/giz_unicef_Catalogue_WashingFacilities_FINAL_WEB_new.pdf)

[content/ezdocs/giz_unicef_Catalogue_WashingFacilities_FINAL_WEB_new.pdf](http://www.fitforschool.international/wp-content/ezdocs/giz_unicef_Catalogue_WashingFacilities_FINAL_WEB_new.pdf)

WHO/ UNICEF

<https://www.who.int/news-room/q-a-detail/q-a-coronaviruses>

<https://www.who.int/emergencies/diseases/novel-coronavirus-2019/advice-for-public>

<https://www.sanitationandwaterforall.org/about/about-us/water-sanitation-hygiene/covid-19-and-wash>

Medical Ambassadors International and Global CHE Network

Complete training course on Covid-19 virus with Community Health Evangelism.

<https://www.chenetwork.org/coronavirus>

Videos on Tippy tap

WaterAid. YouTube movie. Make sure to include a sink pit

<https://www.youtube.com/watch?v=C4d1nLpqx0M>, an example from Sierra Leone

Send a Cow. Short clip

<https://www.youtube.com/watch?v=t6bP7JYPOzM>, an example from Uganda

Tippytap.org

<https://www.youtube.com/watch?v=Qdpd3roZjYw>

Studies on effects of Tippy taps

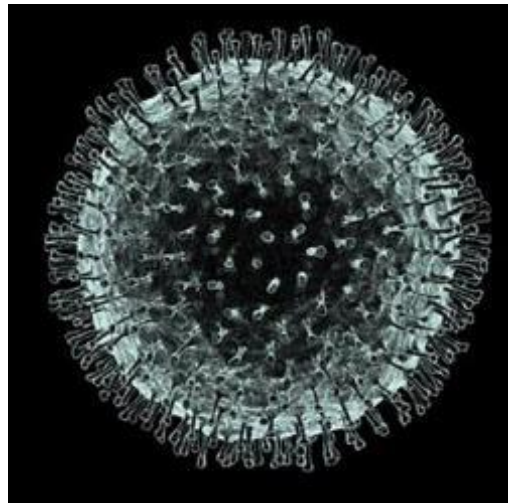
<http://www.tippytap.org/wp-content/uploads/2011/03/GHD-report-manual2.pdf>

WHO. Movie on handwashing with the Tippy tap

https://www.youtube.com/watch?v=HNk1Zqs_40

11 What is Coronavirus?

Viruses in general are very small and can only be seen under special microscopes. It can cause infections which can be mild or very serious. The Coronavirus spreading now is the Covid-19 virus.



How does the Covid-19 virus spread?

The Covid-19 virus probably started to spread from bats to humans. It can spread from droplets of mouth and nose via close contact, sneezing, coughing, touching hands, touching door knobs or other items that were touched by people who have the virus.

What are symptoms of the Covid-19 virus?

- Symptoms appear 2 to 14 days after exposure.
- Many people may only have a mild illness, similar to a cold. They may have:
 - Fever, Cough, Shortness of breath
- Others have a more severe illness. They may have:
 - Difficulty breathing, Pneumonia, Other complications
- Some people die.

What is the treatment?

There is no vaccine yet or specific treatment for Covid-19 virus.

If you have symptoms contact your health centre right away.

How can I reduce risk of a Covid-19 virus infection?

- If you have symptoms stay home
- Keep distance between persons of 1.5 meter
- If you have touched an infected part, Wash hands well with soap for 20 seconds
- Cough, sneeze in your elbow

