

**SURCe**

Supply Of Unpolluted clean drinking water  
to Rural Communities

# THE SOURCE OF CLEAN WATER





# Foreword

Water is the most familiar and abundant liquid on earth as it covers 70% of the earth's surface. Most of the living tissue of a human being is made up of water. However, the quality of water differs due to human and natural influences. Poor quality of water reduces the quantity of useable water since it cannot be used for drinking, agriculture and industry, and it also leads to disease such as diarrhea. Although 80% of Nepal's population has access to water, most of their resources are unsafe for drinking. This comic book is developed to raise children's awareness on the importance of drinking safe water. It is advised that parents and teachers read this book to children at home or in school to ensure that they are informed about clean drinking water.

# About the Booklet

The manual is created as part of the Public Private Partnership project called SOURCE (Source Of Unpolluted clean drinking water to Rural Communities) funded by DEG and Vestergaard further implemented by Asia Society for Social Improvement and Sustainable Transformation (ASSIST) in association with Sustainable Industrial Development and Entrepreneurial Empowerment Center-Nepal (SIDEc-Nepal). It introduces the basic information on drinking clean and safe water to school children in a child-friendly manner. It consists of ten chapters, starts with the importance of safe drinking water, water sources contamination etc. and ends with the methods to protect water, get rid of the germs etc.

Vestergaard and ASSIST wish you an engaging and informative experience with this manual. The overall design has been chosen carefully to match the needs and preferences of children and it is prepared while taking essential elements from booklets development by UNICEF, European union, International standards of drinking water, WHO, UN water, etc. Amoeba and Water prepared by Environment and Public Health organization (ENPHo) and UNICEF Nepal.



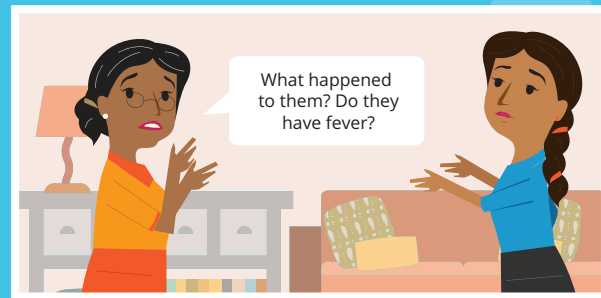
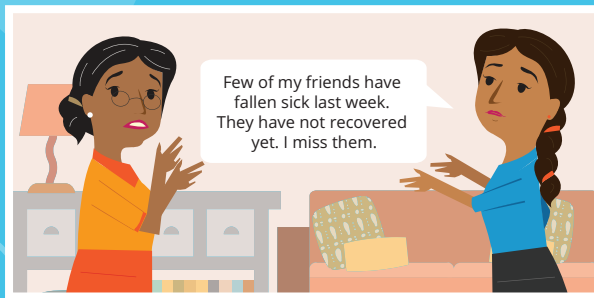
# Project SOURCE

Nepal faces a high number of water-related diseases. Access to safe drinking water became more critical and the demands for clean water increased significantly, especially in the aftermath of the 7.8M earthquake that hit the nation in April 2015. The project, SOURCE aims to prevent water-borne diseases in rural areas of Nepal by providing access to improved drinking water and sanitation services, through the installation of household and community water filters, as well as creating awareness on safe drinking water and proper hygiene practices.

## Vestergaard Water Filters

**LifeStraw®** water filters convert contaminated water into clean, safe drinking water. The easy-to-use filters are a vital tool for some of the 780 million people who do not have ready access to safe drinking water. This leaves them at risk for diarrheal disease, which kills more than 1.5 million people every year. Safe drinking water is important especially for vulnerable groups, such as children under five, pregnant women and people living with HIV. LifeStraw® water filters also prevent cryptosporidiosis, a major cause of diarrheal illness in people living with HIV and children under five. LifeStraw® water filters comply with US Environmental Protection (EPA) 1987 Guide Standard and Protocol for Testing Microbiological Water Purifiers. Each product in the LifeStraw® portfolio is designed for a specific situation where safe water is needed but not readily available.

It is summer holidays! Leena was waiting for her lovely granddaughter, Crystal to come home. She is doing her middle school in the city. She stays with her parents and during summer holidays she comes to her grandma's place. Leena lives in a village. She is a doctor and an expert in treating children's diseases. She had her own clinic in the past.





# Why water is important for our lives?



More than **70%** of our body is made of water

We feel thirsty when our body needs more water



We also get water from milk, juice and other liquids



We must drink water many times a day



Where do you get your drinking water in your house?



We get our drinking water from various sources depending on where we live. In cities, we get water from taps in our houses. In villages, we get water from wells, springs, rivers, or streams





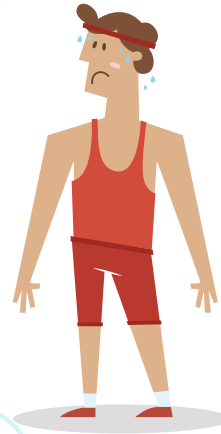


## If we don't drink water

When the amount of water in the body drops below healthy levels, we feel weak and may even faint

This condition is known as

# DEHYDRATION



**DEHYDRATION**



How much water do these fruits & vegetables have?



**Cucumber = 96%**



**Orange = 86%**



**Apple = 85%**



**Potato = 79%**

# What if we don't drink Water?



## DEHYDRATION

Dehydration is the first effect from drinking insufficient water. Dehydrated people often experience thirst, headache, dryness and/or stickiness in the mouth, lips, tongue, and skin.



## BODY TEMPERATURE

The water inside your body acts as a cooling mechanism, both for external skin and internal organs, particularly following physical exercise. This internal cooling system may not function properly if you are not drinking enough water.



## CHEMICAL IMBALANCE

Dehydration can interfere with many bodily processes, such as providing organs with sufficient oxygen, disposal of waste products, and bone & joint lubrication.



## CONSTIPATION & DIGESTIVE PROBLEMS

For effective bowel motion, you need plenty of water. Not drinking enough water can cause toxin build-up and weight gain, and you will start to feel terrible.



## STOMACH ULCER

Within the stomach, there is a mucosal lining consisting of 98% water and 2% sodium bicarbonate, which aids digestion and protects the stomach by neutralizing digestive acids. During dehydration, the stomach cannot effectively produce this mucosal lining.



## JOINT PAIN

Cartilage is found in the joints and vertebral discs, and is required to prevent bones grinding together. It consists of around 80% water. Good hydration ensures good shock absorption in the joints during running, dancing, or jumping.



### HUNGER PANGS

When you are dehydrated, the body can confuse the signals, so you may think that you are hungry. This can occur at all times day and night.



### WEIGHT GAIN

Many times when we are thirsty we eat food rather than drink water. This can cause unnecessary weight gain, especially for a sedentary person.



### REDUCTIONS IN MUSCLE MASS

Muscles are also high in water content, so not drinking enough water can lower overall muscle mass.



### PREMATURE AGING

As we get older, the body naturally retains lower amounts of water, so we need to increase our water intake.



### LONG PERIODS OF ILLNESS

Water constantly eliminates toxins from the body and allows your organs to filter out waste products. This process will start to malfunction during dehydration.

# The Water Cycle



Water from oceans, rivers, lakes or from the ground evaporates and form clouds

Water falls from clouds as rain, snow or hail. As soon as a raindrop falls on the ground, things get mixed in it

Rain water get absorbed by the ground and also flows to the sea

Insecticides used in agriculture and waste from factories can get mixed into the water

Water absorbed by the ground collects in layers of sand, gravel or rocks and also slowly flows down through the cracks

Contaminated water is also absorbed into the ground



## Not all water is the same

Depending on its location, water may have different substances mixed with it.

Flowing water can collect to become a pond

Underground water which comes out on the surface is called Springs

Water from the ground can be taken out using a tubewell. Since it goes deeper than a dug well, its water is cleaner than water from the dug well

Water flowing underground collects inside a well. Water from a well is often cleaner than water from a pond

Water from a spring can be brought to a tap using pipes.

# Water-borne diseases in Nepal



Drinking dirty water is the major cause of illness in Nepal.

A person can get ill by drinking water with germs. In every 15 seconds, a child dies in the world because of unsafe drinking water. In Nepal, 13,000 children die every year due to diarrhea. Diarrhea is caused by unsafe water and un-hygenic practices.



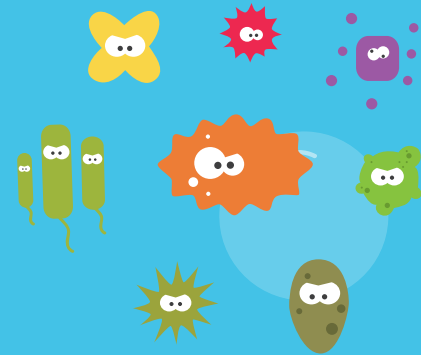
## What causes diseases?

Nothing happens to a buffalo if it drinks from a pond, but if we drink from a pond we will fall ill. Water from lakes, rivers or streams has millions of microbes in it.



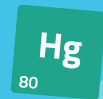
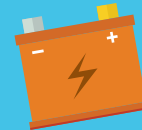
# What is a Microbe?

Microbe is a living creature smaller than your naked eyes can see. Bacteria, viruses and yeast are types of microbes. Amoeba is one kind of microbe that lives in water. Some microbes do not cause diseases, but those like amoeba, salmonella and worms make us ill. Besides germs, water can have harmful chemicals.



# What are Chemicals?

Acids in batteries, medicines, like iodine, salts like copper sulphate, and substances like washing soda are known as chemicals. Many of them dissolve in water. We can tolerate chemicals like iron, ammonia, arsenic and mercury in small amounts, but when there's too much of chemicals they will make us sick.



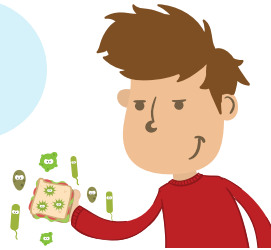
# How do Germs enter our body?



Different germs enters our body in different ways:



through the air we breathe  
(like the virus of the  
common cold)



through food and water  
(like the bacteria that  
causes cholera)



through the skin cuts  
and scratches (like  
tetanus and scabies)

Once germs enter our body, they multiply and cause disease. Although germs constantly surround us, our skin protects however they get inside our bodies through mouth and cause stomach aches We will be healthier if we can prevent germs moving from place to place.

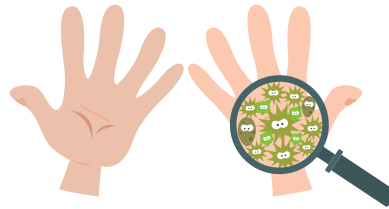


# 3 Ways to get Germs into our bodies



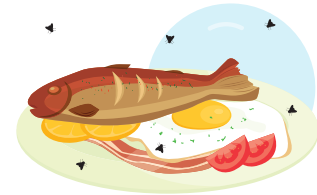
## Drinking dirty water

- Water kept in a dirty vessel
- Things fallen into the water
- Fingers dipped into the water



## Eating with dirty hands

- Dirty hands carry germs
- Germs are passed to our food from our dirty hands
- Dirty nails store germs



## Eating dirty food

- Food prepared by dirty and unwashed hands
- Food fallen off the plate
- Food landed by flies and stale food
- Uncooked and poorly washed fruits & vegetables

# How Much Water Do You Need Everyday?

The traditional advice is to have 8 glasses of water daily, but some medical professionals say it should be more than this, around 3 liters/13 cups a day for men and 2.2 liters/9 cups for women. The reason for this difference is that men generally have greater muscle mass than women.



You may need to drink more than you normally do in the following situations:

- During hot weather
- Before, during and after physical activity
- Women who are pregnant or breastfeeding
- If you have a health condition, such as urinary tract infection, or are ill, for example, with the flu



# Quick Facts about Water!



Women and children bear the primary responsibility for water collection



Women and girls often spend up to 6 hours each day collecting water



In Africa and Asia, women and children walk an average of 3.7 miles a day just to collect water



Reductions in time spent collecting water have been found to increase school attendance



Every 90 seconds a child dies from a water-related disease



160 million children suffer from stunting and chronic malnutrition linked to water and sanitation



Globally, 1/3 of all schools lack access to safe water and sanitation



Diarrhea is the 3rd leading cause of child death, a majority of which are water-related

# How should we identify Safe Drinking Water?



Water without germs or harmful chemicals and that is stored properly is considered safe drinking water.



## Look:

- Drinking water should be clean.
- It should be clear and not have any color.
- Even after it stands for several hours there should be no color or cloudiness.
- Nothing should be floating or settled at the bottom.



## Think:

- Water should be kept covered in a clean vessel.
- Vessel for drinking water should be stainless and odorless and should not break or help germs reproduce.



## Taste and Smell:

- Safe water normally has no taste or smell. If there is a taste or smell, it is because some of substances or chemicals mixed in the water.

# How does Water get polluted?



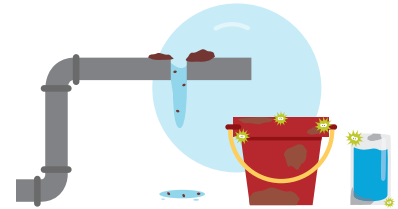
## Pollution of surface water

- Waste and dirty water which drains from kitchens, toilets and cowsheds often get mixed into streams as they flow past people's houses.



## Pollution of ground water

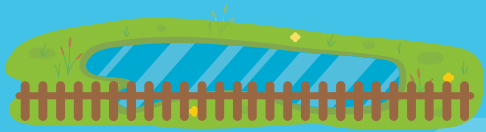
- Animals may step or swim in a spring from which water is used and make it dirty.
- Things may fall into a well.
- Harmful substances can seep into layers of underground rocks and make underground water dirty.



## Pollution of water sources

- Underground pipes may break letting harmful substances mix with the drinking water.
- Things may fall into storage tanks.
- Storing vessel may be dirty.
- Drinking glasses may be dirty.

# Ways to Protect the Water Sources



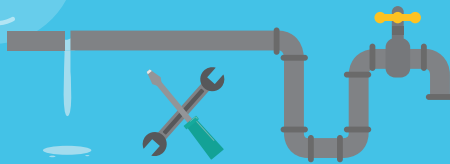
## Spring

- Remove dry leaves and dirt from time to time.
- Stop animals from reaching it by fencing it.
- Put a cover over the spring.



## Well

- Remove dirt which falls onto the well.
- Put a cover over the well.



## Pipe

- Repair broken pipes.
- Cover pipes so that they do not break.



## Tap

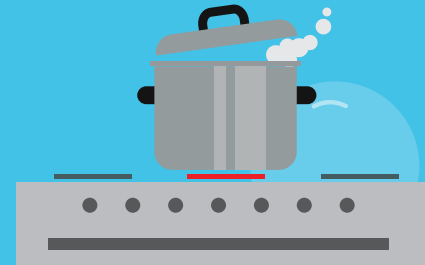
- Keep the surroundings clean.
- Maintain it.

# How to get rid of Germs?

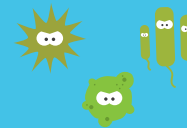
## Boiling Water

Most germs are killed when water is boiled. Water that has no color, odor and is not cloudy can be used for boiling. Boiling water in a well washed pot with a good lid keeps its taste. If there are things floating on the water after boiling it then they should be blown away. If there are particles after boiling, then we should let them settle at the bottom. As the water begins to boil, you will see little bubbles. Keep boiling until you see large bubbles.

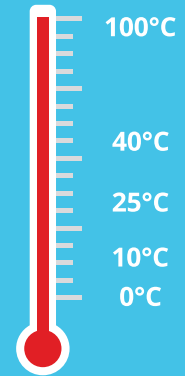
Where to cool water after boiling it? Boiled water should be cooled in the same pot. Cover the pot with a lid to keep it safe. Hot water burns, so be careful. Do not insert another container into boiled water. Pour it into a clean jug and drink it from a clean glass or a cup.



DEAD GERMS



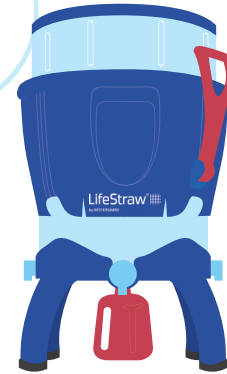
HAPPY GERMS



# How to get rid of Germs?

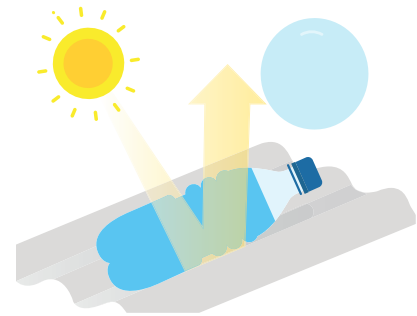
## Filtering Water

Rain water gets absorbed into the ground. The layers of soil, sand and rocks filter out the germs that were in the water. As the water goes deeper into the ground, it gets cleaner. A similar method of cleaning water at home is called a filter.



## Solar disinfection (SODIS)

Sunlight contains ultraviolet rays called UV-A. These ultraviolet rays are harmful to living organisms. Microbes are killed by these UV rays and the sun's temperature. The method of killing germs with sunlight is called Solar Disinfection. For this method we need a transparent clean plastic bottle, like a mineral water bottle, with a cap that can be tightly closed.





# How to get rid of Germs?

## Chlorination

The easiest method of making drinking water safe is to add drops of chlorine. You can do this easily at home. Chlorine is a highly reactive chemical that kills harmful organisms. After adding the required amount of chlorine to drinking water, all micro-organisms die in half an hour and the water will be made safe to drink. When using, read the instructions on the label carefully and follow them.



**Unsafe water and lack of basic sanitation cause 80% of all sickness and disease in the world.**

# What did you learn?



All water is not safe to drink. Just because your mother brought the water, does not mean that it is safe to drink.

Although water looks clean, it can have harmful germs and invisible things in it.

Remove germs and chemicals from water before drinking.

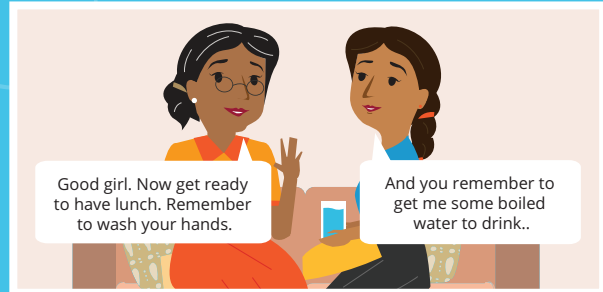
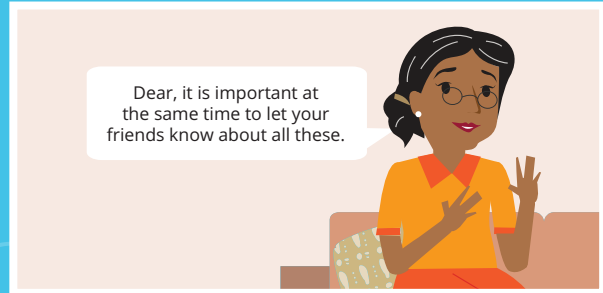
Boiling, Filtration, SODIS and Chlorination remove germs.

# Additional Information about Water

Our brain contains large amount of water. To be alert and productive the brain needs to be supplied with plenty of water and oxygen. Once we drink water our brain receives the amount of water it needs. When you want to learn something new in class, drink some water. It helps you to learn things better. Safe drinking water is a basic need in schools.



After listening to Leena, Crystal was feeling enlightened!



# WATER WORD SEARCH

B T A N K C D D G M B G  
 P I O E C I E N C U O O  
 J C H V L P H A M C T K  
 D R I N K I Y R A D T A  
 C F D L M S D E S I K B  
 O D R I V E R L U O E A  
 L N E B C A A O R H V C  
 D A V R Q M T H I P Y T  
 T Q A N G D I C V Y S E  
 U J S X E J O K Z T J R  
 Z B O I L I N G P A T I  
 V Q D D M Q R E T A W A

Look at the word puzzle below. Search for the words related to health and water. Words are arranged horizontally and vertically.



HIDDEN ANSWERS ARE HERE:

BACTERIA BOILING BOTTLE  
 CHOLERA COLD DEHYDRATION  
 DRINK ICE PIPE RIVER SAVE  
 TANK TAP TYPHOID VIRUS  
 WATER



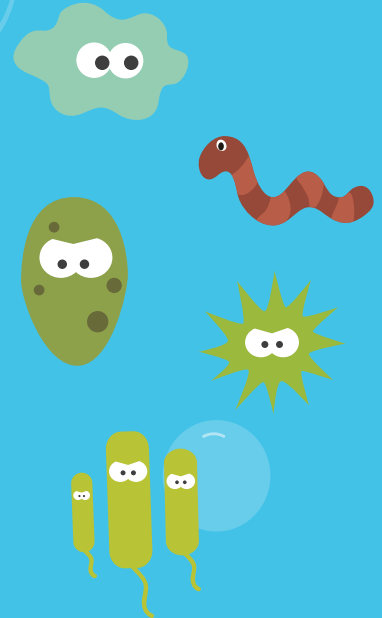
Roll a dice, play with a friend!

# HEALTHY HABITS

# SAVE YOUR LOVED ONES






## RULES:

- This is a game which two players play by rolling a dice.
- One takes germs and the other takes people.
- Germs move clockwise, following the arrows in boxes of their own color only. People move across from 1 to 10.
- Roll dice in turns to move any of the six germs or any of the six (6) people.
- Only the boxes with healthy habits are safe spots for people.
- If a germ gets a person in an unsafe spot, the person loses and has to be removed.
- Moving backward is not allowed and one has to make a move when it is possible to do so.
- Get all your people across to win the game.



You need a dice, 6 beans and 6 buttons to play this game.



	 AMOEBA	 WORM	 BACTERIA	 VIRUS	 SALMONELLA		
FRIEND	Filter → 1	↓ Use of toilet 2 3	↓ SODIS 4 5	↓ Washing hands with soap 6	↓ Boiled water 7 8	↓ Boiled water 9 10	SAVED
SIBLING	Washing hands with soap → 1	Filter 2 3	Chlorine 4 5	Boiled water 6	Boiled water 7 8	Use of toilet 9 10	SAVED
SIBLING	SODIS → 1	Boiled water 2 3	Washing hands with soap 4 5	Use of toilet 6	Use of toilet 7 8	Filter 9 10	SAVED
SIBLING	Boiled water → 1	Use of toilet 2 3	Boiled water 4 5	Filter 6	Filter 7 8	Chlorine 9 10	SAVED
MOTHER	Use of toilet → 1	Chlorine 2 3	Filter 4 5	Chlorine 6	Washing hands with soap 7 8	Washing hands with soap 9 10	SAVED
FATHER	→ 1	↩ Boiled water 2 3	↩ Filter 4 5	↩ SODIS 6 7	↩ Chlorine 8 9	↩ Washing hands with soap 10	SAVED



### **Deutsche Investitions-und Entwicklungsgesellschaft (DEG)**

DEG, a member of the KfW Bankengruppe (KfW banking group), finances investments of private companies in developing and transition countries. As one of Europe's largest development finance institutions, it promotes private business structures to contribute to sustainable economic growth and improved living conditions.



### **Vestergaard**

Vestergaard is an international company dedicated to improving the health of vulnerable people, most of whom live in developing countries. Our game-changing solutions contribute to a healthier, more sustainable planet by fighting malaria, HIV/AIDS, diarrheal diseases and neglected tropical diseases. Additional company initiatives are focused on mitigating climate change and enhancing food security.



### **Asia Society for Social Improvement and Sustainable Transformation (ASSIST)**

ASSIST is an international non-government organization focused on capacity building. It seeks to promote sustainable practices to address social problems in the developing world, with focus on Asia and Africa.



### **Sustainable Industrial Development and Entrepreneurial Empowerment Center – Nepal**

SIDEC-Nepal is a purely social, non-profitable and non-political organization established under the organization registration act- 2034 in 2015. The working area of the organization is within the territory of Nepal, focusing on the sector of sustainable industrialization, energy, water resource management, disaster risk management, employment generation program, poverty alleviation, entrepreneurship development and optimization and sustainable use of resources.