

# Cleanliness, hygiene and health

[3-4] Consider events and phenomena that are, or are likely to be, a threat to the growth and development of children in Cambodia.

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## Learning objectives

You will be able to gain proper understanding and explain:

- The principles of cleanliness and hygiene.
- With examples, diseases and conditions that arise from unsanitary and unhygienic behavior.
- With examples, good hygiene behavior and behavior to keep our bodies clean.
- With concrete examples, unhygienic environments (home, school, town/community).
- With multiple examples, diseases and conditions that arise from unhygienic environments.
- With examples, what can be done to improve unhygienic environments.
- Ideas on how unhygienic and unclean behaviors can be changed.

In this chapter, we learn about cleanliness and hygiene in relation to children, homes, schools, and communities. The specific learning topics are hand washing, bathing, clean water, hygienic food preparation, cleaning, waste separation, and water and sewage systems.

## 1. Personal and environmental cleanliness and hygiene (home, school, town/community)

### 1) Personal cleanliness and hygiene

To lead healthy lives, we need to keep our own bodies **clean and hygienic**. “Cleanliness” refers to the state or habit of keeping yourself and your surroundings free from dirt. “Hygiene” means the practice of preventing illness or the spread of disease by keeping yourself and your home, workplace, and community environments clean. Key behaviors in maintaining cleanliness and hygiene are washing your hands, brushing your teeth, and bathing.

First, to prevent infectious diseases, it is important that your hands are clean (not dirty) and hygienic (no cause for disease to take effect). Hands need to be washed with water and well-lathered soap to remove dirt attached to the surface of the hands (cleanliness), while also removing the viruses and bacteria that are the cause of disease (**hygiene**), blocking this infection route. As explained in detail in Chapter 7, the three main factors in the transmission of infectious diseases are **pathogens** (for example, bacteria and viruses that cause disease), **transmission routes** (the routes whereby bacteria and viruses are communicated), and **hosts** (people’s resistance and immunity to bacteria and viruses). Transmission routes include **direct contact, droplets, and airborne transmission**. To prevent direct contact transmission in particular, it is important to maintain cleanliness and hygiene by washing your hands, sterilizing your fingers, and sterilizing surfaces that are touched by multiple people.

Next, cleanliness and hygiene are also the foundation for preventing tooth disease and keeping teeth healthy. If teeth are not brushed correctly, food particles are not completely removed, and the particles attach to the tooth surface. Bacteria then flourish, forming a sticky white substance called **plaque**. Plaque can grow within approximately eight hours of your last meal. Many bacteria live in the plaque adhering to your teeth, with *mutans streptococci* ('cavity bacteria') and lactobacilli converting the sugar from food particles into acid that begins to dissolve the teeth. To prevent tooth disease and keep teeth healthy, it is therefore vital to keep teeth clean so that food particles don't remain on the teeth, and to **maintain oral hygiene** by removing the clumps of bacteria and bacterial metabolites that make up plaque. This means, firstly, brushing your teeth correctly every day. Brushing using a fluoride toothpaste and using dental floss or an interdental brush for interdental care are also effective methods. Fluorides encourage tooth recalcification, repairing the tooth damage caused by decalcification and restoring the teeth to health. Fluorides also inhibit the production of acid by plaque (see Chapter 8 for details).

Cleanliness and hygiene are also fundamental in preventing infectious diseases and dermatitis (skin disease) (Figure 4.1, Figure 4.2). After you have washed dirt from your body in a shower or tub using cold or hot water and soap and then dried yourself, your skin needs to be moisturized. Brushing and washing your hair and trimming your nails so that your skin is not scratched also help to maintain personal **cleanliness**. Washing dirty clothing and towels prevents diseases and the bad odors caused by the reproduction of the bacteria and mold feeding off sebum and protein in the stratum corneum (**hygiene**).

A survey<sup>1</sup> on the cleaning practices and hygiene behaviors of Cambodian children aged 13–17 found that most brush their teeth at least once a day and are in the habit of washing their hands before meals



Figure 4.1 Practicing personal cleanliness and hygiene

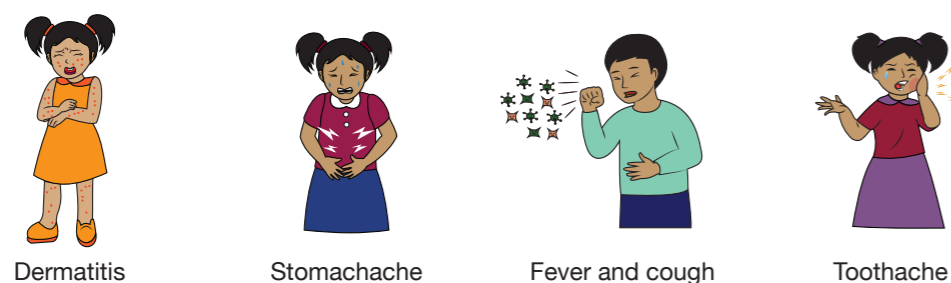


Figure 4.2 Disease caused by unhygienic behaviors

and after using the toilet. On the other hand, around 20 percent of children had taken time off school in the last 12 months because of toothache, which shows that cavities and periodontal disease prevention through correct brushing is clearly an issue in school health care.

## 2) Home cleanliness and hygiene

A clean and hygienic home environment is closely related to your health. For example, **cleaning** your house and separating your household waste properly prevents **vector insects** and environmental pollution. Make sure that you use the right disposal methods for waste and recycling resources. Organic waste (food scraps) should be placed in a polythene bag for disposal, or, if you are burying it, covered with a good layer of soil. Glass bottles, cans, and plastic bottles should be put out for recycling.

**Column: Vector insects** — Insects causing direct harm to people, including lice, mites, cockroaches, and flies

Ensuring clean water with no pathogens helps to prevent food poisoning and the intestinal infectious diseases which are so common in Cambodia. Dirty water contains pathogenic microbes such as pathogenic *Escherichia coli* (*E. coli*), *Salmonella enterica*, *Staphylococcus aureus*, viruses, and *Entamoeba histolytica* that cause infectious gastroenteritis. For drinking water, buy mineral water or, if none is available, drink boiled tap water. In the countryside, when using water from wells, rivers, lakes, and springs, remove any dust and dirt first by straining the water through clothing, a handkerchief, or a towel and then boil the water to kill bacteria and viruses, which cannot be simply strained out. The boiling time must be at least five minutes.

You can prevent food poisoning by acquiring fresh food ingredients, storing them appropriately, preparing them hygienically, and storing food appropriately after cooking. In particular, raw fish and meat that have been purchased at the market should be cooked immediately or, if you have a refrigerator, stored in the refrigerator. If you don't have a refrigerator, use all the fish or meat at once. If there are **best-before** or **use-by dates** on food packaging, make sure you consume that food completely before the given date.

**Column: Drinking water in Cambodia**

The World Health Organization (WHO) defines drinking water as including all water used in daily life, breaking this up into three levels. '**Improved drinking water sources**' comprise 'pipelined water on the premises' (from a household well, for example), while '**other improved drinking water sources**' comprise public wells and rainwater tanks, etc. All of these have lids to prevent contamination by fecal matter and are relatively hygienic, but they can still be contaminated with bacteria, so care is needed. '**Unimproved drinking water sources**' comprise sources that are not protected from the external environment and could be contaminated by fecal matter, etc. ([https://www.who.int/water\\_sanitation\\_health/monitoring/water.pdf](https://www.who.int/water_sanitation_health/monitoring/water.pdf)).

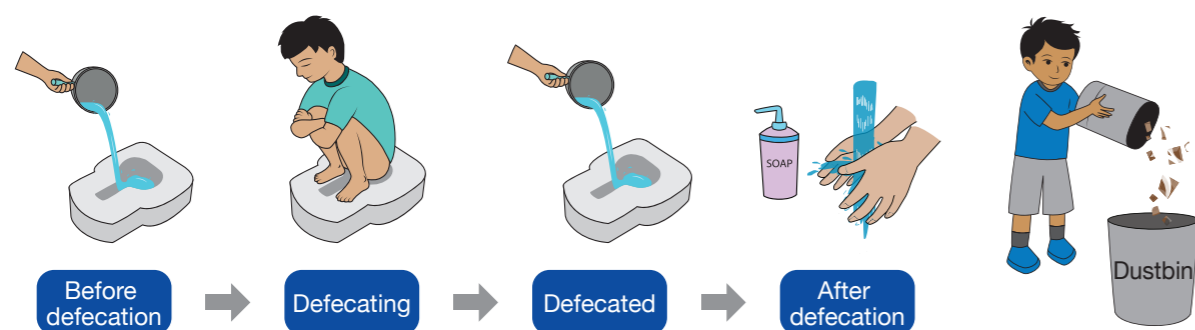
According to a study on the drinking water used by Cambodian children aged six to 36 months, more than 90 percent of city children use relatively hygienic water, including 34.8 percent who use bottled water and 58.1 percent who use piped water on the premises. In rural areas, however, the total was only around 30 percent, including 23.6 percent who use bottled water and 7.9 percent who use piped water on the premises. Around 40 percent of rural drinking water comes from unimproved drinking water sources, making securing safe and hygienic drinking water a key challenge in health protection (Poirot et al, "Water quality for young children in Cambodia: High contamination at collection and consumption level," *Maternal and Child Nutrition*, 2019; e12744. doi.org/10.1111/mcn.12744).

**Column: Best-before and use-by dates**

The food that you buy in stores only tastes good and can be consumed safely for a certain length of time. Food packaging and containers are usually marked with a best-before or use-by date. The **best-before date** is the date up to which, if the packaging or container around the food remains unopened, the food will taste good and have lost none of its quality. The **use-by date** is the date up to which, if the packaging or container around the food remains unopened, the food may have lost some of its quality and not taste as good but is still safe to eat. Food stored at high temperatures and humid conditions tends to spoil more quickly than the indicated date. Once the packaging or container has been opened, the product should be consumed as quickly as possible regardless of the date.

### 3) School hygiene

Because many people gather at schools, they can become places for disease transmission. Schools also need to provide a good learning environment to promote children's growth and development. Care therefore needs to be taken to ensure a clean and hygienic school environment. First, toilets must be used for all urination and defecation, and children must be taught to wash their hands with well-lathered soap after using the toilet (Figure 4.3). Classrooms must be kept clean and food debris and waste placed in waste bins, not left lying around.



**Figure 4.3** Hygienic behavior at school (left: how to use the toilet, right: placing waste in waste bins)

It is also important to make the classroom a good learning environment. Not only do classrooms need to be clean and free of waste but care also needs to be taken with the air quality (temperature, humidity, dust), brightness (natural light and artificial light), and noise levels (Figure 4.4). Natural and artificial light should be used to ensure that classroom brightness is right for learning, and the air in the classroom should be kept at a normal level by bringing in fresh air from outside and expelling stale air.



**Figure 4.4** How to keep classrooms healthy and hygienic

**Table 4.1** Examples of necessary conditions for the school environment in Cambodia

Category	Requirement	Example
Drinking Water	• All students have safe drinking water in schools.	All students have safe drinking water at least 500 ml per shift by bringing from home or from other sources.
Latrines and Urinals	• All students can use functional and clean latrines in both shifts.	The school has 1 latrine for boys and 1 latrine for girls.
Hand Washing Facilities	• All students can use hand-washing facilities with water and soap.	A basic hand washing facility is next to each latrine or/and classroom.
Environment and Safety	• All students participate in daily cleaning of school premises, classrooms, latrines and hand-washing facilities. • No waste in school premises and classrooms.	School has at least one waste bin per classroom and latrine, and they are used.

Created from *Minimum Requirement Guidelines on Water, Sanitation and Hygiene in Schools* (2016)<sup>4</sup>

Cambodia has set the target of having hygiene facilities installed in all schools to create a healthy and safe learning environment and enable children to practice desirable health behavior.<sup>2,3</sup> In 2016, the School Health Department created the **Minimum Requirement Guidelines on Water, Sanitation and Hygiene in Schools** (WinS) that stipulate necessary school conditions in relation to (a) drinking water, (b) toilets, (c) hand washing facilities, and (d) environment and safety (Table 4.1), as well as mechanisms for the improvement of hygiene facilities and for health and hygiene activities.<sup>4</sup>

In 2019, the School Health Policy was upgraded into a **National Policy on School Health**,<sup>5</sup> of which one of the strategies is to “strengthen the concepts of cleanliness, safety and good hygiene practice regularly in the workplace and in educational institutions.” In other words, in addition to creating mechanisms for health and hygiene activities and improving hygiene facilities, Cambodia has now reached a stage whose aim is to introduce clear standards for cleanliness, safety, and hygiene.

#### Column: School environmental hygiene in Japan

In Japan, the School Health and Safety Act requires **regular school environment hygiene inspections** based on the school environmental hygiene standards.<sup>6</sup> These regular inspections check whether schools are maintaining appropriate learning environments. For example, they measure carbon dioxide, temperature, relative humidity, floating dust, air flow, carbon monoxide, nitrogen dioxide, volatile organic compounds, mite allergens, illumination, glare, and noise levels. The inspections are conducted by experts or by teachers under the guidance of experts.

In addition to the inspections, there are also several items that must be checked daily (Table 4.2). Teachers can conduct these checks every day either visually or using simple instruments.

**Table 4.2** Examples of school environmental hygiene items subject to daily checks in Japan

	Item	Standard
Classroom environment	(1) Ventilation	(1) No irritants or foul odors are detected on entering the classroom from outside
		(2) Appropriate ventilation
	(2) Temperature	The classroom is at a temperature conducive to learning (in Japan, stipulated at 17°–28°C).
	(3) Brightness and glare	(1) Sufficient light to be able to clearly see letters and diagrams on blackboards and desktops
(2) No glare interfering with the visibility of blackboards, desktops, and surroundings		
(3) No light reflections on the blackboard		
(4) Noise	Students can easily hear what the teacher is teaching.	
School cleanliness, vermin, and insect pests	(5) School cleanliness	(1) School facilities and classroom equipment are clean and undamaged.
		(2) Sports grounds and sandpits are clean and free from waste and animal fecal matter.
		(3) Toilets and toilet facilities are clean, functional, and undamaged.
		(4) No mud or sand has built up in drainage ditches and their surrounds, and there are no foul odors.
		(5) Rubbish collection points, waste bins, and their surroundings are clean.
	(6) Vermin and insect pests	There are no mice, wild dogs or cockroaches inhabiting school buildings or school grounds.

Created from Ministry of Education, Culture, Sports, *Science and Technology*, *School Environmental Hygiene Management Manual*, 2018 revision<sup>6</sup>

## 4) Town and community hygiene

### (1) Waste disposal

In Cambodia, rapid socioeconomic development and the advance of the tourism industry have made waste disposal a huge social problem. Throwing waste on roads and into empty lots makes your town look ugly, and people are offended by the putrid smell. Not only that, discarded waste makes the living environment unhygienic. Piles of waste provide breeding grounds for mosquitoes, flies, and other insects harmful to human health, for example, as well as generating toxic gases, and when it rains, waste-clogged drainage ditches flood the town with dirty water. In rural areas, rain falling on piles of waste creates polluted water that then flows into farmland and pollutes the crops. Waste is not a problem created solely by Cambodians, but also by tourists visiting the country. At the same time, mountains of waste can also be a source of revenue supporting people’s lives in some poor regions and regions with little industry. We need to recognize that waste is a complex issue in which social development, environmental and ecosystem pollution, and people’s livelihoods and health are all interwoven.

To address the waste issue in daily life, it is important to start by learning about the necessity of waste separation and recycling, including setting up boxes and containers so that waste can be divided into recyclables, non-recyclables, and organic waste when it is thrown out. Ideally, social mechanisms will be developed for collecting and processing the separated waste.

If not dealt with, organic waste in particular becomes a breeding ground for flies, cockroaches, and other vector insects, so the waste must be disposed of hygienically. The elimination of cockroaches, mosquitoes, and other disease vectors carrying the pathogenic microbes that cause infectious diseases is just as important. For example, because dengue fever and malaria are transmitted by mosquitoes, the number of people affected increases during the rainy season. Certainly, people should take personal care of themselves to avoid mosquito bites, such as using insect repellent and mosquito nets. However, it is also important to create an environment that prevents mosquitoes from breeding, such as removing old tires, empty cans, and plastic bottles where water could collect and provide a home for mosquito larvae (see Chapter 7).

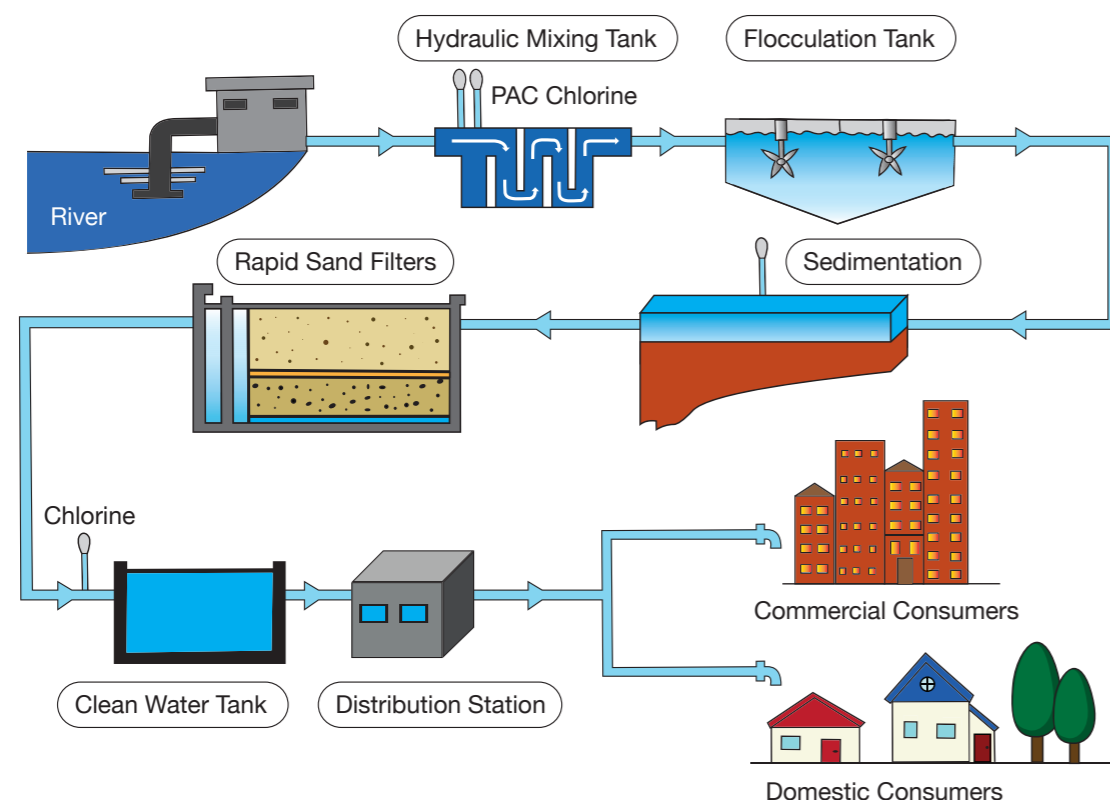
In addition to developing social mechanisms for waste disposal, reducing the amount of waste created in the first place will be critical for Cambodian society in addressing the waste problem.

### (2) Drinking water and wastewater treatment

The public facilities that supply potable water are called **waterworks**, while the facilities that purify rainwater and sewage (the generic term for human waste) and then release it into rivers and seas are called **sewers**. Waterworks send water to households and factories via (a) water tanks in which waste and sand is precipitated from water taken from rivers; (b) mixing tanks where microorganisms and air are mixed in thoroughly to have the water purified; (c) flocculation tanks which use chemicals to flocculate impurities; (d) sedimentation tanks that settle the suspended particles of impurities; (e) filter tanks that filter the impurities; and (f) reservoirs for adding chlorine and storing clean water). The water purification system at the Phnom Penh waterworks is shown in Figure 4.5.<sup>7</sup>

Ensuring safe drinking water and preventing infectious diseases require installing combined septic tanks and sewage systems to process town and community sewage. **Sewage** is the generic term for the

human waste from toilets as well as domestic wastewater from cooking and laundry, along with the industrial wastewater from business operations (stores, hotels, and workshops through to large factories). Waterworks are gradually being installed in Cambodia, starting with Phnom Penh and other cities. However, there are still few sewage systems, with sewage passing from septic tanks through drainage canals out into lakes and wetlands where it is purified by natural processes. Given the issues related to sewage treatment as shown in **Table 4.3**, Cambodia clearly needs to install combined septic tanks and sewers.<sup>8</sup>



**Figure 4.5** Water treatment process<sup>7</sup>

**Table 4.3** Sewage treatment issues in Cambodia<sup>8</sup>

- 1 Because septic tanks have not been installed, untreated sewage percolates underground or is released directly into drainage canals and rivers.
- 2 Even when septic tanks are installed, they have insufficient capacity.
- 3 Only human waste is treated in septic tanks, with domestic wastewater directly released to the environment.
- 4 Septic tank sludge is not properly scooped up, so septic tank treatment efficiency is low.
- 5 Households along rivers and waterways release their sewage directly into the water.

## 2. Tips for creating a clean and hygienic personal environment

### 1) Preventing food poisoning

To prevent food poisoning, hygiene needs to be maintained at each stage of consumption, from buying and storing food to preparing and cooking it, eating it, and storing the leftovers. Key points in relation to each of these are shown in **Figure 4.6**. First, when buying food (**point 1**), choose fresh ingredients, check the use-before dates (see **Column: Best-before and use-by dates**), and get your groceries home as quickly as possible. Store raw fish and meat and perishable ingredients in the refrigerator (**point 2**), if one is available, to protect the food from perishing or being contaminated by flies. At the preparation stage (**point 3**), don't use the same chopping board and knife that you used for raw fish and meat for your vegetables, wash your cooking implements thoroughly afterwards, and wash your hands after handling raw fish and meat. Avoid undercooking by heating food to the point that it reaches a sufficient temperature even right in the middle (**point 4**). Wash your hands before eating and use clean tableware (**point 5**). Store remaining food and ingredients in the refrigerator and throw out old food (**point 6**).



**Figure 4.6** Actions to prevent food poisoning

### 2) Cleaning

Tidying and cleaning your environment contributes to safe and healthy living by helping to prevent infectious diseases and allergies as well as injuries from falling. Engage in cleaning activities, including using a dustpan, broom, or vacuum cleaner to remove dust from floors, wiping desks with a cloth, and putting the accumulated waste in waste bins (**Figure 4.7**). Particularly when infectious diseases are going around, use **disinfectants** to sterilize surfaces that many people touch (**Figure 4.8**) and engage in cleaning activities to **block infection routes** (for more on infection routes, see **Chapter 7**).



Figure 4.7 Classroom cleaning



Figure 4.8 Examples of disinfectants

**Column: Disinfectants by efficacy**

There are many types of disinfectant with varying efficacies, so the right disinfectant needs to be used for the right job. **Ethanol** is used to sterilize fingers and objects such as doorknobs and tables. However, there are some viruses on which ethanol has little effect unless it is very concentrated. It also has no sterilizing effect on spores, which are the special cellular structures that form when some microbes are placed in an environment in which they cannot reproduce. Spores are highly resistant to heat, desiccation, and drugs, and cannot be sterilized using ethanol.

**Sodium hypochlorite** is usually found in bleach and has powerful disinfecting properties. Unlike ethanol, it should not be used on the skin, but it can be used to soak clothes and dishes or applied directly to vomit for sterilization (see also Chapter 15). Check the product label for the appropriate concentration. For skin applications, people who are allergic to alcohol can use povidone iodine (isodine) instead. **Povidone iodine** is sometimes used to sterilize wounds and injection sites. It can also work on spores given a long disinfection period. The area of skin to which it is applied will turn brown, but this will wash off with water.

### 3. Good hygiene practices

#### 1) Effective handwashing technique

Influenza and many other infectious diseases can be spread by human fingers, so **making it a habit to wash your hands effectively** using water and well-lathered soap increases the chances of preventing infectious disease. The specific method (Figure 4.9) is to wash hands with running water, pick up the soap and lather it well, and then wash your hands for around 30 seconds in the following order: palms, palm side of fingers, back of hands, back of fingers, between fingers right down to the base, thumbs and cushion at the base of thumbs, fingertips, and wrists. Then rinse thoroughly with running water to wash off the soap. After washing your hands, wipe and dry your hands using a clean towel or paper towel. Please do not use a shared or dirty towel, as the effect of hand washing can be lost as a result. Disinfecting your hands with alcohol once you have wiped away the water is also effective. Washing your hands with soap using the correct method increases the chance of eliminating bacteria and viruses (Table 4.4).<sup>9</sup>

The **coronavirus** (SARS-CoV-2), and infectious disease caused by them (**COVID-19**) has been sweeping the world since January 2020, and effective treatments and vaccines to increase immunity against the virus are still in development. The virus is transmitted via droplets and fingers, so it is vital to follow **cough etiquette** when coughing, and to wash your hands carefully and thoroughly for at least 30 seconds. Cough etiquette means using your sleeve, a tissue, a handkerchief, or a mask to cover your nose and mouth when coughing or sneezing to avoid spreading the virus to others (Figure 4.10).

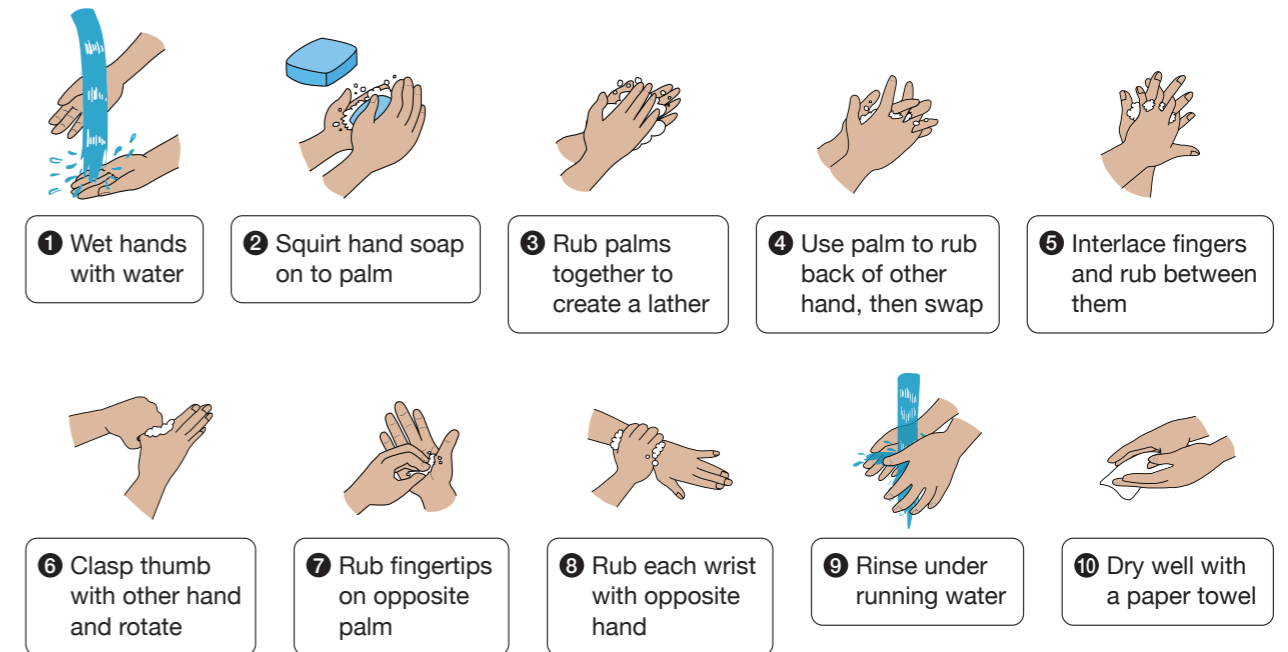


Figure 4.9 Washing hands with soap

Table 4.4 Effect of handwashing by duration and no. of times

Handwashing method	No. of viral flora remaining (survival rate)
No handwashing	Approx. 1,000,000
Wash 15 seconds under running water	Approx. 10,000 (approx. 1%)
Rub with hand soap for 10 seconds, then rinse under running water for 15 seconds	Several hundreds (approx. 0.01%)
Rub with hand soap for 30 seconds, then rinse under running water for 15 seconds	Several hundreds (approx. 0.01%)
Rub with hand soap for 60 seconds, then rinse under running water for 15 seconds	Several dozen (approx. 0.001%)
Rub with hand soap for 10 seconds, rinse under running water for 15 seconds, then repeat	Several (approx. 0.0001%)



Figure 4.10 Cough etiquette

### Exercises for further thought and research

[4-1] Try an experiment on effective handwashing.

You will need: Starch, iodine solution (or another disinfectant containing iodine), basin.

Method (Figure 4.11):

- (1) Rub the starch over your hands and wrists like hand cream.
- (2) Let it dry.
- (3) Wash and dry your hands using your usual method.
- (4) Place the iodine solution in the basin and soak your hands into it.
- (5) The iodine solution will react with any remaining starch by turning purple.
- (6) Discuss those areas easily missed when washing your hands.



Figure 4.11 Experiment on effective handwashing

- [4-2] Identify an unhygienic environment close at hand and discuss in groups how it could be improved.
- [4-3] Identify unclean or unhygienic actions by people around you and discuss in groups how those actions could be changed.
- [4-4] Discuss in groups problems related to using and cleaning school toilets and cleaning classrooms and school grounds, as well as possible solutions to these problems.
- [4-5] Research waste treatment problems in developing countries and discuss why these problems are occurring and what impact they are having on the environment and on people's lives and health from the perspectives of social development, the environment and ecosystems, and people's lives

and health. Draw a diagram of how these elements are related.

- [4-6] Discuss your experiences of food poisoning and think about how they could have been prevented.
- [4-7] Discuss how to ensure that there is always soap in school bathrooms when schools have such tight budgets.

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