

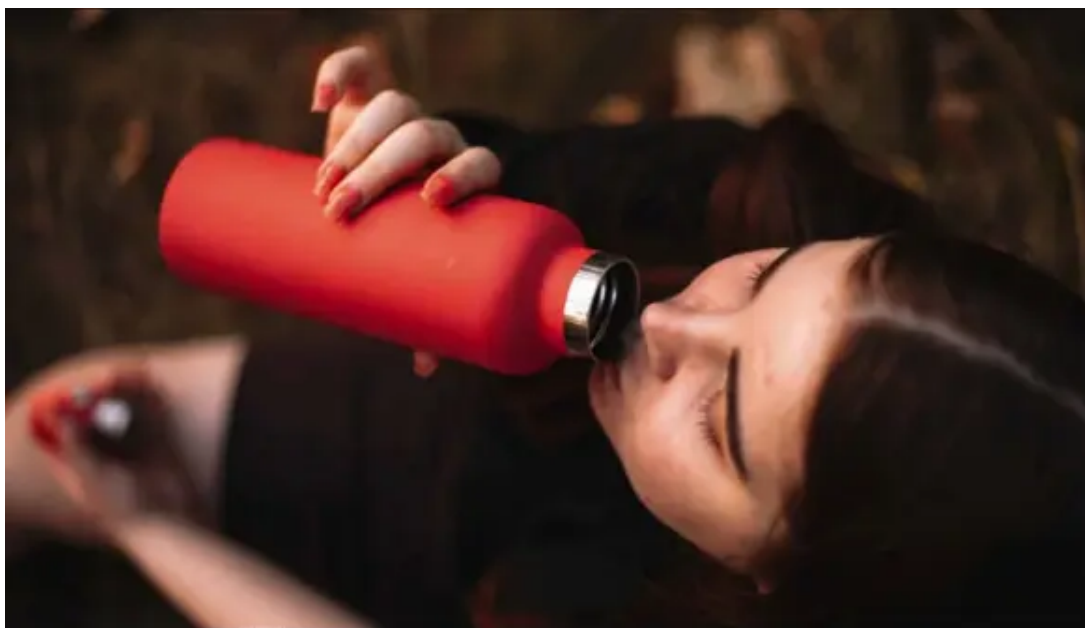
- Drinking water / Bacteria

WATER BOTTLES: HOW SAVING THE PLANET COULD MAKE YOU SICK

Reusable water bottles reduce waste from single-use plastic, but without regular cleaning become havens for bacteria

BBC Science Focus · 22 Feb 2024 · 34 · By DR PRIMROSE FREESTONE Primrose is an associate professor in clinical microbiology based at the University of Leicester.

Take a walk around any local park, office or city centre and there's a good chance you'll see a number of people drinking from reusable water bottles.



They've become something of a fashion accessory, as well as a means to help us meet the NHS health recommendations of drinking 6-8 glasses of water per day and reduce our environmental footprint by cutting down on the need for single-use plastic bottles.

But, while using a water bottle might be a noble, health-improving and planet-protecting act, the bottles may be carrying a hidden risk. Research carried out by US water filtration company Water Filter Guru has shown that if you don't regularly wash your water bottle thoroughly, bacteria and moulds can build up – both on the inside and outside – that, if swallowed, have the potential to make you very ill.

Water, even from a kitchen tap, isn't usually sterile, and bacteria begins growing naturally in all non-carbonated waters only a few days after a bottle is filled. The longer that water is stored in a bottle at room temperature, the more bacteria will grow. (Refrigerating filled water bottles can help limit microbial numbers, however.)

Some of a water bottle's microbes will come from the water itself, but mostly they come from the person drinking from it. Our bodies are naturally covered with millions of microbes (microflora), including the insides of our mouths.

Microbes found inside a typical water bottle unsurprisingly include skin and oral microbes, such as Staphylococcus and Streptococcus. Although these bacteria are normally part of the human microflora, they can cause skin and respiratory infections.

The bottle will also contain microbes present in the environment around it, which could be of a huge variety. While they might land on the exterior of your bottle initially, they may later find

their way onto the interior after being transferred by you. And each time you drink from the bottle you'll be adding bacteria from your mouth, which is home to millions of microbial cells. If you don't wash your hands after going to the toilet, bacteria that typically live in your intestines, such as *Escherichia coli* (*E. coli*) may also make their way onto, and into, your bottle.

The WaterFilterGuru study, mentioned above, found that the levels of intestinal bacteria, such as *E. coli*, found in a typical water bottle were similar to those found on toilet seats.

Drinking water that's been contaminated this way can harm your health, causing diarrhoea and vomiting, and, if moulds are present, possibly allergies. Pregnant women, the very young, the elderly or those who are immuno-compromised are most at risk of becoming ill from drinking water contaminants.

The type of drink you keep in your bottle also has a major effect on what grows inside it. Drinks that nourish you also nourish microbes, so it's best to avoid filling your bottle with anything other than water. Fluids to particularly avoid include protein shakes, energy drinks, fruit juices or anything containing sugar, as this can stimulate the growth of any bacteria or mould present. "The levels of intestinal bacteria, such as *E. coli*, found in the typical water bottle were similar to those found on toilet seats"

Interestingly, carbonated (fizzy or sparkling) water tends to be antimicrobial. Research has found that adding carbon dioxide to bottled water inhibits the growth of water-associated pathogens, such as *E. coli* and *Pseudomonas aeruginosa* – both of which can cause nasty infections in humans. Even bottles filled with carbonated water still need to be cleaned regularly, however, to prevent bacteria from building up on the interior surfaces.

Although your bottle may be reusable, it doesn't maintain its own hygiene. This means that you can't refill and reuse the bottle without cleaning it.

If you don't wash out your water bottle regularly, any bacteria and moulds that may be present will grow and contaminate whatever liquid you put in it. Then, when you next drink from your bottle, you may notice an odd taste or texture due to the waste products released by the growing microbes.

It's therefore important that you regularly clean your bottle, just as you would any other item you use that comes into contact with anything you eat or drink, such as saucepans, crockery and cutlery.

Cleaning your water bottle is necessary, but, thankfully, straightforward. Use hot water (over 60°C/140°F, as this temperature kills most pathogens), add washing-up liquid, swirl it around for a few seconds, then leave it for ten minutes. Afterwards, rinse it with hot water and allow it to dry – overnight is best, as thorough drying will also help to protect against the growth of microbes.

For more heavy contamination (after a long period of use without washing), use a half vinegar/half water mixture and soak the bottle for several days. Then clean it using the method outlined above.

To avoid getting ill from your water bottle, you should ideally clean it with detergent after each use, or at least several times a week. It's also important to clean any lids or attachments, such as straws, as these can also harbour microbes.

There's no need to be alarmed, however. Humans have a very powerful immune system, which protects us against all kinds of infections that evolved when we lived in much less hygienic conditions, rarely washed our hands and drank dirty water.