

Should fluoride still be in our water? Yes, here's why

The mineral is a key defence against tooth decay, which remains a big problem.

Sharon Tan and Felicia Sundram

There has been growing concern about the presence of fluoride in drinking water, particularly after a study was published in the *Journal of the American Medical Association Paediatrics* early last month. The study, a meta-analysis of several others conducted around the world, suggested a possible link between higher fluoride levels in water and lower IQ scores in children.

At this point, it is important to understand the facts and dispel some myths surrounding the issue.

It is critical to note that the studies included in the meta-analysis were focused on regions where the fluoride concentrations in drinking water were significantly higher than the levels used in places like Singapore.

Specifically, the study in the journal found a correlation between fluoride exposure and IQ scores only in areas where the fluoride concentration was above 1.5 milligrams (mg) per litre. This is considerably higher than the levels recommended by global

health authorities. For example, the World Health Organisation (WHO) recommends a maximum fluoride concentration of 1.5mg per litre, while the Public Health Service of the United States recommends a concentration of 0.7mg per litre.

In Singapore, the fluoride concentration in tap water is well below these levels, at around 0.5mg per litre. In fact, national water agency PUB reports that fluoride levels ranged from 0.2mg to 0.56mg per litre between July 2023 and June 2024, an amount much lower than that mentioned in the studies cited in the journal.

WHY DO WE NEED FLUORIDE?

A naturally occurring mineral, fluoride has long been recognised for its ability to help prevent tooth decay. The discovery of its dental benefits dates back to the early 1900s when scientists noticed that people living in areas with naturally fluoridated water had fewer cavities.

Fluoride helps in the prevention of tooth decay in three ways:

- By strengthening enamel: Fluoride helps to convert the mineral structure of tooth enamel from hydroxyapatite to a

more durable form called fluoroapatite. This structure is significantly more resistant to acid attacks from bacteria in the mouth.

- By remineralisation: Fluoride is beneficial in reversing early stages of tooth decay. It aids in the process of remineralisation, where minerals are restored to weakened enamel before deeper cavities can form.
- By bacteria inhibition: Fluoride inhibits the growth and activity of the bacteria that cause tooth decay, reducing the production of harmful acids that damage the enamel.

But given that tooth decay is less common than before, some have questioned the need for fluoride. The fact, however, is that tooth decay remains a big problem. The 2019 National Adult Oral Health Survey found that 34.8 per cent of adults in Singapore still have untreated decay and nearly one in two children experience decay by primary school.

Tooth decay is not merely a cosmetic issue. It can result in pain and infections, potentially impacting the development of teeth and jaws, as well as long-term health problems. In children and adults, severe decay often requires complex and costly treatments involving surgery, sedation and/or general anaesthesia.

Fluoride is an affordable and

effective way to prevent these conditions and denying access to water fluoridation, especially to vulnerable groups, can result in significant social and economic costs.

FLUORIDATED TOOTHPASTE

With the widespread use of fluoridated toothpaste since the 1970s, many have argued that additional fluoride in drinking water may no longer be necessary. It is true that the use of fluoride toothpaste has significantly reduced rates of tooth decay worldwide, but not for a significant number of people who do not maintain good oral hygiene or have access to oral health care.

For example, young children and elderly individuals with reduced hand dexterity, as well as people with special care needs, may struggle with basic tooth brushing. For parents, trying to get a young child to cooperate with brushing their teeth is an all-too-familiar challenge.

Without proper brushing, fluoride toothpaste alone may not be enough to protect against cavities.

Moreover, modern diets, which often contain processed foods and high levels of sugar, continue to fuel tooth decay. The bacteria in our mouths feed on sugars, producing acids that erode tooth enamel. The risk of tooth decay increases with frequent and

prolonged exposure to sugar and brushing once or twice a day may not fully combat this risk, particularly for individuals who are more susceptible to tooth decay. For individuals with a higher risk of tooth decay, additional fluoride preparations in direct contact with the teeth, such as varnishes, gels or rinses, may be recommended by oral health professionals.

Additionally, it is prudent to be aware of and adhere to the recommended amounts of fluoridated toothpaste to be used when brushing teeth, especially for young children who are more likely to ingest toothpaste.

Research has shown that water fluoridation and topical fluoride applications work together with fluoride toothpaste to provide additional protection against tooth decay.

In places like the US state of Alaska, Calgary in Canada, and south-west Scotland, where water fluoridation was removed, tooth decay rates increased as a result. This underscores the fact that water fluoridation remains a vital tool in the fight against dental decay, even in an era where toothpaste is widely used.

HOW MUCH IS TOO MUCH?

When it comes to fluoride, as with many things in life, the Goldilocks principle applies: Too little is ineffective, but too much

can be harmful. Excessive fluoride exposure can lead to dental fluorosis (discolouration of the teeth) or, in extreme cases, skeletal fluorosis (damage to bones and joints). Fortunately, the authorities in Singapore carefully monitor and regulate fluoride levels to ensure they remain within safe and effective limits.

Singapore was the first in Asia to introduce universal water fluoridation, and fluoride levels in the tap water have been carefully adjusted over the years based on scientific research and local needs.

When water fluoridation was first introduced in 1957, the concentration was set at 0.7mg per litre, then lowered to 0.6mg per litre in 1992, and finally to the current level of 0.5mg per litre in 2008. These adjustments take into account fluoride intake from other sources such as toothpaste, tea, coffee and dietary supplements.

In the final analysis, fluoride is a key tool in protecting dental health, but it is not the only one. Good oral hygiene habits, like daily brushing and flossing, limiting the intake of sugary foods, avoiding smoking and going for regular dental check-ups, are just as crucial. Ultimately, only a comprehensive approach which includes the use of fluoride can ensure strong, healthy teeth for life.

• Dr Sharon Tan and Dr Felicia Sundram are chairpersons of the Singapore Dental Association's Dental Public Health Committee. Dr Tan is also a research fellow at the NUS Saw Swee Hock School of Public Health.