



Water Fluoridation in Scotland

Improving Oral Health

Introduction

Water fluoridation, also known as community water fluoridation, is adjusting the natural level of fluoride in public water supplies to achieve the optimum for preventing tooth decay. Fluoride is a naturally occurring mineral found in almost all water, and it has been shown to help strengthen tooth enamel and reduce the pain, misery, disruption, disfigurement and costs caused by dental cavities. Adding fluoride to drinking water is a World-wide public health measure intended to improve overall dental health in a community.

The issue is famous in Scottish legal history when, in 2012, Catherine McColl won a civil action that Strathclyde Regional Council had exceeded its legal powers in its plan to put fluoride in residents' water. However, this case was decided on the narrow test of legal powers. Lord Jauncey, the judge in the case, rejected all the medical arguments against it.

In this paper, we explain the process of water fluoridation and why it would improve children's oral health. This includes examining the case against before concluding how the issue might be progressed.

Background

On 23 September 2021, the four UK Chief Medical Officers (CMOs) stated, *'There is strong scientific evidence that water fluoridation is an effective public health intervention for reducing the prevalence of tooth decay and improving dental health equality across the UK.'*

Despite this call, in Scotland, no public drinking water supply is currently fluoridated, and naturally occurring fluoride, in general, is less than 0.1 mg/l. The initiative for fluoridation lies with local NHS health boards. They have to undertake a full public consultation exercise before applying to Scottish Water to add fluoride to the water supply. The 2018 Scottish Oral Health Improvement Plan recognised the benefits of fluoridation but despite claiming there were more achievable alternativesⁱⁱ. Five years later, these have not been published. Last year, NHS Greater Glasgow and Clyde (NHSGGC) were reported as actively considering water fluoridation, although they argued that this is best done on a Scotland levelⁱⁱⁱ. Scottish Water confirmed in 2022 that it has received no contact from NHS Greater Glasgow & Clyde regarding the subject of fluoridation of the public water supply in the area.^{iv}

The optimal level of fluoride in drinking water in the UK is one part per million (ppm), although this can vary around the World. This concentration is safe and effective in reducing tooth decay while minimising the risk of dental fluorosis, a minor cosmetic issue that can occur when people are exposed to excessive fluoride during tooth development. The British Fluoridation Society have a range of resources that explain why water fluoridation is positive for dental health and how it is undertaken.^v



Water fluoridation involves carefully monitoring and adjusting the fluoride levels in public water supplies to ensure it remains within the recommended range. Many countries,

including the United States, Canada, Australia, New Zealand, the Republic of Ireland and England, have implemented water fluoridation programs as a cost-effective and accessible way to improve oral health in their populations.

While water fluoridation is considered safe and effective in reducing tooth decay, ongoing debates and discussions about its benefits, potential risks, and ethical considerations exist. Some individuals and groups have concerns about issues such as consent, possible side effects, and the broader debate over mass medication. Public health authorities closely regulate and monitor water fluoridation to ensure it remains within established safety guidelines.

Children’s Dental Health in Scotland

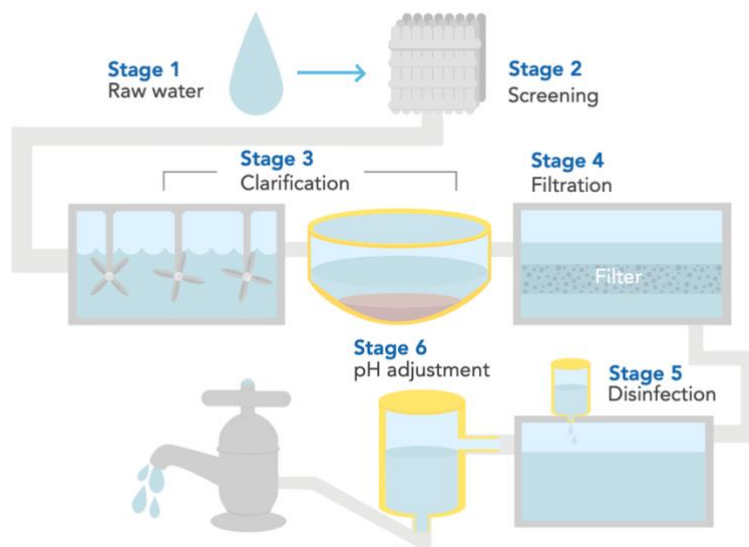
In 2022, 73% of Primary 1 children in Scotland were found to have no obvious decay experience in their primary teeth. While this is a significant improvement since 2003 (45%), it still leaves many young children with dental decay.

Dental disease inequalities persist, with children from the most socio-economically deprived backgrounds having the highest levels of decay experience. In 2020, the percentage of P1 children with no obvious decay experience ranged from 58.1% for children in the most deprived quintile (SIMD1) to 86.9% for those in the least deprived quintile (SIMD5). The absolute inequality between SIMD1 and SIMD5 was 28.8 percentage points in 2020.^{vi}

How is water fluoridation delivered?

The process would be managed in Scotland by our public water service administered by Scottish Water, a public corporation accountable to Scottish Ministers. Our water is already treated using several processes to ensure that the water supplied to the public is safe to drink. These include adding chemicals to disinfect the water.^{vii}

Fluoride is added to drinking water in a controlled and regulated manner as part of the water treatment process that all our water goes through. The addition of fluoride to water is carried out as follows:



- Selection of fluoride compound: Water treatment facilities usually use sodium fluorosilicate (Na_2SiF_6), or fluorosilicic acid (H_2SiF_6) as the source of fluoride.
- Dilution: The chosen fluoride compound is carefully diluted to the appropriate concentration. The concentration at which fluoride is added to drinking water one part per million (ppm). This is safe and effective in preventing tooth decay while minimising the risk of dental fluorosis (a cosmetic issue with teeth caused by excessive fluoride exposure).
- Mixing: The fluoride is thoroughly mixed with the treated drinking water to ensure an even distribution of fluoride.

- **Monitoring:** Water treatment facilities closely monitor the fluoride levels to maintain the desired concentration. This ensures that the fluoride levels remain safe and effective.
- **Distribution:** The fluoridated water is distributed through the water supply system and made available to consumers for drinking, cooking, and other domestic uses.

The case for and against fluoridation

Water fluoridation can be a contentious issue. Proponents argue that it can significantly benefit dental health, while opponents raise concerns about potential health risks and ethical considerations. Here's an overview of the case for water fluoridation in Scotland and a response to the concerns raised:

The case for water fluoridation in Scotland:

- **Dental Health Improvement:** Water fluoridation is an effective and cost-efficient way to improve dental health, especially in areas with high rates of tooth decay. Fluoride strengthens tooth enamel and reduce the pain, misery, disruption, disfigurement and costs of cavities.
- **Reduced Health Inequalities:** Water fluoridation can help reduce dental health inequalities. Those who benefit most are often people from lower socioeconomic backgrounds who may have limited access to dental care and healthier diets.
- **Public Health Approach:** Water fluoridation is considered a public health intervention, similar to seat-belt legislation or vaccination, that benefits the entire population regardless of age, income, or access to dental services.
- **Strong Scientific Consensus:** Many public health organisations, such as the World Health Organization (WHO) and the Centers for Disease Control and Prevention (CDC), support water fluoridation as a safe and effective practice.
- Not only is fluoridation effective at reducing pain, misery, disruption, disfigurement, it can cut NHS costs. For every £1 spent on fluoridation, particularly in deprived areas, it can secure over £12 savings after five years, rising to nearly £22 after ten years^{viii}.
- Public opinion in Scotland gauged through a random on-street representative survey, remains strongly in favour of community water fluoridation. It found that for those who gave an opinion, 88% favoured adding fluoride to water to reduce tooth decay, with 12% stating that they did not favour water fluoridation.^{ix}

A systematic review of nine studies with 2,731 child participants found that previous water fluoridation caused reductions in caries prevalence among the Scottish child population. The cost of dental treatment also decreased, always favouring the fluoridated groups.^x

The case against water fluoridation in Scotland and responses:

- **Ethical Concerns:** Critics argue that fluoridation infringes an individual's freedom. They claim that individuals should have a choice in whether or not to ingest fluoride, even though all water already contains fluoride and no one has an individual right to demand changes to their water supply. A further ethical concern is that if an individual blocks fluoridation they are denying a large proportion of Scottish children freedom from the pain, misery, disruption, disfigurement and costs of dental decay.
- **Health Concerns:** Despite extensive research there are no health risks associated with water fluoridation. Issues such as skeletal fluorosis (a severe condition affecting bones), and possible links to other health issues, such as cancer, neurodevelopmental disorders, HIV and genetic problems,

none have been found when properly researched. Dental fluorosis is a mild cosmetic condition of no health relevance.

- Environmental Impact: Some argue that water fluoridation can have negative environmental consequences in aquatic ecosystems. However, sea water already has 1.2ppm fluoride.
- Alternative Solutions: Critics contend that there are alternative methods for promoting dental health, such as education, increasing access to dental care, and dietary improvements, which do not involve adding fluoride to the water supply. These are all complementary to water fluoridation and Scotland should use all of these methods for the benefit of dental health.

The debate over water fluoridation continues in Scotland, as in many other parts of the World. Whether to implement water fluoridation is a complex process that involves weighing the benefits to dental health against the unfounded concerns related to health, ethics, and the environment. Public opinion, scientific evidence, and government policies all play significant roles in shaping the approach to water fluoridation in a given area.

Conclusion

SHA Scotland agrees with the Chief Medical Officers statement and argues that Fluoridation is an important additional dental public health intervention for tackling the health inequalities associated with tooth decay. It is complementary to the Scottish Childsmile programme and should be integrated into that programme. Given the likely level of public debate and the potential for misinformation, there is also a need for non-partisan political and strategic public health leadership both at local and national levels, as was found with other successful Public Health approaches such as banning smoking in public places and the early adoption of minimum alcohol unit pricing in Scotland.^{xi}

This paper is published by SHA Scotland, a campaigning organisation that promotes health and wellbeing and eradicates inequalities through the application of socialist principles to society and government. We believe that these objectives can best be achieved through collective rather than individual action. Therefore, we campaign for an integrated healthcare system that reduces inequalities in health and is accountable to the communities it serves.

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ⁱ Department of Health and Social Care, *Water fluoridation: statement from the UK Chief Medical Officers*, (2021), <https://www.gov.uk/government/publications/water-fluoridation-statement-from-the-uk-chief-medical-officers>

ⁱⁱ Scottish Government, *Oral Health Improvement Plan*, (2018), <https://www.gov.scot/publications/oral-health-improvement-plan/>

ⁱⁱⁱ STV News: *Fluoride could be added to tap water used by more than a million Scots*, (6 April, 2022), <https://news.stv.tv/west-central/fluoride-could-be-added-to-tap-water-used-by-more-than-a-million-scots>

^{iv} FoI request to Scottish Water, August 2022, <https://www.whatdotheyknow.com/request/fluoridation>

^v BFS, <https://bfsweb.org/home/introduction-to-fluoride-in-water/>

^{vi} ScotPHO, Oral Health: Key points, <https://www.scotpho.org.uk/health-conditions/oral-health/key-points/>

^{vii} Scottish Water, *Water treatment process*, <https://www.scottishwater.co.uk/-/media/ScottishWater/Document-Hub/Careers-and-Education/All-About-Water/110918NewWaterTreatmentDiagram.pdf>

^{viii} *Fluoride in water in Scotland would save NHS a fortune, says dental expert*, (BBC, 6 April 2022) <https://www.bbc.co.uk/news/uk-scotland-glasgow-west-61010060>

^{ix} Jones, Lowry and Brophy, Public attitudes to water fluoridation in Scotland, (BDJ, Aug. 2022), <https://pubmed.ncbi.nlm.nih.gov/35931752/>

^x Al Rasheed, Water fluoridation for dental caries prevention in Scotland: a systematic review, (University of Dundee, 2022), https://doi.org/10.1922/CDH_BASCD22_Abstract16

^{xi} Colwyn Jones, *Water Fluoridation in Scotland?*, (BDJ, 233, 2022), <https://www.nature.com/articles/s41415-022-4560-8>