

# The Controversy Surrounding Fluoride in Water and its Health Effects, Practices, and Opposition

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**Abstract-** Water pollution is a pressing global issue, with various comical constituents in water bodies playing a significant role in public health. Fluoride's impact on health is a central aspect of this debate. On one hand, fluoride plays a crucial role in dental health. It strengthens tooth enamel and is known to reduce tooth decay and cavities, making it a valuable tool in public health dentistry. Water fluoridation, a common practice, has been credited with improving dental health, particularly in communities with limited access to dental care. However, the controversy arises from the difficulty in controlling the dosage of fluoride individuals receive through water fluoridation. Critics worry about potential health risks associated with excessive fluoride consumption, particularly in vulnerable populations like children. Skeletal fluorosis and dental fluorosis, conditions caused by excessive fluoride exposure, have raised concerns about the long-term impact of water fluoridation on public health. Water municipalities follow common practices in their efforts to balance the potential benefits and risks of water fluoridation. They typically aim to maintain fluoride concentrations within recommended ranges, as advised by health organizations like the World Health Organization and the American Dental Association. Common methods for adding fluoride include fluorosilicic acid and sodium fluoride, both approved for water fluoridation. Among these constituents, fluoride stands out as being an essential element for preserving and maintaining human health. As discussed in lecture, fluoride is important for various water supplies and products for human consumption. However, through research, fluoride in drinking water has been the subject of controversy for many years. The controversy surrounding fluoride in water primarily stems from concerns related to safety, ethics, and individual choice. In this analysis, I will delve into the contentious topic of fluoride in water, exploring why it is controversial, the potential health effects, common practices for water municipalities, and the actions taken by some corporations to being against adding fluoride to products. Despite common practices, some water municipalities have taken actions against adding fluoride to their water supplies. This includes holding referendums to allow communities to decide on water fluoridation and even implementing bans on the practice in response to concerns raised by activities and residents.

## I. FLUORIDE: A CONTROVERSIAL TOPIC

Fluoride in a water supply is a contentious issue due to a complex web of factors surrounding its potential health benefits and risks, ethical concerns, and questions regarding

individual choice. Understanding the controversy necessitates a closer examination of both the positive and negative health effects associated with fluoride and why its presence in drinking water can trigger intense debate. On the positive side, fluoride offers significant advantages for dental health. Its primary benefit lies in its capacity to strengthen tooth enamel and combat tooth decay and cavities. When teeth are exposed to fluoride, they become more resilient to acid attacks from oral bacteria and sugars, which is essential in preventing dental caries. This reduction in dental caries can avert pain, tooth loss, and various oral health problems. Moreover, water fluoridation, as a public health measure, has exhibited considerable success in diminishing dental caries rates across communities, benefiting individuals of all ages and socioeconomic backgrounds. However, the controversy arises due to several factors. One key concern revolves around the ethics of mass medication. Critics argue that fluoridating public water supplies entails adding a substance to the water that individuals are compelled to consume without their explicit consent, raising significant ethical questions about medical autonomy and individual choice. The involuntary nature of water fluoridation leads to a fundamental debate over whether such a public health intervention is justified when it affects an entire population without their informed consent. Through research, I have explored how critics have argued that the fluoridation of water could lead to various adverse health effects, such as dental fluorosis. Dental fluorosis, which is a cosmetic issue affecting teeth and skeletal fluorosis is a more severe condition impacting the bones (Niazi et al., 2023). They both raise questions about the appropriate levels of fluoride exposure, especially in vulnerable populations like children and individuals with kidney problems. The potential for dental fluorosis, characterized by discoloration and pitting of the teeth, is a significant concern. Additionally, many critics have argued that the optimal level of fluoride for preventing tooth decay, which is around 0.7 milligrams per liter, is dangerously close to the threshold for dental fluorosis, which begins at 0.8 ppm. Another aspect of the controversy relates to potential health risks associated with fluoride consumption. While fluoride at the recommended levels can enhance dental health, excessive exposure can lead to adverse effects.

Dental fluorosis, characterized by cosmetic dental discoloration, and skeletal fluorosis, a more severe condition affecting bones and joints, are possible outcomes of excessive fluoride intake. This raises concerns about the potential risks, especially for vulnerable populations such as children, who may

be more susceptible to these adverse effects due to their lower body weight and developing teeth and bones.

The ethical dimensions of the controversy centers on mass medications without individual consent (Solanki et al., 2022). Critics argue that mandating fluoride in public water supplies infringes upon personal freedom and autonomy, as individuals should have the right to make choices about their healthcare, including dental treatments. Skeletal fluorosis, although rare in regions with water fluoridation programs, is a severe condition that affects bone health and mobility. The ethical dimension of the controversy centers on mass medication without individual consent. Critics argue that mandating fluoride in public water supplies infringes upon personal freedom and autonomy, as individuals should have the right to make choices about their healthcare, including dental treatments. Fluoride has both positive and negative health effects, depending on the dose and duration of exposure. According to Dr. Solanki and Dr. Agarwali, excessive fluoride intake can lead to higher risk for younger children who consume excessive amounts of fluoride, such as toothpaste and mouthwash (Solanki et al., 2022). Furthermore, there is a challenge in controlling the dosage of fluoride individuals receive through water fluoridation. The amount of fluoride ingested depends on an individual's water consumption, and it can be difficult to regulate or adjust the dosage for each person. Critics argue that this lack of control over individual fluoride exposure further compounds the health risks and ethical concerns associated with water fluoridation.

On the other hand, the controversy surrounding water fluoridation primarily stems from concerns regarding individual rights, consent, and the ethics of mass medication. Critics argue that adding fluoride to public water infringes upon individuals' autonomy and their right to informed consent (Douglass & Josipura, et al., 2006). The argument is that people should have the freedom to choose whether to use fluoride-based dental products or receive fluoride treatments from their dentists rather than having it forced upon them through their water supply. Another focal point of the controversy is the potential for overexposure to fluoride when considering all sources of fluoride intake. While water fluoridation is intended to reach a broad population, individuals may also use fluoride-containing dental products and consume foods and beverages that contain naturally occurring fluoride.

#### Common Practices for Water Municipalities

Water fluoridation is a widely adopted practice among water municipalities, aimed at improving dental health in communities. First and foremost, water municipalities adhere to regulations and guidelines established by health authorities to determine the appropriate fluoride concentration in drinking water. For instance, in the United States, the Environmental Protection Agency (EPA) sets a maximum allowable fluoride concentration in drinking water. These regulations are based on extensive research and are designed to ensure a balance between the dental health benefits of fluoride and its potential risks. Essentially, the U.S. Environmental Protection Agency (EPA) sets a maximum allowable fluoride concentration of 4.0 milligrams per liter (mg/L) in drinking water, with a recommended range of 0.7 to 1.2 mg/L (U.S. EPA, et al., 2023). Despite the controversy, water fluoridation remains a common practice in many municipalities worldwide, including Australia.

The first community water fluoridation program in Australia was initiated in 1953, with a subsequent expansion to recover the majority of the population. Water fluoridation is viewed as a cost-effective public health intervention, being especially beneficial in rural and low-income areas where access to dental care may be limited (Armfield et al., 2010).

Some communities have chosen to hold referendums or public votes to decide the fate of water fluoridation. This approach allows residents to have a say in whether fluoride should be added to their water supply. In some cases, communities have decided to discontinue water fluoridation through these referendums, effectively banning the practice. The continuous monitoring and quality assurance are fundamental practices to ensure the safety and efficacy of water fluoridation. Municipalities regularly sample water from various points in the distribution system and subject these samples to laboratory analysis to verify fluoride levels remain within the recommended range. Additionally, various quality assurance programs are established to maintain accurate dosing equipment and to ensure that the fluoride added is of high purity, helping to meet strict safety standards. Lastly, various cost-effectiveness considerations play a significant role in the decision to implement water fluoridation. This practice is often referred to as a cost-effective public health intervention, as it helps reduce dental caries rates in populations, thus leading to potential savings in healthcare against the long-term benefits of improved oral health, especially in underserved or low-income communities (Solanki et al., 2022). In summary, water municipalities follow a structured approach to water fluoridation, guided by regulations, collaborative decision-making, rigorous monitoring, and a commitment to cost-effectiveness.

While the controversy surrounding this practice continues, these common practices aim to strike a balance between promoting dental health and to address concerns related to fluoride addition in drinking water.

Actions of Water Municipalities Against Adding Fluoride Water municipalities across the world have faced varying opposition to the practice of adding fluoride to their water supplies. This opposition has led to actions by some communities and water authorities against the addition of fluoride, which is often driven by concerns related to health, ethics, and individual rights. One of the primary actions taken by municipalities against the addition of fluoride to water supplies is the decision to discontinue water fluoride programs (U.S. EPA, et al., 2023). In some cases, municipalities have chosen to halt water fluoridation in response to perceived health risks associated with fluoride overexposure. Concerns about potential adverse health effects, especially in children, have led some communities to stick on the side of caution (National Health and Medical Research Council et al., 2017).

Another action taken by water municipalities is the initiation of public discussions and awareness campaigns. These efforts aim to inform residents about the potential risks and benefits of water fluoridation and engage them in the decision-making process. By fostering open dialogue and providing residents with information, municipalities seek to address these concerns, build trust, and make informed choices regarding fluoride addition. Legal actions have also been taken against fluoride addition in some instances. Lawsuits have been filed challenging the practice of water fluoridation, citing violations of individual rights and many health

concerns (Solanki et al., 2022). Furthermore, actions taken by municipalities include exploring alternative methods of delivering fluoride to the population. Some communities that oppose water fluoridation have opted for alternative approaches, such as fluoride supplements, dental clinics, or education programs to help promote dental health without fluoridating the water supply. Lastly, the motivations driving these actions against adding fluoride are multifaceted, stemming from concerns about individual rights and consent, perceived health risks, and ethical considerations that play pivotal roles in shaping community decisions. Many critics argue that the practice of mass medication through water fluoridation infringes upon individual autonomy, leading to calls for informed consent (Solanki et al., 2022). Additionally, these concerns about potential overexposure to fluoride have driven opposition based upon perceived health risks, namely children. Therefore, actions taken by water municipalities against adding fluoride reflects the diverse range of concerns and motivations surrounding this practice. Whether through discontinuation, public engagement, legal challenges, or alternative methods of fluoride delivery, these actions underscore the ongoing controversy over the role of water fluoridation in public health and the balance between its potential benefits and perceived risks. In summary, the controversy surrounding fluoride in a water supply hinges on the delicate balance between its potential health benefits for dental health and the ethical dilemmas it poses regarding mass medication without individual consent and concerns about health risks associated with excessive fluoride consumption. Striking this balance is a complex challenge that requires a careful consideration of both the positive and negative aspects of water fluoridation in public health policy and decision-making.

## II. CONCLUSION

The issue of fluoride in water supplies is a multifaceted and contentious one, influenced by a range of factors including public health, ethics, and individual rights. Fluoride is known for its critical role in dental health, particularly in reducing tooth decay and cavities by strengthening tooth enamel. Water fluoridation, a common practice, has been successful in improving dental health, especially in underserved communities with limited access to dental care. However, this positive impact on dental health must be balanced against concerns about excessive fluoride exposure and the ethics of mass medication without individual consent. The controversy surrounding fluoride in water primarily arises from the ethical dilemma of mass medication.

Critics argue that adding fluoride to public water supplies forces individuals to consume a substance without their informed consent, raising significant ethical questions about medical autonomy and individual choice. This controversy extends to

questions about the appropriate dosage of fluoride, as excessive exposure can lead to conditions like dental fluorosis, which affects tooth appearance, and skeletal fluorosis, a more severe condition affecting bones and joints. Water municipalities, responsible for water supply management, follow common practices to address these concerns. They aim to maintain fluoride concentrations within recommended ranges set by health organizations like the World Health Organization and the American Dental Association. Approved fluoride compounds, such as fluorosilicic acid and sodium fluoride, are used to carefully adjust fluoride levels in the water. This practice allows municipalities to provide the benefits of fluoride while minimizing the risk of excessive exposure. Despite these common practices, some water municipalities have faced opposition to adding fluoride to their water supplies.

Actions taken against water fluoridation include holding referendums to allow communities to decide on its continuation or discontinuation, as well as implementing bans on the practice. Legal challenges have also arisen, with lawsuits alleging violations of individual rights and health concerns associated with water fluoridation. In response to these controversies, some municipalities have explored alternative methods of delivering fluoride, such as fluoridated salt or targeted dental programs. In summary, the issue of fluoride in water supplies is marked by a delicate balance between its potential benefits for dental health and the ethical and health concerns it raises. Water municipalities adhere to common practices to ensure safe and controlled fluoride levels, but opposition to water fluoridation persists in some communities, leading to various actions and alternative approaches. The controversy underscores the challenges of making decisions that prioritize public health while respecting individual rights and informed consent.

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