



## Europe and Fluoridation: The Facts about How Europe Uses Fluoride

Fluoridation opponents say that “97% of Europe is not fluoridated.” This is a misleading statement because it suggests that European nations have rejected the use of fluoride in population-wide efforts to improve dental health. Here are the key facts:

### **1. Fluoridated water reaches more than 13 million Europeans.**

[Water fluoridation programs](#) exist in England, Ireland, Poland, Serbia and Spain. A leading health agency in England issued a 2018 report with [this assessment](#): “Children from both affluent and deprived areas benefitted from fluoridation, but children from relatively deprived areas benefitted the most.”

### **2. Fluoridated salt reaches more than 70 million Europeans.**

Austria, France, Germany, Switzerland and several other countries have approved programs [adding fluoride to table salt](#). Fluoridated salt reaches a large share of Europe’s population, and studies show it reduces tooth decay. The European Academy of Pediatric Dentistry (EAPD) recently [called water fluoridation](#) "a core component of oral health policy" and adds that salt fluoridation "is suggested when water fluoridation cannot be implemented" due to technical, logistical or political reasons.

### **3. Fluoridated milk programs have operated in several European countries.**

[Fluoridated milk programs](#) for children have been operated in Bulgaria, England, Hungary, Russia and Scotland. These programs do not address adults’ dental health needs.

### **4. Some European nations provide regular fluoride treatments to children or young adults through free or heavily discounted dental care.**

For example, national health insurance in [Sweden](#) entitles all residents to free dental care through the age of 23. In [Denmark](#), dental care is free for all children until age 18. Any legal resident of [Finland](#) is entitled to get dental care from public dental clinics. In Scandinavia, a number of schools sponsor dental programs to provide children and teens with [fluoride varnish](#), [fluoride tablets](#) or [fluoride rinses](#). These programs have a higher per-child cost than water fluoridation.

### **5. Some areas of Europe have water that is naturally fluoridated.**

In [an article about water fluoridation](#), Italian researchers explained that their nation’s health officials believe it “is a good health measure,” but it is “not being currently adopted in Italy because in a number of areas throughout the country, water is naturally fluoridated, reaching the optimal level for [cavity] prevention.”



## The Fluoride Court Case: Background on the Federal Lawsuit

Some people opposed to fluoridation in Spokane have said that “fluoridation is on trial” in a federal lawsuit. But they have provided misleading or incomplete details about this court case. We wish to clarify what has happened, starting from what prompted the lawsuit.

### 1. Several years ago, fluoridation opponents filed a petition with the EPA that was rejected.

- The petition that anti-fluoride groups filed urged the Environmental Protection Agency (EPA) to ban a particular type of fluoride additive that is used for fluoridation.
- In 2017, EPA issued an order [rejecting the petition](#). In its order, EPA wrote that the petition “has not set forth a scientifically defensible basis to conclude that any persons have suffered neurotoxic harm” due to exposure to fluoride through fluoridated water.

### 2. Dissatisfied by EPA’s decision, the opponents filed a lawsuit.

- The lawsuit focuses on whether the Environmental Protection Agency (EPA) properly reviewed the petition in accordance with the Toxic Substances Control Act.
- In early August 2020, the federal judge [issued an order](#) that temporarily suspended the lawsuit. The judge instructed the plaintiffs (the anti-fluoride groups) to file a new petition for EPA to review. The judge said he might reopen the case depending on the EPA’s decision.

### 3. The judge offered a negative assessment of the arguments made by opponents.

- [In his order](#), the judge made the following observations about the arguments made by fluoridation opponents (plaintiffs):
  - “Plaintiffs’ standing is also problematic because the evidence of the harm alleged by the named Plaintiffs was practically non-existent at trial.”
  - “In light of the fact that Plaintiffs have not shown any relationship between the evidence presented on neurodevelopmental harm to fetuses/infants and the harms alleged by the named Plaintiffs, it is doubtful they have carried their burden of demonstrating that they would likely be redressed by a favorable ruling from the Court.”



## Who Can You Trust?

### Finding Credible Information about Fluoridation

Many good, well-intentioned people can be confused or fearful of fluoride based on what they read online or through social media. But is the information that opponents share credible?

#### 1. Fact-checkers have repeatedly found opponents' claims to be deceptive.

PolitiFact — an independent, journalist-led fact-checking service — has reviewed several anti-fluoride statements over the past 10 years. In each case, PolitiFact has rated these statements as false or misleading:

- The toxicity of [fluoride additives](#)
- The [advisory label](#) on toothpaste
- How [the Nazis](#) supposedly used fluoride
- Comparing [cavity statistics](#)

#### 2. Health leaders have warned about the misinformation circulated by opponents.

Last year, several physicians wrote an article in the [Journal of the American Medical Association](#), warning of the “torrents of misinformation” that circulate online about vaccines, fluoridation and other health topics. A study of hundreds of [Instagram posts](#) found that the most common theme of anti-fluoride content was a conspiracy theory.

#### 3. Opponents cherry-pick phrases to misrepresent what the research shows.

In a 2012 report, the [Institute for Science in Medicine](#) documented several instances in which opponents of fluoridation misrepresented reports or research by citing certain phrases or sentences out of context. Articles on anti-fluoride websites [often leave out key sentences](#) in a study that would make it clear the study was not raising concern about fluoridation.

#### 4. The leading anti-fluoride group has been caught making false public statements.

- The Fluoride Action Network (FAN) made a [false statement](#) about fluoridation activities that prompted the Pew Center to demand a retraction. On YouTube, FAN [understated the number of countries](#) that engage in water or salt fluoridation.
- A journalist in FAN's home state of New York investigated the claims that FAN's leader (Paul Connett) has made about the alleged harms of fluoride. The journalist found that Connett “[often relies on studies](#) of fluoride use in other countries, where concentrations are significantly higher” than the level used for water fluoridation.
- FAN [promotes a conspiracy theory](#) that connects water fluoridation with atomic bomb research during World War II. This ignores the fact that research into fluoridation's ability to prevent tooth decay began in the late 19th century.



## Fluoride Is a Nutrient: Here is What the Experts Say

At the August 27th forum sponsored by the League of Women Voters, one of the primary speakers opposed to fluoridation asserted that fluoride is not a nutrient. That statement is contradicted by leading health and nutritional experts:

**The National Institutes of Health (NIH):** In its fact sheet about fluoride, the NIH [recognizes this mineral as a nutrient](#). This is evident when the NIH refers to the expert panel that developed intake recommendations “for fluoride and other nutrients.”

**The Institute of Medicine (IOM):** In 1997, the IOM’s Food and Nutrition Board issued a major report called *Dietary Reference Intakes for Calcium, Phosphorus, Magnesium, Vitamin D and Fluoride*. The IOM [described the report’s purpose](#) as developing “a comprehensive set of reference values for dietary nutrient intakes for the healthy population in the United States and Canada.” (Underlined for emphasis)

**The Academy of Nutrition & Dietetics:** In a position paper adopted in 2012, the Academy [made this statement](#): “Fluoride is a natural element that is considered a beneficial nutrient at optimal levels and is important to the integrity of bone and teeth.”

**Food & Agriculture Organization of the United Nations (FAO):** On its website, an FAO fact sheet [categorizes fluoride](#) as a micronutrient.

**U.S. Department of Health, Education & Welfare:** In 1974, the Department (which was later renamed) produced [an issue brief](#) declaring that the “essentiality of fluoride as a mineral nutrient has been reemphasized and confirmed in statements by competent authorities and in reports” by numerous organizations.

**American Academy of Pediatrics (AAP):** In 1972, AAP’s [Committee on Nutrition](#) adopted a statement recognizing fluoride as a nutrient. In 1995, the same committee [issued recommendations](#) for fluoride supplements.

**The Australian & New Zealand Governments:** The health ministries in these nations recognize fluoride as a nutrient, and this is reflected by the [Adequate Intake level](#) that these officials established for fluoride in 2017.

**Nutrition (Journal):** Fluoride is [recognized as a micronutrient](#) by *Nutrition*, which is an open-access, peer-reviewed scientific journal based in Europe.



## Kidney Health & Fluoride: What the Evidence and Experts Say

Questions have been raised about fluoridated water and kidney health. Smile Spokane wishes to share information to address these questions.

### 1. Fluoridated water is safe for kidney dialysis patients to drink.

When asked about the drinking of fluoridated water, the [National Kidney Foundation](#) (NKF) gave this answer: “Fluoride will not harm a dialysis patient if it is ingested in normal amounts in water.” Nowhere on the Foundation’s website are people with Chronic Kidney Disease advised not to drink fluoridated water.\* All water that is used for the dialysis process is treated beforehand to remove the chlorine and fluoride from the water.

### 2. Fluoridated water is safe for people with Chronic Kidney Disease (CKD).

In 2011, [Kidney Health Australia](#) — a leading patient advocacy group — reaffirmed its position that based on the available research, there is “no evidence that consumption of optimally fluoridated drinking water poses any health risks” for people who have CKD. The National Kidney Foundation (U.S.) [offers 10 tips](#) for people with newly-diagnosed CKD, and none of them recommends drinking non-fluoridated water.

### 3. Opponents tend to cite research that isn’t relevant to fluoridated communities.

- For example, anti-fluoride activists cite studies such as [this 2001 study from India](#) to suggest that fluoride is harmful to kidney health. Yes, the researchers did link fluoride exposure to kidney stones, but the fluoride in the local water supplies was 5 to 7 times higher than the concentration used to fluoridate tap water. Other researchers who have reviewed studies like this [point out](#) that “the subjects of this study were at increased risk of kidney stones due to malnutrition.”
- [A 2019 study](#) that opponents cite is relevant to the U.S. because it relied on data from a national health database. However, its findings are far from conclusive. As the authors themselves say, one way to interpret their findings “is that poorer kidney function may contribute to increased plasma fluoride levels rather than resulting from them. This possibility is supported by our finding that water fluoride concentrations were not associated with kidney parameters.”

\*There are roughly 200,000 Americans whose primary water source has naturally occurring fluoride that reaches or exceeds 4 mg/L, which is the EPA’s allowable limit for fluoride. Any of these people who have kidney disease are advised not to drink their tap water. Many of these Americans live in certain regions of Arizona, Colorado, New Mexico and Texas.



## Responses to Councilmember Cathcart Questions on Community Water Fluoridation

Thank you for the opportunity to answer your questions around community water fluoridation. We know there is a lot of misinformation out there, and we appreciate you investing the time to research and understand this issue on behalf of your constituents.

Note: For the most part, we have only reviewed articles that include the author, date and place of publication, which allows anyone to read the entire unedited article online. These sources include [PubMed from the National Center for Biotechnology Information](#), [the University of Washington Health Sciences Library](#), and [the Centers for Disease Control and Prevention \(CDC\)](#).

The following additional resources are helpful to consider when evaluating public health evidence on this and other topics:

- [Sifting through the Coronavirus Pandemic](#)
- [How to fact check an infodemic](#)
- [How misinfodemics spread disease](#)
- [Counteracting health misinformation](#)
- [A State Official's Guide to Science-Based Decision-Making](#)

Smile Spokane strongly supports community water fluoridation. Nevertheless, we strive to remain objective and are open to all information resulting from peer-reviewed scientific studies. Our reviewers are committed to setting aside personal views to ensure we provide verifiable responses based on the best information available.

Please consider us a resource if you have any questions going forward. Thank you for your attention and consideration.

Sincerely,

A handwritten signature in black ink that reads "Chuck Teegarden".

Chuck Teegarden  
Director, Communities in Schools  
Co-chair of Smile Spokane

## Questions related to the plan to fluoridate

### Spokane Production & Infrastructure Questions:

1. What is the source of fluoride used for Community Water Fluoridation (CWF)?

- Communities can choose which type of [fluoride additive](#) they wish to use to fluoridate their tap water. The certified operator of the local water system is typically consulted about this and/or asked to make a recommendation.
- Sodium fluoride, sodium fluorosilicate and fluorosilicic acid (FSA) are [the three additives approved for use in fluoridation in the U.S.](#) Most large water systems use FSA because it is available in a liquid form, which facilitates its addition to the water supply.
- If by “source” you mean to ask where the fluoride is sourced in its raw form, the answer is phosphorite rock. Fluoride is extracted from this rock, leaving the rest of it (minerals such as phosphorus and nitrogen) to be used later to produce fertilizer for farmers or homeowners.

2. Is there a chemical compound difference between naturally occurring fluoride and the by-product fluoride added to water systems?

2a. If so, please describe the scientific or chemical differences between the two products and any differing effects on humans or animals.

- No, there is no chemical difference between naturally occurring fluoride and the by-product fluoride added to water systems. The fluoride ion is the same whether it occurs naturally in a water supply or whether it is obtained from phosphate rock.
- The Centers for Disease Control and Prevention (CDC) [addresses this question on its website](#). According to the CDC, studies “demonstrate that the same fluoride ion is present in naturally occurring fluoride or in fluoride drinking water additives and that no intermediates or other products were observed at pH levels as low as 3.5. In addition, the metabolism of fluoride does not differ depending on the chemical compound used or whether the fluoride is present naturally or added to the water supply.”

3. The EPA describes fluoride as a byproduct of aluminum and fertilizer manufacturing. Can you please explain the process by which the fluoride that is injected into a municipal water supply is produced?

- The fluoride that is used for water fluoridation is generally sourced from phosphorite rock. After fluoride is extracted from the phosphate, much of the remaining rock is later used to create fertilizers that will enrich soil. Opponents raise this topic a lot, probably because they want to create the false impression that fluoride comes from fertilizer.
- You can obtain more information about the sourcing of fluoride by visiting [this CDC web page](#).

3a. What controls exist in these aluminum and fertilizer manufacturing plants to ensure that the fluoride byproduct contains no other unhealthy, toxic or carcinogenic substances?

3b. Are there allowable amounts of other products permitted by regulatory bodies to be included in this byproduct? If so, how much and of what substances?

3c. What testing methods are used? What frequency is testing of these substances completed?



- The Environmental Protection Agency (EPA) requires that any compound that is added during the water treatment process [should not exceed the MCL concentration](#) (Maximum Contaminant Level) for regulated substances.
- The American Water Works Association (AWWA) sets minimum requirements for the design, installation, performance, and production of fluoride products that are used for the fluoridation process. AWWA sets quality-testing requirements and verification that are reviewed and updated at least every 5 years.
- NSF International is an independent nonprofit institute that develops standards, tests and then certifies the quality and purity of water additives. [NSF's standards and rules for fluoride](#) include the following:
  - ✓ NSF requires that fluoride or any other water additive be accompanied by “a full formulation disclosure” of every ingredient therein, allowing for a comprehensive evaluation of quality and safety.
  - ✓ NSF conducts a review of all water additives that “considers all chemical ingredients in the product, as well as the manufacturing process, processing aids and other factors” which could have an impact on the quality and purity of the drinking water that reaches water customers. All of these ingredients are evaluated during NSF’s testing phase.
  - ✓ An NSF professional conducts an initial audit of the manufacturing site and process. Future audits occur annually and these on-site visits are unannounced.
  - ✓ NSF even inspects, samples, tests and certifies fluoride at rail transfer and storage depots.
  - ✓ NSF tests fluoride additives for a variety of compounds that have the potential to be harmful. Arsenic is only one example. [NSF reports that none of the samples](#) that it tested exceeded 1/10th of the EPA’s limit in water.
- For additional information about NSF standards and testing, see the [NSF Fact Sheet](#). Tables 1, 2 and 3 show the maximum allowable levels (MCL) that EPA permits in water, serving as a benchmark for NSF standards. Pages 8-9 offer details on how NSF standards were established.

#### 4. Can you describe the steps taken to inject fluoride into a municipal water system?

**4a.** By what method and frequency will the level of fluoride in Spokane’s water supply be monitored and what controls will exist to ensure the level of fluoride never exceeds the dosage presented in documentation presented to Council?

- Thousands of water system personnel across our nation have implemented and maintained the practice of water fluoridation for a number of years. Water systems that are just beginning this practice have a variety of helpful resources and training modules to guide their water operators on implementing water fluoridation. For example:
  - ✓ The AWWA and other organizations have produced a variety of documents to guide local water operators on the best practices in fluoridating water. These documents include [AWWA's comprehensive manual](#) on water fluoridation, which covers a variety of topics for water operators — monitoring fluoride levels, storing and handling additives, and keeping records to ensure compliance.
  - ✓ The CDC offers a [variety of resources](#) to local water systems on how to implement and manage the fluoridation process. For example, CDC created its Fluoridation Learning Online (FLO) training for water personnel, and this training is available online



for free. The CDC also promoted [this 1995 report](#) to advise states and local communities on the personnel, training and other components that should be in place for fluoridation.

- ✓ Washington state provides a water Quality Assessment Specialist and Lab Liaison to support water department staff.
- The AWWA manual that we cited previously offers more than 40 pages of details on the numerous steps involved in water fluoridation. If you are interested in learning about all of these steps, the complete manual is available [for purchase](#) on AWWA's website.
- Diagrams of the feeders and saturators that are typically used for water fluoridation are [provided in this document](#) as part of a continuing education course for water operators in Virginia.

**5.** If fluoridation occurs now, but in the future, the community determines that it no longer wants fluoridation, what does that process look like? How easily can de-fluoridation occur?

- [The AWWA manual](#) that we cited earlier provides details for water personnel on the process of ending fluoridation. In fact, an entire chapter is devoted to that topic.
- There are some communities that have chosen to end fluoridation, but some of them have chosen to resume this practice after seeing a noticeable decline in their community's dental health. For more information beyond the AWWA manual, you might want to check with a water system in a community that has remained non-fluoridated.

**6.** According to a "safety data sheet" available from fluoride distributor, Solvay S.A., hydrofluorosilicic acid is harmful if swallowed, toxic in contact with skin, harmful if inhaled and also that it causes severe skin burns. It further says that no one should breathe its mist, vapors or spray. One should not eat drink or smoke near it. It is to be used only outdoors and in a well-ventilated area. Workers are supposed to wear protective clothing and face protection. Is this the product intended for use in Spokane?

- If Spokane approves fluoridation, the decision about which type of fluoride to add to Spokane's water would be made by city officials in consultation with the water system administrators. It might be hydrofluorosilicic acid or it might be another form of fluoride.
- You didn't include the data sheet for our reference, but our assumption is that this sheet is typical of the advisories that accompany any number of products that have the potential to be toxic in *very high concentrations*. (Toxicity is dependent on the dose or concentration.) Inside a water plant, the fluoride that is added is, of course, highly concentrated because it will be mixed into tremendous volumes of water.

**6a.** How will the safety of our City of Spokane employees be guaranteed while handling the corrosive product?

- Water personnel need to follow certain protocols for handling fluoride, just as they must follow appropriate precautions when [handling chlorine](#), a water additive that is used to prevent the spread of harmful [E. coli bacteria](#). Chlorine is [currently used](#) in a gaseous form by the Spokane water system.
- Those of us who have toured a water plant or talked with state water officials have been impressed with the fact that people at the state/local levels who work in this field take their jobs very seriously and carry out their roles in compliance with recommended practices.

- Nearly 18,000 public water systems across the U.S. (and many in other nations) engage in water fluoridation. For this reason, most certified water operators are aware of the process and how to carry it out safely and properly within a water plant. As mentioned in a previous answer, there are manuals and training that have been created specifically to train water system employees to fluoridate drinking water. We are confident that the hard-working people handling Spokane's water treatment needs are fully capable of learning and implementing this process safely and effectively.

**6b.** Some studies, mostly focused on heavy salt use to deice roadways, have suggested that increased salt can have very negative impacts on water infrastructure. If my understanding is correct, hydrofluorosilicic acid is a derivative of salt. If this is the case will this have any corrosive or otherwise negative impact at all on Spokane's water or waste water infrastructure?

- Please share your studies about salt, and we can take a look at them and respond. Until we can read the full text of these studies, it would be impossible to give you an informed answer.

**6c.** Are there any incidences of fluoridation negatively impacting water/utility infrastructure in other water systems around the nation? Around the world?

- The CDC has examined research and other information related to the potential for fluoride to cause corrosion or other water infrastructure problems. The agency [offers this summary](#): "The fluoride ion interacts weakly with common metals in plumbing materials and the [AWWA] Research Foundation has reported that fluoride ions contribute to corrosion to the same extent as at the same concentration chloride and sulfate ions . . . Therefore, the corrosive influence of fluoride in drinking water is not significant compared with other ionic influences."
- As mentioned earlier, fluoridation is practiced by nearly 18,000 local water systems. If fluoridation caused significant damage to water infrastructure that required expensive repairs, most of these water systems would have stopped engaging in fluoridation. We are not aware of any meaningful, negative effects on infrastructure.
- A water engineer with extensive knowledge of fluoridation would probably be in the best position to answer your question. The CDC has a water fluoridation engineer on staff. Let us know if you would like us to put you in touch with them to discuss your questions or concerns.

**7.** How will individuals who need or want non-fluoridated water access this in Spokane? Some suggestions have included requiring individuals to visit community centers where untreated wells would be available. How will different populations (i.e. low income, limited mobility, elderly, limited or no access to transportation) be able to access these wells - and more importantly, return home with enough usable water to consume or cook with?

- We are still having conversations with key people to understand the logistics of how this could be done and the costs involved. It's possible that the cost of creating non-fluoridated taps in multiple locations would be cost-prohibitive, but we are certainly exploring that.
- Cities that have installed a non-fluoridated tap in the past, such as Kansas City, had one access point for non-fluoridated water and it was located at the main water treatment facility. The city's pump was removed years after installing it when they determined that it was rarely or never used.

- In Tacoma, non-fluoridated water is dispensed one gallon at a time, a relatively high flow rate when compared to typical filling stations, at the water treatment site location.

### COST Related Questions:

**8.** To date, I have been made aware of only \$3 Million in committed contributions from ARCORA to pay for water fluoridation in Spokane. An additional \$1 Million has been suggested could be raised towards the effort. Will ARCORA sign an MOU committing to this amount and agreeing to pay any expenses that rise above this estimated total?

- No, the Arcora Foundation will not commit at this time to more than already committed.
- The city accepts hundreds of grants a year to do projects. If road projects go over the projected costs the city does not ask for cost overruns to be covered by the Federal or State Governments.

**9.** Will ARCORA additionally agree to fund 100% of all operating costs in perpetuity, ensuring that neither tax payers nor rate payers will be forced to pay for this program?

- We believe that Spokane taxpayers will recognize the smart investment this is when they understand the ways in which water fluoridation benefits the community as a whole. [Research shows that fluoridation saves money](#) by reducing the need for treatments to address dental cavities or abscessed teeth.
- Arcora Foundation, like many other health foundations, does not provide operation and maintenance to local governments in perpetuity, but rather grants that have specific goals and measures for a specified period of time.

**10.** Where else has ARCORA or affiliated organizations offered to pay fluoridation costs?

- Some examples where fluoridation was started with such funding include King County Water District 111, Pasco, Parkland, Port Angeles, Sammamish Plateau Water, Tacoma, & Yakima.

**10a.** Have any communities turned down the offer to have fluoridation costs covered by a third party? If so, what was the reason?

- Some communities have turned it down despite a public vote or survey to approve, including the Skagit Public Utilities District and Lakewood Water District in WA.
- Other communities have turned it down after a ballot, like Bellingham in WA.

**10b.** What happens if a community accepts funding to cover fluoridation costs, but later due to legal changes, health discrepancies, or simply the will of the people it's determined to reverse course and de-fluoridate the water supply?

- If the city chooses to cease fluoridation, oral disease rates would rise, there would be more pain and suffering of Spokane residents, and long term effects could include lower job prospects and higher health care costs. The dollars invested toward improving oral health would be wasted, more so the less time fluoridation had been provided.
- If the city ceased fluoridation for political reasons before health benefits could be realized, it would be obligated to repay the expended grant amount at a pro-rated basis, based on years in place, such that the offered funding earmarked to improve health would be available to do so.

- In the case that fluoridation is longer be recommended by the Centers for Disease Control and Prevention (CDC) or regulated by WA State, the city would not be obligated to replay the grant dollars.

**10c.** Will ARCORA agree contractually that in the event of a change in the community's desire to fluoridate (for any reason) that any monies expended towards fluoridation will be considered a grant and no reimbursement will be sought after?

- No, see 10b for details.

**11.** In other communities around the country where fluoridation has occurred, have there been increased operating costs over time? If so, what is the typical annual increase in those costs?

- Year-to-year operating costs for fluoridation are reasonably low. Researchers reviewed 10 studies about the economics of water fluoridation, and they analyzed data from water systems operating in communities with at least 1,000 people. Their analysis showed that [the average annual per-resident cost of fluoridation](#) ranged from 11 cents to \$4.92 for communities of this size.
- The primary change in operating costs is driven by the cost of the *fluoride additive*. These costs can fluctuate over time and costs can depend on the supplier, but the trend has been reasonably steady based on our conversations with water experts.
  - ✓ One example: The public water system in Bismarck, ND provides water for 100,000 people. Since 2009, the cost of Bismarck's fluoride additive has increased from 51 cents per pound to about 60 cents per pound. Over this 11-year period, the per-pound cost has risen an average of 1.5% each year, which is no more than the rate of inflation over this period.

**12.** In other communities where fluoridation has occurred, on average, have capital costs generally met or exceeded their initial budgets? If in excess of the budgeted capital program, how much typically do they go into the red?

- We do not have access to the capital improvements budget of all U.S. cities that engage in water fluoridation, so there is no way for us to give you a definitive answer.
- The initial capital costs are typically much higher than any subsequent year-to-year capital costs. The initial capital costs will cover the tank, pump, saturator and/or other fluoridation equipment. At some point in the future, these devices will need to be repaired or replaced. The Superintendent of the large water system in North Dakota that we cited in the previous answer has informed us that their fluoride pump has lasted 10 years and is still functioning well.

**13.** What is the cost to a water system such as ours to later de-fluoridate, should the community choose to do so in the future?

- We have no experience living or working in a community that has started and later ceased water fluoridation, so we do not have the expertise to answer this question.

#### Questions related to other U.S. and global communities:

**14.** Why do a majority of European countries choose not to fluoridate their water systems?

- First, it is worth noting that roughly 13 million people in England, Ireland, Poland, Spain and Serbia receive drinking water that is fluoridated to lower the risk of tooth decay.

- Second, many European countries use other forms of fluoridation to reach a critical mass of their populations. For example, [salt fluoridation](#) reaches [millions of people](#) in Germany, Switzerland, France, Austria and the Czech Republic. Some countries use [milk fluoridation](#) initiatives to improve dental health for children.
- Third, it is highly misleading to suggest that Europe is hostile to water fluoridation. As [these Italian researchers explained](#), some countries “started with water fluoridation to interrupt it later” with other forms of fluoride. These researchers added: “Austria, Belgium, France, Norway, and Italy are instead convinced that fluoridation is a good health measure, but no decision regarding it has ever been made . . . [Water fluoridation] is not being currently adopted in Italy because in a number of areas throughout the country, water is naturally fluoridated, reaching the optimal level for caries prevention.”
- Fourth, one reason why water fluoridation is less common in Europe than in the U.S. is that the infrastructure of a local water system tends to be older and smaller in Europe. This can create logistical challenges for fluoridation.
- European public health leaders recognize the benefits of water fluoridation. The Platform for Better Oral Health in Europe cites water fluoridation as [one of eight “best practices” for preventing cavities](#) across the life span. In [a 2012 report](#), the Platform called fluoridated water “one of the few public health interventions that directly reduces disparities in dental decay between high and low socioeconomic status groups.”

**15.** In the nation of Ireland, the law generally requires fluoridation, however, many of their local counties have been opting out of mandatory fluoridation since granted the right to do so in the last two decades. Can you explain why?

- We contacted the Chief Dental Officer in Ireland who [shared a recent letter he wrote](#) to a dentist, explaining that fluoridation is required of *all* local water systems. In other words, there have been no opt-outs in Ireland.
- In his letter, Dr. Joseph Mullen writes: “Local Authorities, such as County Councils, have no legal authority regarding [water fluoridation].”

**16.** Communities across the United States and Canada are not just opposing fluoridation to begin with, such as Portland, OR or Wichita, KS, but many including Port Angeles here in Washington State; Soddy Daisy, TN; Ocilla, GA; Jonesborough, TN; Bucks County, PA (switched water suppliers to avoid Fluoridation); or Windsor, ON, CAN are now overturning years of fluoridation. With rising opposition coming from those who once fluoridated, what science, data, or even anecdotal evidence are they seeing that’s leading to a rise in such modern opposition?

- Over the same time period that you have cited, a number of communities — big, medium and small — voted to start or expand water fluoridation programs. These communities include:

- |                   |                             |
|-------------------|-----------------------------|
| ✓ San Jose, CA    | ✓ Issaquah, WA <sup>1</sup> |
| ✓ Meadville, PA   | ✓ Wilkesboro, NC            |
| ✓ Lake City, FL   | ✓ Greenville, TX            |
| ✓ Albuquerque, NM | ✓ Coffee County, GA         |
| ✓ Sulphur, LA     | ✓ Bedford County, VA        |
| ✓ Wilmington, OH  | ✓ Wellington, FL            |

- In fact, the most recent data available show that the number of Americans with access to fluoridated water [increased by more than 5.8 million](#) between 2016 and 2018.

- An analysis of local fluoridation decisions found that [4 out of 5 communities](#) that make a decision on whether to cease fluoridation choose to continue it. Why? Once they scratch beneath the surface and look closely at the claims made by opponents, they usually realize that the weight of the evidence is clearly on the side of fluoridation.
- Why do a handful of communities stop? Usually, a few residents approach their elected officials after reading something online about fluoride that raises their fear. Typically, what they read is a comment based on a low-quality study or a sentence that misrepresents a study about fluoride. In an article for the [Journal of the American Medical Association](#), two physicians warned about the “torrents of misinformation” about vaccines, fluoridation and other health issues. The physicians wrote that “exciting falsehoods apparently spread faster than boring truths on social media.”
- You mentioned the city of Windsor, Ontario (population of 235,000). In December 2018, the city council in [Windsor voted to resume fluoridation](#) because the local health department reported that the percentage of children with tooth decay or requiring urgent dental treatment had increased by 51% after fluoridation was ended. And the city of [Jonesborough also reversed its decision](#) and chose to resume fluoridation.
- We’re not sure if you heard about Windsor and Jonesborough from a group or website opposing fluoridation, but if they failed to mention that these cities had reversed their decision, you might reconsider them as a source. On numerous occasions, the Fluoride Action Network has been caught disseminating [false](#) or [misleading](#) information.

#### Questions related to the precision, efficiency, and effectiveness of water fluoridation:

17. Is the primary goal of water fluoridation to deliver fluoride directly to low income children and minority communities in Spokane?

- Fluoridation will improve the dental health of *all* Spokane residents — both adults and children. It is the one form of fluoride that benefits everyone in a community because they can access it at the tap.
- Additionally, we are very encouraged that fluoridation is a proven strategy for reducing the disparities in tooth decay rates between the affluent and low-income people. For example:
  - ✓ A [study in South Korea](#) (2017) examined children’s dental health and concluded that fluoridation programs “should be sustained to overcome oral health inequalities due to socio-economic factors and improve children’s overall oral health.”
  - ✓ A [report in England](#) (2014) found that when comparing the dental health of 5 year-old children, those living in fluoridated areas “are 28% less likely to have had tooth decay than those in non-fluoridated areas.”

18. How will water fluoridation medically help the people who are not lacking in fluoride?

- We disagree with the implication that “some people” would not benefit from water fluoridation. Adopting a fluoridation program would benefit the dental health of all residents of Spokane with teeth — it’s simply a question of degree.
- Looking beyond dental health, there are additional ways in which fluoridation can benefit our city as a whole:
  - ✓ **Educational achievement:** Improving dental health can help children perform better in school — and that has major implications for Spokane’s economic future.



Specifically, research shows that children with poor dental health are [3 times more likely to be absent from school](#) and students with recent dental pain were about [4 times more likely to earn lower grades](#).

- ✓ **Job opportunities:** Improving dental health could help more Spokane residents compete for good-paying jobs. An [NBC News story](#) explained that “most people—including employers—make instant judgments based on appearance, including someone’s smile and teeth.” Health economists in Sweden investigated the relationship between fluoride and labor market outcomes (employment, etc.) as a proxy for outcomes. [These health economists found](#) that “fluoride improves labor market outcome later in life, which confirms that good dental health is a positive factor on the labor market.”

**19.** What percentage of Spokane’s water supply is actually ingested versus turned into wastewater or used for other agricultural or landscaping type purposes?

**19a.** If the volume of ingested tap water is in fact incredibly low as has been suggested to me, then isn’t water fluoridation an incredibly imprecise and inefficient delivery system?

- It goes without saying that most tap water is not consumed. Even with this understanding, the research shows that fluoridated water saves money for the residents of a city by reducing their need to get fillings, crowns or other kinds of dental treatment. Each \$1 spent on [water fluoridation has a return on investment \(ROI\) of \\$20](#).
- In fact, [the ROI of fluoridation is better](#) than childhood vaccinations, tobacco prevention programs, and other public health measures.
- Studies confirm that fluoridation saves taxpayer money by reducing the cost of state Medicaid programs:
  - ✓ A study in [Louisiana](#) found that children in non-fluoridated communities were 3 times more likely than kids in fluoridated areas to receive dental treatment in a hospital operating room due to rampant tooth decay.
  - ✓ A study in [Texas](#) showed that Medicaid’s dental costs are \$24 lower *per child, per year* for kids who live in a fluoridated community.

**20.** What is the cost of a fluoride supplement dose as would be provided by a dentist directly or through a prescription?

- We used the [GoodRx](#) mobile app to check prices for fluoride supplements in Spokane. The cost of fluoride supplements ranged from \$22 to \$25 for enough tablets (0.5 mg) to last a child between the age of 3 and 6 for three months. In other words, the annual cost for that child would be between \$88 and \$100.
- Compare the costs of supplements with the per-person cost of fluoridation for a larger community such as Spokane: [between 11 cents and \\$4.92](#). Even if we accept the *higher* cost for fluoridation and the *lower* cost for supplements, we find that the per-child cost for fluoride supplements is *almost 18 times the cost of fluoridation*.

**20a.** Would it not be much more efficient and fair to those who don’t want to use fluoride to simply supply these fluoride supplements through our community health agencies directly to low income families in need?



- Fluoride supplements are for children until the age of 16, so they don't do anything to help improve dental health for adults. By contrast, water fluoridation would benefit *everyone* in Spokane.
- The benefits of water fluoridation can be accessed easily from the tap — either as drinking water or by using it to make iced tea, soup or other foods/drinks. By contrast, there are various factors that can complicate or hinder the use of fluoride supplements:
  - ✓ The [dosage of fluoride supplements](#) varies based on a child's age and the background (natural) level of fluoride in the local water. This makes prescribing it much more complicated than it is to prescribe most dietary supplements. Many children spend some amount of time (weekends or summers) with a divorced parent; this factor adds another layer of complication to the issue of the background level of fluoride in a child's tap water.
  - ✓ For parents of *multiple* children who have fluoride supplements, dosage can become confusing because their children may require a different dosage based on their ages.
  - ✓ Compliance with the daily use of fluoride supplements is a big hurdle. Researchers [conducted a 2017 study](#) of more than 200 Oregon parents who received dietary fluoride supplements and reached this conclusion: "Difficulty remembering to give fluoride daily is the greatest barrier to adherence."
  - ✓ Busy, stressed parents can forget to refill the prescription so there is a gap of several days with no fluoride exposure. As a child moves to a divorced parent's home for several days or even a few weeks, it isn't hard for a primary caregiver to forget to pass along the fluoride supplements to the other parent for use while the child is in their care.

**21.** A study published in the Journal of Public Health Dentistry titled, "Consideration on Optimal Fluoride Intake using Dental Fluorosis and Dental Caries Outcomes – A Longitudinal Study," found that, "Of course, given that most caries prevention is believed to be due to topical exposures, it may be of little consequence as to what the "optimal" fluoride intake level is for caries prevention." If prevention is due to topical treatment, how effective is fluoride in the water?

- Fluoridated water benefits people *both* as a topical and ingested (systemic) form of prevention.
- Research shows that *ingested* fluoride is [strongly drawn to calcified tissues](#), which is how it reaches teeth and bones. Even while a young child's teeth are developing below the gums, [fluoride is incorporated](#) into the tooth structure. This makes the tooth enamel more resistant to cavities.
- The fluoride contained in tap water benefits people *topically* because trace levels of fluoride in the mouth become incorporated into saliva and dental plaque. In turn, this fluoride bathes the surface of teeth and strengthens the enamel. The CDC [recognizes fluoridated water as a topical source](#) of fluoride, not just an ingested source.

**21a.** Anecdotally, when I have visited the dentist, no fluoride treatment from childhood to adulthood has included ingesting any amount of fluoride. When I was young, the process was to swish a liquid around in my mouth, likely to coat the teeth, before expelling the fluid, always being very strictly instructed not to swallow. More recently, the dental assistant places a varnish directly on the teeth. Fluoride Toothpaste packaging is also extremely clear not to swallow the material. With all of this emphasis on application of fluoride to the teeth and avoiding ingestion, again, what is the efficacy of drinking water with fluoride?

- There is a very good reason not to swallow *most* fluoride products (toothpaste, varnish, and rinses) and that is because they contain a concentration of fluoride that is dramatically higher than the level found in fluoridated drinking water.
- Fluoride mouth-rinses are generally hundreds of times more concentrated (230 to 920 ppm) than the same amount of fluoridated tap water (0.7 ppm). Fluoride toothpaste generally contains a concentration that is 1,000 to 1,500 times the level found in fluoridated tap water. More information on the relative concentrations [can be found here](#).

**22.** In a March, 2003 study published in the Journal of the American Medical Association, author Andrew Aligne, MD reports that children exposed to second-hand smoke face a 27% higher risk of tooth decay and a 14% higher risk of fillings. Have there been any studies in Washington State looking at the incidence of tooth decay since the ban on smoking in public places and the implementation of fines to implement those bans?

**22a.** Do we know if the ban on smoking in public places has resulted in a lower occurrence of second hand smoke among children?

**22b.** Do we know if the incidence of smoking in the home or car has increased since the ban on smoking in public places that may attribute more child exposure to second hand smoke as an unintended consequence?

- We are not aware of any studies specifically looking at tooth decay trends since [Washington State's ban on indoor smoking](#) took effect in December 2005.
- Although it is possible that someone is collecting data on children's exposure to second-hand smoke in our state and its sources, we are not aware of such data.

**23.** A research article in the American Journal of Preventive Medicine, published in November of 2019 found that 76% of children from 2003 - 2014 receiving federal food assistance were drinking sugary beverages on a typical day. Given the high rates of sugar consumption and the correlation between sugar and tooth decay, what percentage of adolescent tooth decay is due to sugary beverage abuse versus fluoride consumption?

- We aren't aware of any study that has been able to determine the precise percentage of tooth decay that is driven by sugar consumption, but the data you shared is a concern. Even if our city starts fluoridation, many of us will continue to work in a variety of ways to promote healthy diets and encourage families to reduce their consumption of sugary drinks.
- The silver lining in that study is that it shows that among the participants in the Supplemental Nutrition Assistance Program (SNAP), consumption of sugar-sweetened beverages on a typical day [fell from 84% to 76%](#). Efforts are needed to educate parents and caregivers so this downward trend continues. Part of the challenge is that many of the families most vulnerable to tooth decay [are targeted](#) for sugary drink ads and marketing efforts.
- A 2013 study in the [American Journal of Public Health](#) found that "...greater exposure to water fluoridation significantly reduced the association between sweetened drink consumption and both [tooth decay] in both deciduous and permanent teeth." In addition, the researchers found no association between sugary drink consumption and tooth decay in permanent teeth for children aged 11 to 16 who had lived for most of their lives in fluoridated areas.

**24.** What percentage of children suffer simply from poor hygiene habits or lack of access to routine dental care and not necessarily access or lack thereof to fluoride?

- One cannot separate good oral hygiene from fluoride. A 2018 study, [led by a University of Washington researcher](#), concluded that fluoride plays a critical role in reducing the risk of cavities. As the study concluded: “Personal oral hygiene in the absence of fluorides has failed to show a benefit in terms of reducing the incidence of dental caries.”
- Many low-income families face a variety of challenges that can push oral hygiene habits down the priority list. For parents, these challenges include unemployment or a cut in work hours; exposure to violence; housing insecurity; and mental health issues.
- Through its Mighty Mouth [website](#) and [social media](#), Arcora Foundation is working to educate and support parents to instill good oral hygiene in their children, including helpful tips about brushing and flossing. These educational efforts are not a substitute for fluoridation.

**25.** A research letter published in the Journal of the American Medical Association Pediatrics from April, 2019 points out that 1 in 5 adolescents do not drink any tap water on a given day. If this is the case, have any studies confirmed that the specific populations fluoridation is targeting are even consuming fluoride from tap water?

- People can get the benefits of fluoridated water not only from drinking tap water, but also from consuming foods/drinks that are made with fluoridated water (iced tea, soup, etc.). From what we can tell, the analysis you shared focused specifically on tap water — not on other drinks/food that would also convey fluoride’s benefits.
- Across the country, a number of stakeholders have developed educational materials and social media platforms to promote tap water consumption. Here in Washington State, Arcora Foundation is actively promoting tap water consumption, and its [Mighty Mouth web platform](#) reaches new mothers with messages such as [Choose water for thirst](#). These efforts will continue, regardless of the decision that Spokane makes about fluoridation.

**26.** Why add only fluoride to the water supply and not include other additives that could potentially have an impact on the health of low income populations, such as immunity boosting supplements, especially now as we deal with COVID? Questions regarding science and safety?

- Many other nutrients and additives are already added to other foods or beverages. For example, [iodine](#) is added to table salt, and [milk](#) is fortified with Vitamin D. We are not aware of any registered dietitians or nutritional experts who have suggested moving these additives to water.

**27.** Why does the FDA consider fluoride to be a drug?

- Fluoride is classified this way by the FDA only when it is used to fortify toothpaste, mouth rinses or other dental products — or when added to bottled water. However, the FDA has no regulatory authority over community water fluoridation. The EPA holds this authority.
- [In a 2011 letter](#), FDA officials informed California officials of their conclusion that fluoride is “safe and effective” at preventing cavities.
- An unpublished [court opinion](#) in Washington State validated prior case law which concluded that “the fluorides in water are not drugs.”

**28.** Why does the CDC label fluoride as a poison and a contaminant?

- The web page you cited refers to *industrial* exposures of fluoride, and this is made clear by the reference, for example, to “workers exposed to concentrations above 250 mg F/m<sup>3</sup>.” [If you look at the charts](#) showing lethal doses, you can see these exposures are generally *hundreds of times higher* than the exposures that a consumer would experience from fluoridated water.
- If the CDC had even the slightest concern about water fluoridation’s safety, it would not recommend it so strongly *and* it would not have named fluoridation as one of [10 great public health achievements](#) of the 20th century.
- Leading toxicologists don’t view the issue of toxicity as a yes-or-no question. Instead they view it as a question that depends on the amount or concentration of a substance. Why? Because virtually any substance, including healthy vitamins and minerals, can be toxic if consumed in extraordinarily high levels. Both [Vitamin D](#) and [iron](#) are important nutrients, but even they (like fluoride) have the potential to have adverse effects on humans if consumed in unusually high levels.

**29.** In 2011, the federal government further reduced the recommended dosages of municipal water fluoridation. What was the reason for this reduction in quantity? What would be the worst case scenario if current rates are still determined to be too high and negatively impacting consumers? What certainty do we have today that .7 mg/L is the safest level and that this will not be lowered again in the future?

- The original recommended fluoride level (1962) was a range of 0.7 to 1.2 mg/L. This recommendation reflected research showing that Americans consumed different levels of water based on the average ambient temperatures in their region of the country. For this reason, water systems in southern states fluoridated their water near the lower end of the range, and water systems in the northern part of the U.S. maintained fluoride levels near the upper end of the range.
- In 2015, the [new recommendation](#) was issued by the U.S. Public Health Service (PHS), which closed the range and chose 0.7 mg/L as the optimal level for fluoridation. This change was driven not by safety but by recent research showing that: a) Americans had access to more fluoride-containing products, and b) the amount of drinking water consumed on average no longer revealed differences based on regional climates.
- The fact that the PHS issued this recommendation is reassuring because it confirms that federal health officials are monitoring new research and considering how it should affect health policies. None of us has a crystal ball so we cannot speak with “certainty” about when or if a federal guideline will change in the future.

**30.** If warnings are provided to avoid swallowing fluoride toothpaste, why is it that consuming fluoride through water is perfectly safe?

- The dose matters. In this case, there is a huge difference in the concentration of fluoride. The concentration in toothpaste is between [1,000 and 1,500 times higher](#) than the concentration in fluoridated water. That helps to explain why an advisory message is on the toothpaste tube.
- Opponents of fluoridation often point to the advisory message on tubes of fluoride toothpaste. In 2012, PolitiFact (an independent fact-checker) examined this issue to see if any concern were valid. [PolitiFact concluded](#) that the fluoride opponent “overstates his case and the alarm to the public. People generally don’t eat and swallow toothpaste. And if they

did, it would take a massive amount to be at risk from fluoride poisoning.” We invite you to read the PolitiFact analysis.

**31.** Furthermore, fluoridated toothpaste also specifies that it is not to be used by children under 2 years of age. Why is this unsafe, but fluoridated water for children under 2 is safe?

- We could not get the link to open that accompanied this, so we have no way of knowing what statement you are relying on for the premise of your question. But here’s the bottom line: Two of the most respected authorities for dental health/children recommend that parents use a fluoride toothpaste for their children *once a child’s teeth begin appearing in the mouth*. These sources are the [American Dental Association](#) and the [American Academy of Pediatrics](#).
- Again, it’s important to recognize that the fluoride concentration in toothpaste is at least 1,000 times higher than the concentration in fluoridated water. That is important context for understanding why we and [so many leading health authorities](#) feel confident about the safety of fluoridated water.

**32.** Studies suggest that different dosages are safer in different climates, suggesting that the amount of water individuals drink does have an impact on the dosage of fluoride. Given this, why are many of the recommendations within the United States the same in places with warmer climates such as Florida, and those with colder climates?

- We aren’t sure what studies you are referring to, but research conducted in recent years has revealed little or no difference in water consumption based on region/climate. [A 2015 article in Public Health Reports](#) noted that temperature “explained less than 1% of the variation in plain water intake; thus, these findings support the use of one target concentration for community water fluoridation in all temperature zones” of the United States.

**33.** For excess water drinkers in our community, those who live very healthy lifestyles, participate in fitness activities or simply for a myriad of reasons sweat out significant amounts of water that needs replenishing, how are dosages for those individuals controlled or monitored?

- Water consumption (dosage) is not controlled any more than Vitamin D consumption is controlled for people who drink milk. Yet the concentration that is used for fluoridated water is not high enough to cause adverse health conditions, even for those who tend to drink more water. If you find research to the contrary, please share it with us.
- The updated recommendation for fluoridation that was completed in 2015 by the U.S. Public Health Service serves as a reminder that federal health officials regularly review new research. The level recommended for fluoridation allows for a solid margin of safety. A search for “water fluoridation” yields [more than 6,600 research papers](#) that have been published by the National Library of Medicine. The weight of this evidence points to the safety of fluoride at the levels used for water fluoridation.

**34.** According to a November 2019 article in the Environmental Pollution Journal, it is hypothesized that fluoride could trigger neutrophil extracellular traps. What is this and what are the dangers? Doesn’t Covid-19 also trigger something similar?

- You only shared [the abstract](#) of this animal study. The complete text might provide more clarity on the study’s purpose and methodology. However, based on the abstract, it appears that the purpose of this animal study was to better understand how high levels of fluoride affected the function of cells in a cow’s immune system.



- The concentration of fluoride that they used in this cow (bovine) study seems to be quite different from normal exposures. The methodology section in the full text might offer more details on the exposures. If these researchers felt their findings had implications for the use of fluoride in dental or public health settings, they would have cited this in their abstract. Instead, it appears that this study informs basic science related to cell function and bovine immunology, not the effects of fluoridated water on human beings.

**35.** Please explain the research identified in the October 2012 study published in Environmental Health Perspectives, titled “Developmental Fluoride Neurotoxicity: A Systemic Review and Meta-Analysis” that concluded that their “results support the possibility of adverse effects of fluoride exposures on children’s neurodevelopment.” What studies have been conducted to counter these findings? Why are there no concerns over these findings?

- The authors of this paper [reviewed 27 studies](#), most of which were done in China. There are good reasons why we are not concerned and why many researchers consider this 2012 research paper very weak:
  - ✓ First, the authors themselves wrote that “each of the [studies] reviewed had deficiencies, in some cases rather serious ones, that limit the conclusions that can be drawn.”
  - ✓ Second, only 18 of the 27 studies reviewed in this article provided complete data on the fluoride concentrations in the local water supply, meaning that 1/3 of the studies are missing a crucial data point.
  - ✓ Third, these studies, primarily from China, did not provide any data on concentrations of lead and arsenic in the water sources. This raises the concern that these compounds could have skewed the findings. This is not a minor concern, as [many areas of China](#) are known to have high levels of [lead](#) and [arsenic](#), both of which can have neurotoxic effects.
  - ✓ Fourth, the authors pointed out that the exposure data from these studies “did not allow a formal dose-response analysis.” This is a significant limitation.
- You asked about whether any studies counter this study. Please refer to our response to Q-37 for research showing no link between fluoride and lower IQ scores.

**36.** Further, an investigation published in the Journal of the American Medicine Association, in 2019 titled, “Association between maternal fluoride exposure during pregnancy and IQ scores among offspring in Canada<sup>13</sup>,” found that, “higher levels of fluoride exposure during pregnancy were associated with lower IQ scores in children measured at age 3 to 4 years. These findings were observed at fluoride levels typically found in white North American women. This indicates the possible need to reduce fluoride intake during pregnancy.” How was this study conducted and why is there no concern on the part of fluoride proponents over these findings? Have any studies countered this investigation?

- The [Canadian Agency for Drugs and Technologies in Medicine](#) (CADTH) conducted an evaluation of the JAMA study that you are asking about. CADTH is an agency whose evaluations are highly respected.
- CADTH found that the study is based on “weak” evidence due to “potential errors and biases” and/or the failure to account for other factors that could have affected the study results. CADTH also reported that the study’s conclusion “was not supported by the data.”

- [This study](#) has too many critical gaps to be viewed as a reason to dictate policy about fluoridation. One gap is that we have no idea what the IQ scores of the mothers were. This is important because we know maternal IQs influence a children's IQs. Another gap is that the study lacked any data on the children's lead exposures during the roughly 3 years between their births and when their IQs were tested. These and other gaps represent a lot of missing pieces.
- This study shows *virtually no difference* between the composite IQ scores in fluoridated and non-fluoridated communities. [See the Full-Scale IQ \(FSIQ\) scores in Table 1](#). It shows that the average IQ score among children in fluoridated communities (108.21) was almost the same as the IQs in non-fluoridated communities (108.07).
- More than 30 international researchers and public health experts [wrote a letter citing 10 significant concerns](#) about the methods and analysis used for this study.
- At least two of the authors of this study have stated they do *not* see it as something that should influence a community's decision about water fluoridation. In fact, one of them [told a BuzzFeed News reporter](#): "I think this message could be easily misconstrued as us saying don't drink fluoridated water—we're not saying that."
- You asked about how this Canadian study was conducted. These details are provided in the Methods section of [the journal article](#).

**37.** A 2019 study review titled, "Developmental fluoride neurotoxicity: an updated review" published in Environmental Health concludes that, "there is little doubt that developmental neurotoxicity is a serious risk associated with elevated fluoride exposure, whether due to community water fluoridation, natural fluoride release from soil minerals, or tea consumption, especially when the exposure occurs during early development, but imprecision of the exposure assessment most likely results in an underestimation of the risk." Again with multiple reports showing links to harmful effects during early development, how can community water fluoridation be considered as harmless and a good investment? Have any other studies countered these conclusions?

- This article was written by Philippe Grandjean, who is in a distinct minority of researchers who believe fluoride is harmful. He begins by claiming that fluoridation "has become controversial," but he offers no evidence of this. If it were truly controversial, then we would see a deep split among the leading health authorities — some would favor it, while some would oppose it. But we don't see that. Instead, [the leading public health, medical and dental organizations agree](#) that fluoridation is a wise health practice.
- When he writes that "topical fluoride application" is a more appropriate way to prevent decay, Grandjean reveals a lack of understanding that fluoride in water benefits teeth through *both* **systemic** and **topical** means. For more than 20 years, researchers have recognized this. For example, as [this researcher explained](#), fluoride protects the mineral structure of teeth and this fluoride "comes from 'topical' sources such as drinking water, and fluoride products..."
- Grandjean makes a weak case for assuming that the risk of neurotoxicity is underestimated. The only support he offers is to cite an article he co-wrote 15 years earlier. And he ignores the issue of whether [publication bias](#) could be a reason why health journals are reluctant to publish studies that show *no statistically significant link* between fluoride and neurotoxicity.
- In this article, Grandjean refers to the 27 mostly-Chinese studies as evidence of fluoride's neurotoxicity, but it's disturbing that he did not disclose two key points to his readers:



- ✓ Grandjean was a co-author of this article, and he co-wrote that “each of the [studies] reviewed had deficiencies, in some cases rather serious ones, that limit the conclusions that can be drawn.” Why did he omit the fact that all of these studies had notable deficiencies?
- ✓ Grandjean doesn’t mention that the reference levels of fluoride in these studies — these were the lower fluoride levels that were associated with *higher IQ scores* — average out to 0.7 mg/L. This level is the recommended level for water fluoridation. If anything, this should strengthen confidence in the safety of fluoridation. We cited this in our answer to Q-35.
- Several studies, reports and research reviews *strongly counter* the research articles that you have shared. Consider the following:
  - ✓ [The American Journal of Public Health](#) has published the only study (2015) that examined fluoride and IQs by: a) conducting the study in a country where water fluoridation is common; and b) testing IQs multiple times over a 30-year period of time. This study was conducted in New Zealand, where fluoridation occurs in many communities. Multiple IQ tests strengthens the reliability of the scores. The study showed no link between IQ scores and growing up in a fluoridated community. In fact, IQ scores were *slightly higher* in fluoridated areas.
  - ✓ [The Archives of Toxicology](#) published a scientific review (2020) that was written by 30+ European experts in toxicology, neurology and food safety. They reviewed dozens of studies — in other words, this was “a study of studies.” The experts wrote that the evidence “does not support the presumption that fluoride should be considered as a human developmental neurotoxicant at current exposure levels in European countries.” The fluoride levels in Europe are very similar to the levels seen in the United States.
  - ✓ The [National Academies of Science, Engineering and Medicine](#) (NASEM) was asked last year to evaluate a research document that had called fluoride a neurotoxin. After evaluating the document, NASEM issued a March 2020 report explaining that the evidence submitted did *not* provide adequate support for this conclusion about fluoride.
  - ✓ [A study from Sweden](#) (2017) investigated the relationship between fluoride and cognitive ability, using labor market outcomes (i.e., employment) as a proxy for outcomes. These health economists found that fluoride concentrations below 1.5 mg/L had “zero effects on cognitive ability, non-cognitive ability and education.”
  - ✓ [A study from Spain](#) (2019) was presented at a European conference, showing that prenatal exposure “at the levels found in fluorinated drinking water may exert a *beneficial effect* on the development at 4 years of age.” (Italics added for emphasis) Several urban water systems in Spain are fluoridated. The authors are in the process of publishing a more detailed narrative of their research.
  - ✓ The leading public health, medical and dental organizations have reviewed the studies that you have cited related to IQ and neurodevelopment. Yet they remain supporters of community water fluoridation. It stands to reason that these health and medical leaders don’t view the studies you cited make a strong case for why they should rethink their position. These organizations include:
    - *Centers for Disease Control and Prevention*
    - *American Academy of Pediatrics*

- *American Dental Association*
- *American Academy of Family Physicians*
- *American Public Health Association*
- *U.S. Community Preventive Services Task Force*

**38.** According to the CDC, consuming formula mixed with fluoridated water can increase the child's risk of developing dental fluorosis and according to a 2006 report by the ADA, "infants may be getting a greater than optimal amount of fluoride through liquid or powder baby formula mixed with water containing fluoride." Are there studies that contradict this? How do we control for this in the water supply?

- We want to call your attention to the start of the paragraph that you cited. This is where [the CDC states](#): "Yes, you can use fluoridated water for preparing infant formula." Why would the CDC give this advice in light of their statement about dental fluorosis? Because tooth decay is an oral infection that even has the potential to [cause death](#), while [dental fluorosis](#) is a cosmetic issue. The kind of fluorosis seen in the U.S. leaves faint white spots on the tooth enamel that may not be noticed by someone other than a dental professional upon close examination. Fluorosis does not cause pain, and it does not affect the health or function of the teeth, which is why many people don't even realize their teeth have fluorosis.
- The [2015 adjustment](#) in the recommended level for water fluoridation was aimed at providing the benefits of fluoride while reducing the frequency of dental fluorosis. For this reason, fluorosis is likely to decline in the coming years.

**39.** According to a 1992 study published in the Journal of the American Medical Association (JAMA), at a fluoridation rate of 1ppm, "a small but significant increase in the risk of hip fracture in both men and women," was identified. Have any studies countered these findings?

**39a.** Do we know what the specific incidence of hip fracture is at .7mg/L?

- As the authors of this study noted, the difference in hip fracture rates was small. The sample size was 246 people at or above age 65. The overall weight of the scientific evidence points *against* a link between fluoride at the level used in fluoridation and the risk of bone fracture. Consider these studies:
  - ✓ A study (2010) compared bone specimens from hospitals in two metro areas of Canada — Toronto (fluoridated) and Montreal (non-fluoridated). Compressive mechanical testing was used to assess fracture risk over a four-year period. [The authors reported no link](#) between fluoridated water and bone fractures:  
*"Many decades of epidemiological studies have shown minimal evidence of any effects of fluoride administration on bone, and it is therefore very unlikely that municipally fluoridated water affects adults with healthy bone."*
  - ✓ A study (2001) with a sample size of more than 8,200 people at or above age 50 revealed that people living in areas with water fluoride at about 1 mg/L (optimal) had lower rates of bone fracture than those living in areas with lower fluoride levels. As for hip fractures, [this study](#) showed that none of the other five fluoride levels were linked to a lower fracture prevalence (see Table 4) than the optimal level.
- Regarding Q-39a, we are not aware of any studies that were conducted using 0.7 mg/L as a benchmark level.

**40.** According to a June 2015 report, “Water fluoridation for the prevention of dental caries,” in the Cochrane Database of Systematic Reviews, the authors found that “where the fluoride level in water is 0.7 ppm, there is a chance of around 12% of people having dental fluorosis that may cause concern about how their teeth look.” With the proposal to increase Spokane’s fluoride levels to .7ppm, does this not put thousands of children at risk for fluorosis in our community?

- There are probably some Spokane children whose teeth have fluorosis now. Swallowing toothpaste is thought to be a key contributing factor to dental fluorosis by many experts. A study of Indianapolis children offers support for this. Dental offices encourage parents and caregivers to use the [right amount of fluoride toothpaste](#) for their children and to supervise their brushing at younger ages. This can reduce the odds that a child’s teeth will have fluorosis.
- As explained in Q-38, dental fluorosis is a cosmetic effect that does *not* cause pain or affect the health or function of the teeth. Fluorosis is also subtle enough that many people don’t realize their teeth have fluorosis. One reason why it often isn’t noticed could be that [fluorosis tends to decline as children grow up](#).
- Researchers from the University of Iowa reviewed a recent cluster of studies to consider whether the mild dental fluorosis typically seen in the U.S. has a negative effect on quality of life. In 2010, after reviewing a number of studies, these researchers [shared their conclusions](#) that “mild dental fluorosis clearly was not a concern. In fact, sometimes it was associated with improved oral health-related quality of life, probably due to the public’s greater emphasis on white teeth.”

**41.** At a recent Spokane City Council Committee meeting, a lead representative from the fluoridation support group, cited a study that there is “no established incidence” of allergy to fluoridation. However, a 1961 study published in the Journal of Dental Medicine found that, “one percent reacted adversely to fluoride.” While this may not seem like a significant number, it would represent a serious population of individuals in Spokane who could no longer consume our drinking water. Can you please address this study and its findings? Can you point to specific research that counters this finding?

- We’re assuming that you read the text of the study and not just the abstract, correct? If so, please share a transcript of the study and we will be happy to take a look at its results and conclusions. We cannot access the full text [online without a fee](#).
- In general, studies that are more than 50 years old are often of limited relevance to today because a variety of studies and analyses have been conducted between then and now. But we will review the study if you send it to us.

**42.** In another study, published in 1974, “A double blind test for determination of intolerance to fluoridated water,” the researcher found that 60 patients out of 300 were “intolerant to fluoride and reproducibly develop[ed] gastrointestinal symptoms, stomatitis, joint pains, polydipsia, headaches, and visual disturbances.” Again, why is this finding different from the finding cited by the lead proponent of fluoridation, and why was it not at least addressed as a substantiation that intolerance or allergies to fluoride may exist? Has this study been countered? Can you describe the methods used and if they are believed to be inaccurate?

- We have several concerns related to the methods, rigor and reporting of [the 1974 study that you have cited](#), which was conducted in the Netherlands:
  - ✓ Right below the study’s title (see page 146), the words “Preliminary Report” appear. This suggests that the researcher planned additional data collection or analysis after

this article was published. If so, where is the follow-up article? Do you have the complete results?

- ✓ The Methods section states that each patient is “instructed to avoid tea and seafood which are high in fluoride.” Yet [nowhere does the article confirm](#) whether anyone followed up to confirm that patients abstained from consuming tea and seafood. Keep in mind, the average Dutch person consumes more than [46 pounds of seafood](#) each year — nearly 3 times the amount of seafood [eaten by Americans](#). Normally, a post-intervention questionnaire or interview would be used to confirm that patients actually complied with the dietary instructions. That doesn’t seem to have happened in this study.
- ✓ The Netherlands study referred to reports of an allergy-related condition that “involves mainly the gastrointestinal tract.” This may be related to an ingredient of toothpaste that is *not* fluoride. Depending on how much toothpaste someone accidentally swallows, the toothpaste can irritate their stomach, but this is not due to the fluoride. As [this fact-checking article](#) explains, toothpaste typically contains [sodium lauryl sulfate](#) or other cleansing agents “that would disagree with your stomach.” Therefore, it’s possible that this was what irritated people’s gastrointestinal tract.
- ✓ This study was published by a publication called *Fluoride*, whose reputation is tarnished. According to the [Pew Center on the States](#), *Fluoride* is “a publication managed by fluoride opponents” that has published “a number of flawed or scientifically incomplete studies.” Pew also questioned whether the articles in *Fluoride* have undergone rigorous peer review by independent scientists.
- The leading organization of allergists does *not* recognize a “fluoride allergy”. In the early 1970s, the U.S. Public Health Service asked the American Academy of Allergy, Asthma & Immunology (AAAAI) to evaluate “the question of allergy to fluoride as used in the fluoridation of community water supplies.” The AAAAI conducted a review of clinical reports of allergy to help reach its conclusion. In 1971, the Executive Committee of the Academy issued a statement based on its evaluation, which was adopted by a unanimous vote. [Here is the statement](#):

*“There is no evidence of allergy or intolerance to fluorides as used in the fluoridation of community water supplies.”*
- This issue was reconsidered a few decades later by a London-based researcher. In a 1996 study, the researcher [reached this conclusion](#): “There are no confirmed cases of allergy to fluoride, nor of any positive skin testing in humans or animal models.”
- The 1971 evaluation statement by AAAAI has not stopped opponents from making the “allergy” claim. In 2003, for example, opponents in a small city in the western part of our state raised this issue. To clarify the facts, the former president of the Washington State Society of Allergy, Asthma & Immunology wrote a letter to officials in that city. In his letter, Dr. Paul V. Williams explained there is [no documented scientific evidence](#) showing that fluoride in tap water can cause an allergy.

**43.** Recent years have led to an increase in fluoride products available in the marketplace. How can individuals and families be sure they are not over-ingesting fluoride?

- See our response to Q-29. The issue you raised was a factor in the 2015 decision to update the optimal fluoride level for water fluoridation. In the U.S. Public Health Service’s [announcement of the updated fluoride level](#), it specifically cited the availability of more over-the-counter fluoride products as one of four reasons for the change.

44. According to a 1990 study by Elise B Bassin, David Wypij, Roger Davis, and Murray Mittleman, titled “Age Specific fluoride exposure in drinking water and osteosarcoma,” in Cancer Causes and Control, they found using CDC recommended target levels that take climate into account, that there is an association between fluoride exposure in drinking water during childhood and an increased incidence of osteosarcoma among males, but not females.” Discuss your views on sex-dependent vulnerability and how this should be accounted for in reference to community water fluoridation?

- We feel the question of “sex-dependent vulnerability” is a premature topic to raise because the weight of the evidence does not reveal any harmful effects from fluoride that are disproportionately experienced by one sex. Consider these studies, which are much more recent than the 1990 study that you shared:
  - ✓ A 2020 U.S. study reviewed osteosarcoma data from hospitals in seven states and the District of Columbia. More than 1,000 patients were involved in this study. The researchers summarized their findings: “These results indicate that residence in a fluoridated community [is not related to an increase in risk](#) for osteosarcoma, after adjusting for race, ethnicity, income, distance from the hospital, urban/rural living status, and drinking bottled water.”
  - ✓ A 2016 study in Texas examined hundreds of osteosarcoma cases and these researchers reported this conclusion: “[No relationship was found](#) between fluoride levels in public drinking water and childhood/adolescent osteosarcoma in Texas.”
  - ✓ A 2014 study in England examined two types of bone cancer. After reviewing the possible link between fluoride exposure and osteosarcoma (2,566 cases) and Ewing sarcoma (1,650 cases), the researchers [found no evidence of an association](#) between bone cancer and fluoride in drinking water.
  - ✓ A 2013 study in Sweden examined the health records of a large sample of Swedish residents to explore a possible link between the risk of hip fractures and fluoride exposures from drinking water. Individuals were exposed regularly to varying levels of fluoride. After analyzing the data, the researchers “[found no association](#) between chronic fluoride exposure and the occurrence of hip fracture.”

45. According to the EPA, children under 8 years old are most at risk of pitted enamel due to excessive fluoride exposure as a result of impacting teeth during formative phases (Birth – Wisdom teeth). How is this controlled for in a municipal water system?

- You are confusing two very different issues:

The level of fluoride recommended for water fluoridation (0.7 mg/L),  
which is established by the U.S. Public Health Service

**Versus**

The maximum level that the EPA sets for fluoride in drinking water (4.0  
mg/L) regardless of *whether a water system is fluoridated or not*

- To put this in context, [the EPA’s maximum limit](#) for fluoride is more than 5 times higher than the level used for fluoridation.

46. How will fluoridating Spokane’s municipal water supply potentially interact with intertie agreements we have made in the past with other communities to whom we supply water? Could there be any legal exposure or costs associated with the change?



- This question cannot be answered in the abstract. It would depend on the City's intertie contracts with those other providers. However; it is highly doubtful, as the City controls the water and likely the intertie contract, that there exist such restrictions. City water if fluoridated would meet all standards of the state as defined under the Safe Drinking Water Act.

**47.** Can you please describe the ongoing litigation over the Toxic Substances Act in California? Who are the proponents and who are the opponents? What is the substance of the lawsuit and how is or could community water fluoridation be affected by the outcome?

- The lawsuit you're referring to is related to the Toxic Substances Control Act (TSCA), which is [a federal law enacted in 1976](#). A group of anti-fluoride groups filed this lawsuit because they felt the Environmental Protection Agency (EPA) did not properly follow the TSCA when it dismissed their petition a few years ago.
- The original TSCA petition urged EPA to ban a fluoride additive that is widely used for water fluoridation. EPA reviewed the petition and [rejected it in 2017](#). The agency stated in its decision that the petition "has not set forth a scientifically defensible basis to conclude that any persons have suffered neurotoxic harm" due to exposure to fluoride through fluoridated water or from other common forms of fluoride exposure in the U.S. This prompted the anti-fluoride groups to file their lawsuit.
- This August, [the federal judge issued an order](#) that temporarily suspended the lawsuit. The federal judge has instructed the plaintiffs to file a new petition for EPA to review. The judge said he might reopen the case depending on the EPA's decision.
- In his order, [the judge made it clear](#) that the evidence provided by the anti-fluoride plaintiffs was severely lacking:

*"Plaintiffs' standing is also problematic because the evidence of the harm alleged by the named Plaintiffs was practically non-existent at trial."*

*"In light of the fact that Plaintiffs have not shown any relationship between the evidence presented on neurodevelopmental harm to fetuses/infants and the harms alleged by the named Plaintiffs, it is doubtful they have carried their burden of demonstrating that they would likely be redressed by a favorable ruling from the Court."*

**48.** Are there any ethical concerns over approving fluoridation in a manner that lacks in-person public input, avoids voter input, or prohibits a citizen referendum should pursuing such an option be the will of the people?

- A vote by the Spokane City Council would be in keeping with how most communities have adopted a water fluoridation program. In most cases, this health policy was enacted by a vote of their city council, water utility board or a similar governing board.
- Typically, the public does not vote on most public health measures, whether it is seatbelt laws or vaccination rules for school attendance.
- One reason for the above is that public health issues such as fluoridation are subject to "[torrents of misinformation](#)" despite the broad support from the health community based on a substantive body of evidence. This was highlighted in a recent [letter](#) from the Deans of UW.
- In recent weeks, there have been a variety of opportunities for local residents to educate themselves on this issue and make their views heard. For example:

- ✓ The local chapter of the [League of Women Voters](#) sponsored an Aug. 27 virtual forum that provided two speakers from each side and allowed local residents to share their views.
- ✓ The Spokesman-Review has published both op-ed opinion columns and a number of letters to the editor about this issue.
- ✓ People and groups with pro- and anti-fluoridation views are actively communicating to Spokane residents through social media platforms.

**49.** Should informed consent apply to fluoride as it does to other medications?

- Informed consent is a principle that pertains to drugs — not to vitamins and minerals. [The experts define fluoride in water as a mineral](#), not a medication.

**Notes:**

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<sup>1</sup> Fluoridated water currently reaches roughly two-thirds of the population in Issaquah, but the city council [approved a plan](#) to fluoridate the water source that serves the remaining one-third of its population. This plan will be implemented over the next few years.