

## An Analysis of Charles C. Mann’s “Is There Still a Good Case for Water Fluoridation?”, published in *The Atlantic*, April 2020

### **Background:**

*The Atlantic* is a reputable magazine whose writers have offered helpful and provocative insight regarding a wide range of issues. Therefore, it is disturbing that its editors agreed to publish the article about fluoridation written by Charles C. Mann. Mr. Mann either took insufficient time to investigate this issue or hastily came to his conclusion and then sought “evidence” to confirm it. In either case, he neglected to share facts or critical context with readers and such failure will mislead many readers of *The Atlantic*. Certainly, he did not cite experts in fluoridation science who, if consulted, would have helped correct his misunderstandings. This document cites excerpts from Mann’s article and then provides the facts or context that he overlooked, misrepresented or excluded.

### **Context:**

Public health expertise exists not just on pandemic preparedness and management, but also on fluoridation science, among many other subjects. Such public health expertise ought to have been consulted and cited before engaging in an unwarranted attack on a proven public health measure that reduces dental decay in persons of all ages by approximately 25%. The most common disease of childhood, dental decay can prevent children from developing normally when pain prevents them from eating, sleeping, playing, attending school and concentrating. Children who are already vulnerable suffer most from the lack of fluoridated community water.

### **Requests**

In light of these concerns and the many errors revealed below, readers of *The Atlantic* and others who become misinformed by opponents of water fluoridation, who will cite the claims of this article, should have the opportunity to learn the facts presented in this analysis.

In describing [what it is](#), *The Atlantic* has impressively written, “honest reporting and analysis, and the integrity they represent, are what matter most to us, even if their pursuit requires giving up on an alluring narrative.” In the case of this article, the alluring narrative appears to have been prioritized over honest and balanced reporting. Correction of misinformation will advance *The Atlantic*’s laudable mission of being “as good a force as possible for the world around us”.

**1. Mann writes:** “A thought popped into my head: *I am now rubbing fluoride directly onto my teeth. So why is my town also dumping it into my drinking water?* Surely applying Colgate’s meticulously packaged fluoride paste directly onto my teeth, where it bonds with the surface to create a protective layer, was better than the more indirect method of pouring fluoride into reservoirs so that people drinking the water can absorb the fluoride, some of which then makes its way into their saliva.”

### **The facts or important context he excluded:**

- Fluoride is a mineral that exists naturally in lakes, rivers, groundwater and the oceans. Water fluoridation is the process of adjusting the naturally occurring level of fluoride

in a water supply to the optimal level that research shows reduces the rate of tooth decay by approximately 25%.

- Disease prevention experts disagree with the either or choice that Mann presented. The Centers for Disease Control and Prevention (CDC) [explains](#): “Both drinking water and toothpaste with fluoride provide important and complementary benefits. Fluoridated water keeps a low level of fluoride in saliva and dental plaque all day. The much higher concentration of fluoride in toothpaste offers additional benefit.”
- Mann’s explanation is not correct with respect to how toothpaste actually works. Fluoride rubbed on teeth does not bond to the surface. Whether from toothpaste or water, fluoride works to control tooth decay by being carried by saliva into the dental plaque in the nooks and crannies where toothbrushes can’t reach.

**2. Mann writes:** “Fluoride in large quantities is bad news. Potential side effects, I quickly discovered, include joint pain, bone fractures, sperm decline, dementia, premature puberty, gastrointestinal distress, immune-system dysfunction, (possibly) cancer, and (also possibly) lower IQ in children.”

**The facts or important context he excluded:**

- There is virtually no known substance that is not “bad news” when consumed in unusually high amounts, including water itself. (A runner in the 2002 Boston Marathon [collapsed and died from hyponatremia](#) — consuming too much water.) A variety of vitamins and minerals, including [Vitamin E](#), [iron](#) and fluoride, have the potential for adverse health effects if they are consumed in unusually high amounts. It is irresponsible for Mann to confuse “large quantities” of fluoride allowed in U.S. communities with fluoridated water. Such levels are never reached in a U.S. community with fluoridated water.
- The curt, alarmist tone (“bad news”) of Mann’s article implies that researchers have not bothered to study the safety of fluoride at various exposures. The opposite is true. The U.S. National Library of Medicine contains [nearly 15,000 research papers](#) related to fluoride and water or to fluoridation. Many of these studies have examined the efficacy and safety of fluoride in water supplies. Because fluoride can occur at high levels naturally in ground water historically used by communities in the U.S. and still used by communities worldwide, scientists were able to study the effects of fluoride at higher levels before introducing much lower levels in the first fluoridation trials, and continue to study the effects of high levels.
- Researchers have closely studied fluoride, including several of the alleged health harms that Mann cites. The weight of this evidence does not implicate fluoride at common exposure levels in the U.S. Consider bone fractures as one example:
  - A [Canadian study](#) (2010) examined the risk of fractures by comparing bone specimens from a fluoridated and non-fluoridated community, and it reached this conclusion: “A striking finding of this study was the lack of a strong relationship between fluoride exposure and bone fluoride content.”
  - An [Iowa study](#) (2014) found “no significant relationships between daily fluoride intake and adolescents’ bone measures.”

- A [Chinese study](#) (2001) of the relationship between the prevalence of bone fracture and water fluoride level, lauded for its control of key confounders, concluded “The prevalence of overall bone fracture was lowest in the population that had 1.00 to 1.06 ppm fluoride in drinking water.” This amount is slightly higher than is currently used in U.S. fluoridation programs.

### 3. Mann writes: “How much trust should we give to expert judgment?”

#### **The facts or important context he excluded:**

- Mann could have enhanced the public’s science literacy by devoting at least a few paragraphs to answering this relevant and important question. Instead, he treated this as a rhetorical question and immediately moved on to other questions.
- Expert judgment earns trust when that judgment is based on quality research and data. As mentioned previously, the National Library of Medicine database contains nearly 15,000 research papers related to either fluoride/water or fluoridation. Clearly, a significant amount of research has been conducted. There is no such thing as a perfect study, and study quality can vary considerably based on whether researchers relied on a rigorous methodology and on whether they took serious steps to account for confounders that could have influenced the outcomes of their studies.
- While experts are not infallible, they are the people many of us turn to when seeking proper advice and recommendations on a health care issue. We turn to them because of their clinical and/or research knowledge. In the United States, the best advice from experts who have the ability to critically evaluate this evidence for public health measures comes from the Community Preventive Services Task Force. This independent, nonfederal panel of public health and prevention experts, established by the Department of Health and Human Services in 1996, recommends community water fluoridation because available studies provide strong or sufficient evidence that it is effective.

### 4. Mann writes: “The bottom graph, based on the same OECD surveys, tracks the number of decayed, missing, or filled adult teeth in 12-year-olds from countries that have *not* embraced fluoridation in a significant way or at all.”

#### **The facts or important context he excluded:**

- That Mann did a poor job of researching his article is demonstrated by the graph to which Mann referred in this comment. Had Mann done his homework, he would have known that *fluoridated salt* reaches tens of millions of people in several of the European nations cited on this graph (Germany, Switzerland, France, Belgium and the Czech Republic).
- In addition, some European countries have operated *fluoridated milk* programs. Although Sweden does not have water fluoridation programs, economists there conducted a major study that determined those who grew up in areas where the natural fluoride levels were commensurate with fluoridated water had better economic outcomes than those who grew up in areas with typically low levels of fluoride in water.
- In summary, millions of European children and adults have access to fluoridated foods, food additives or naturally fluoridated water in a number of the European nations cited in Mann’s

graph. For this reason, no reputable researcher would consider these two graphs to be a valid basis for assessing the impact of water fluoridation.

**5. Mann writes:** “To evaluate the efficacy of water fluoridation, the Cochrane researchers wanted to select properly conducted scientific research, discarding studies that were badly designed ...”

**The facts or important context he excluded:**

- Mann cites the [Cochrane review](#) as reason to doubt the scientific evidence supporting community water fluoridation’s effectiveness in preventing tooth decay. But he overlooks a major detail. As the Centers for Disease Control and Prevention (CDC) [explained](#), a key factor “that impacted Cochrane’s assessment of the quality of the evidence is that their methodology favors randomized controlled trials (RCTs). While RCTs are a preferred study design for studies comparing different clinical treatments among individual patients, this research design is often not feasible for interventions that occur on a community level, like community water fluoridation.”
- One of the criteria that Cochrane sought is for studies that go beyond a single community and analyze data from two distinct years in each of the comparison communities. As a matter of fact, the year after Cochrane issued its review, Canadian researchers [published a peer-reviewed study](#) that met these criteria.
  - Their study compared tooth decay trends in two fluoridated cities within the same Canadian province: Calgary and Edmonton. Between the two years that were examined, Calgary had ceased fluoridation. This study found that children’s decay rates increased by 146 percent in Calgary, a much greater jump than the rise seen among continuously fluoridated Edmonton’s children.
  - The quality of this study was enhanced by studying the change in tooth *surfaces*, where fluoride is most likely to have an impact for the age group studied and within the time frame considered.
- Mann’s bias regarding Cochrane is exposed by [a tweet he posted in 2018](#): “*According to Cochrane, \*97%\* of them were awful, cuz most epidemiological studies were bad back then.*” Here’s a challenge to Mann: Share that sentence with the Cochrane Oral Health Group, and specifically with Anne-Marie Glenny, who was interviewed for this article, and ask if the authors will publicly agree that your words accurately summarize their 2015 finding. In any case, Mann’s tweet may reflect confirmation bias on his part.

**6. Mann writes:** “Today, given that almost all toothpaste contains fluoride, and that most people brush their teeth, assessing the impact of fluoridated water remains highly problematic. ... The idea is that poor children don’t brush their teeth, and fluoridation will fill the gap—a notion, incidentally, that the Cochrane team found no good evidence to support.”

**The facts or important context he excluded:**

- The fact that fluoride toothpaste is widely used in the U.S. and Canada does not preclude the ability to conduct research into the impact of water fluoridation. Mann cites, and even

provides a link to, what he referred to as “a large, careful study” that was published in *JAMA Pediatrics*. While he acknowledged that the study suggested fluoridation gave extra benefit to poor children, even in this time of widespread use of toothpaste and professionally provided fluoride services, he implied that they were the *only* children who benefited. Following [the link to the study](#), figures displaying findings clearly show that fluoridation reduced decay for children of *every* age and income group. Such clear disregard for important and easily observed findings reveals deficiency in either Mann’s ability to interpret simple graphs or his integrity.

- A [2018 peer-reviewed study](#) compared the dental health of low-income children in Juneau, Alaska before *and* after the city ceased water fluoridation. Although data was not collected on children’s toothbrushing habits before and after, there is no reason to conclude that these habits changed significantly between the two years of the study. The authors reported that both the number and cost of tooth decay procedures for children rose dramatically after fluoridation ended. More specifically, the inflation-adjusted dental treatment costs for children jumped by 47 percent after cessation.
- Mann appears to be taking a cheap shot at dentists and pediatricians who support fluoridation by suggesting they assume “that poor children don’t brush their teeth.” Many children across income groups do not brush their teeth regularly, but the consequences are greater for low-income kids because there are other factors related to their socioeconomic status that raise their risk for tooth decay. The Alaska study reveals these consequences.
- Incidentally, why did Mann make no mention of the Alaska study? It received coverage by [National Public Radio](#), among other organizations. This raises the question of whether Mann found only what he was looking for.

**7. Mann writes:** “Children have smaller bodies than adults and thus are at risk of relatively greater exposure when they drink. In calculating the dose, I thought, the authorities must have taken into account the weird thirsty kid who guzzles water by the quart. But if they lower the dose to avoid harming that child, where would that leave my mother-in-law, who for some reason has decided she no longer wants to drink much water at all? Is she getting shortchanged?”

**The facts or important context he excluded:**

- Mann incorrectly suggests that leading health officials have promoted fluoridation without considering the health needs, drinking water habits, and status of children. In a 2015 journal article, the [U.S. Public Health Service](#) (PHS) explained the reasons for updating its recommendation for the fluoride concentration to be used in the water fluoridation process. The PHS stated that its decision was based primarily on four scientific findings, one of which was more recent evidence on the “fluid intake of *children* across various outdoor air temperatures” (emphasis added).
- In 2018, the [Food Safety Authority of Ireland](#) (FSAI) issued a comprehensive report examining the potential for excessive consumption of fluoride from all sources, not simply through water. (Fluoridation is widespread in Ireland.) After a lengthy analysis of fluoride consumption through all dietary sources, FSAI concluded that the probability of exceeding the tolerable upper intake limits for fluoride through foods and beverages is “very low” for

children in age groups 1-8 and 9-12. In its official statement, FSAI said “there is no safety concern for children and adults living in Ireland from exposure to fluoride through intake of foods and beverages.”

- There will always be outliers — people who consume higher levels of certain drinks or foods – which is accounted for in the PHS assessment. But there is no evidence that children who live in a fluoridated community and who drink more tap water than the typical child will suffer adverse effects. Yes, Mann’s mother-in-law’s decision not to drink much water might be putting her at risk of more tooth decay, but that individual decision hardly justifies increasing the level of fluoride in her water above the level known to be safer for young children. Additionally, there is no scientific evidence that there is any harm to adults who drink high quantities of fluoridated water.

**8. Mann writes:** “A small group of dentists began agitating to add low levels of fluoride to drinking water—low enough to avoid staining and also low enough to be safe. Those dentists would soon get corporate reinforcement.”

**The facts or important context he excluded:**

- Mann’s reference to “corporate reinforcement” in the 1930s repeats the conspiracy-laden story that is widely circulated by anti-fluoride activists but is severely lacking in evidence. Research into fluoride’s potential role in combatting tooth decay dates back to [at least 1874](#) — more than half a century before the supposed ALCOA-related conspiracy.
- The conspiracy theory that Mann cites has been circulated by fluoride opponents for many years. Does Mann have any new evidence that lends credence to it? If he does, he did not share it in his article.
- R. Allan Freeze and Jay H. Lehr wrote a book ([published in 2008](#)) called “The Fluoride Wars” that pleased neither fluoridation supporters nor opponents. In their book, the coauthors explore the various assumptions that fluoride critics make in spinning this story of conspiracy related to the Aluminum Company of America (ALCOA). [Page 135 of their book](#), which explores the ALCOA-related assertions, contains this header in the upper right corner: ALCOAnoia, conflating ALCOA and paranoia.

**9. Mann writes:** “... I mentioned this remark (about fluoride) on social media. The inevitable but somehow surprising response: People I did not know troubled themselves to tell me that I was an idiot, and that fluoridation was terrible. Their skepticism made an impression.”

**The facts or important context he excluded:**

- Last year, [in an article](#) for the Journal of the American Medical Association, Canadian physicians warned of “torrents of misinformation” circulating online about vaccines, water fluoridation and several other issues. Relying on social media as a source for science or health information is a mistake that might have predisposed Mann to assume a negative view of fluoridation.

- It's difficult to understand why Mann trusted Twitter on this topic more than the CDC or the American Academy of Pediatrics. And let's be frank: someone who tells Mann that fluoridation is "terrible" has gone well beyond skepticism.

**10. Mann writes:** "At an annual cost of about \$325 million, more than 70 percent of Americans now have fluoridated water. Still more Americans get fluoride from soft drinks, most of which are made with fluoridated water. Some bottled water is fluoridated too."

**The facts or important context he excluded:**

- Mann makes the cost of fluoridation appear to be very high when quoting it as an aggregate figure, but let's consider what consumers pay. The cost of fluoridated water is generally less than \$2 per person, per year. There is no other preventive measure which approaches the cost-effectiveness of fluoridation when considering its impact through preventing dental disease. In fact, research shows that in a fluoridated community, [the average savings per person](#) is more than \$32, year after year, and the national annual savings is almost \$6.5 BILLION in averted dental decay treatment.
- Mann provides no credible evidence to support his claim that "more Americans get fluoride from soft drinks" nor does he explain why this is relevant. There is every reason to believe that fluoride in soft drinks contributes to prevention of tooth decay, for those with moderate consumption levels, just as it does in tap water.