QUEEN'S MUNICIPAL DAY OF ACTION 2020

WATER FLUORIDATION IN KINGSTON

Fluoride is a naturally occurring mineral found in nearly all water sources. Community water fluoridation (CWF) involves adjusting the fluoride levels in public water systems to provide protection from dental caries. CWF has been proven to prevent 25% of dental caries in children and adults. Over 70 years of research has proven CWF to be a safe, cost-effective public health measure.

Oral health issues disproportionately affect low SES populations. As of 2017, 16% of KFL&A residents considered the health of their teeth to be "fair/poor." Respondents within the lowest income quintile (compared to the highest income quintile) reported higher rates of "good, fair, or poor" oral health, and lower rates of "very good" or "excellent" oral health.

There are many concerns about the safety of CWF; however, there is overwhelming evidence that it is a safe intervention. Numerous studies have shown that when used at the optimal concentration of 0.7ppm, fluoride prevents tooth decay while minimizing the risk of dental fluorosis. Based on current evidence, there is no adverse effect on bone health, cancer rates, risk of osteosarcoma, puberty, fertility, risk of Down syndrome, or other health concerns.

It is not only important to provide CWF, but also to educate the public on ways to maintain oral health. Measures such as regularly using toothpaste with fluoride and reducing intake of sugary foods and drinks, will contribute to a reduction in tooth decay in the population.

COSTS | BENEFITS

- In 2017, Kingston saw 1,267 ED visits for oral health concerns, costing $513.36 per visit (total = $650,427)
- Kingston spends an average $450 000/year on dental treatments
- 1/4 residents avoid the dentist due to costs
- Oral health is worse among those without private insurance
- Lifetime cost of CWF of for one person is less than the cost of one filling

By preventing tooth decay, CWF can reduce costs to the city, healthcare system, and residents

- Reduce days lost of work and school from dental problems
- Reduce risk of tooth decay in the context of serious and chronic conditions like diabetes, and respiratory infections
- Improve behaviour, attention, and sleep in school-aged children
- Increase social mobility and employability in low SES populations

CWF is the single most effective public health intervention to prevent tooth decay and improve overall health

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OMSA

OUR ASKS

We ask that the Kingston City Council **support the implementation of CWF in Kingston,** considering the population burden of adverse oral health, and the potential of CWF as a public health intervention to alleviate that burden. We ask that this is implemented in **accordance with Ontario's 2018 Safe Drinking Water and Fluoride Monitoring Protocol.** As such, the following are our policy recommendations:

POLICY RECOMMENDATIONS:

1. Ensure the fluoride concentration is kept within the **therapeutic range of 0.6-0.8 ppm,** ideally at the **optimal concentration of 0.7 ppm**

2. Continue working with KFL&A Public Health to **educate the public** on the benefit of community water fluoridation and safe oral health practices

3. Work with KFL&A Public Health to **track oral health outcomes** after the implementation of water fluoridation

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WATER RE-FLUORIDATION

DELEGATE BACKGROUNDER

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Executive Summary

Community water fluoridation (CWF) involves adjusting the level of fluoride in public water systems to reduce population rates of tooth decay. Currently, the public water supply of the Kingston, Frontenac, Lennox and Addington (KFL&A) region is not fluoridated. Implementing CWF is an opportunity to engage a cost-effective, evidence-based intervention to protect the oral health of KFL&A constituents.

Key recommendations:

We ask that the Kingston City Council support the implementation of CWF in Kingston, in accordance with Ontario's 2018 *Safe Drinking Water and Fluoride Monitoring Protocol*. As such, the following are our policy recommendations:

1. Ensure the fluoride concentration is kept within the therapeutic range of 0.6-0.8 ppm, ideally at the optimal concentration of 0.7 ppm
2. Continue working with KFL&A Public Health to educate the public on the benefit of community water fluoridation and safe oral health practices
3. Work with KFL&A Public Health to track oral health outcomes after the implementation of water fluoridation

I. Epidemiology[1]

Oral health is a crucial part of overall health, contributing to our communication, nutrition, and protection against microbial infections.[2] Tooth decay is also linked to several serious and chronic conditions including diabetes, respiratory infections, and rheumatoid arthritis.[3] Furthermore, dental health problems can lead to pain, tooth loss, facial disfigurement, anxiety, unemployability,[4] and the inability to attend work or school— all of these have a large impact on quality of life. In turn, oral health is intertwined with overall physical and mental health.

Dental health is often shown to be associated with socioeconomic status (SES), where those with lower income report poorer dentition. As of 2017, 16% of residents of Kingston, Frontenac, Lennox and Addington (KFL&A) residents considered the health of their teeth to be "fair/poor." Respondents within the lowest income quintile (compared to the highest income quintile) reported higher rates of "good, fair, or poor" oral health, and lower rates of "very good" or "excellent" oral health. Oral health status has also been shown to be worse among individuals without private dental insurance coverage, which is the case for an estimated 33% (49,000) of KFL&A area residents. 1 in 4 KFL&A residents report they avoid the dentist due to cost. Such delays in treatment allow minor dental concerns to worsen, sometimes to the point of necessitating a visit to the emergency department (ED). In 2017 alone, Kingston saw 1,267 ED visits for oral health concerns, at a cost of approximately $513.36 per visit (total = $650,427).

1 in 4 children in KFL&A are affected by tooth decay (untreated or previously treated), with an average of 4 affected teeth per child. In 2017, 1,951 children (35%) across KFL&A were

recommended to have a fluoride varnish treatment to protect their teeth from further dental decay, procedures that would require insurance coverage or out-of-pocket payments.

There are a number of publicly funded dental programs and services available in Kingston. This includes Health Smiles Ontario (for children under 18), Ontario Works, Ontario Disability Support Program, the Ontario Seniors Dental Care Program (fewer than 10% of seniors in KFL&A qualify), and My Kingston-Health Benefits. KFL&A Public Health also administers the Dental Treatment Assistance Fund, meant to provide financial assistance to low-income adults in need of emergency dental care who do not qualify for other means of assistance. In 2019, KFL&A supported 299 requests for assistance, and ran out of funding. Across all programs, the City of Kingston spends nearly $450,000 on dental treatment costs per year.

The aforementioned associations between poor dental health and low SES (as well as other forms of marginalization) make oral health an issue of both social justice and health equity.

The Science of Water Fluoridation

Fluoride promotes oral health in three major ways:[5]

1. Protects the surface of teeth by decreasing the rate of demineralization of the outer layer of the tooth (enamel).
2. Increases remineralization, reversing the decay process.
3. Systemic fluoride (ingested) incorporates with forming tooth structures (especially important in children when teeth are developing). Systemic fluorides also provide topical protection because fluoride is present in saliva, which continually bathes the teeth.

Community Water Fluoridation (CWF) is considered an effective public health measure for preventing tooth decay by the World Health Organization, Health Canada, the Canadian and Ontario Dental Associations, the Canadian Association of Public Health Dentistry, and the American Dental Association.[5]

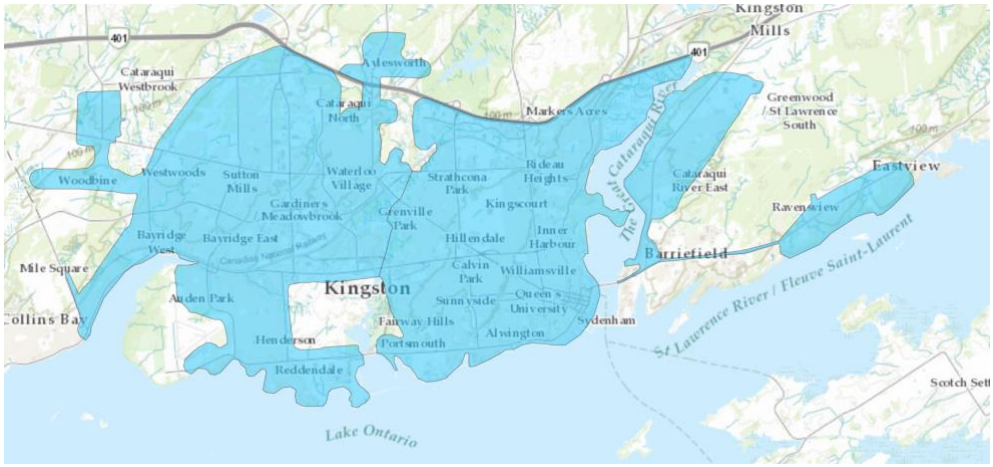
II. Role of Government & Geographical Distribution

Based on the *Fluoridation Act of Ontario*, municipal governments may enact a bylaw to establish, maintain and operate a fluoridation system in connection to the waterworks system. The federal, provincial and territorial governments establish guidelines on fluoridation.

Federal guidelines on fluoride in Canadian drinking water can be found here: Guidelines for Canadian Drinking Water Quality

Provincial guidelines on fluoride in Ontario drinking water can be found here: Safe Drinking Water and Fluoride Monitoring Protocol

Utilities Kingston is responsible for the water management of the Kingston area as outlined below.



In Kingston, the decision to fluoridate the water supply will be made by the City Council, made up of a mayor (currently, Brian Paterson) and 12 city councillors representing distinct geographic regions. In May 2019, Kingston City Council approved a 2019-2022 Strategic Plan with the 5 priorities spanning climate action, housing affordability, transportation, economic development, and health. Within priority 5 **(foster healthy citizens and vibrant spaces),** City Council has committed to "examine the feasibility of fluoridating the drinking water."[6]

In 1966, fluoridation of Kingston's water supply was approved by a direct resident vote, but was later opposed by referendum votes between 1966 and 1978 and was never officially implemented. Because of the Canadian Forces base in Kingston East (formerly Pittsburgh Township), water in this region was fluoridated until 2008 based upon federal policy.

Across Ontario, 71% of people have access to fluoridated water. This includes neighbouring cities of Belleville and Brockville, Ottawa, and Toronto.[7]

In 2016, the Ontario legislature passed a non-binding motion to ban cities from removing water fluoridation in their communities, with support across all primary parties (Liberal Party, New Democratic Party, and Progressive Conservative Party).[8] This motion was seen as mostly symbolic support of community water fluoridation from provincial governing bodies.

III. Logistics of WF & Financial Considerations

Fluoride is a naturally occuring mineral found in nearly all water sources. While fluoride has long been associated with reduced tooth decay, the levels of fluoride that naturally occur in water are not high enough to incur benefit. CWF simply involves adjusting the level of naturally occurring fluoride in public water systems, such that it is at optimal concentrations to provide protection from dental caries.

CWF has been shown to provide significant improvements in dental health at the population level, with estimates of a 25% reduction in dental caries in both children and adults.[9] Additionally, CWF is a cost-effective method of delivering fluoride. According to a recent systematic review by Ran and Chattopadhyay (2016), CWF yields a high return on investment, with a per capita annual benefit ranging from $5.49 to $93.13 per dollar invested.[10] Finally, CWF is a population-preventative intervention that promotes oral health equity by overcoming various social determinants of health, such as age, income and education, all of which impact an individual's ability to access professional dental care.[11] For these reasons, CWF is the most effective and equitable method of delivering fluoride to the population.

Implementing Community Water Fluoridation in Kingston

Fluoridating the water supply in Kingston will be relatively straightforward, given that much of the logistics have already been worked out by other nearby municipalities, such as Brockville

and Belleville. The City of Kingston can look to these municipalities as models for CWF in Kingston.

Following these examples, fluoridation will become the responsibility of the local municipal water provider, Utilities Kingston. Such responsibilities will include adding fluoride to the water supply (likely in the form of fluorosilicic acid, also known as FSA or HFS), and undertaking close monitoring procedures.[11] In Ontario, fluoride additives must meet rigorous standards of quality and purity, as set forth by the *Safe Drinking Water Act* (2002).[12] Health Canada explicitly states that the optimal concentration of fluoride in drinking water is 0.7 mg/L or 0.7ppm.[11] Numerous studies, including recent systematic reviews, have shown that this level of fluoride is both effective for improving dental health.[13–15] Additionally, such studies have continuously demonstrated that fluoridating water to these levels is completely safe. In fact, the Canadian Dental Association assures that "acute fluoride toxicity occurring from the ingestion of optimally fluoridated water is impossible."[5]

Given that fluoridation would fall under the purview of Utilities Kingston, they have been tasked with researching the specific logistics involved in the implementation and long-term provision of CWF in Kingston. These findings have been compiled and submitted to City Council in the form of a private report. While the details are not publicly viewable, potential logistical steps required for CWF include (but are not limited to): notifying residents that water is being fluoridated and utility bills are rising, building of equipment and upgrades for adequate fluoridation at Point Pleasant & King Street Plants, and the implementation of strict monitoring practices.

Predicted Costs

According to the City of Kingston, the foreseeable expenses associated with the aforementioned changes will entail an initial up-front cost of $2-3 million.[16] In addition, Utilities Kingston predicts on-going operative expenses to cost approximately $100,00-300,000 annually.

These costs would be covered by user rates paid on residential water bills, resulting in an increase of approximately $1/month to the average user's water bill.[17] This added expense is minimal compared to the cost-savings incurred through improvements in dental health. Specifically, it is estimated that for every dollar invested in water fluoridation, approximately $38 is saved in averted dental treatment costs.[18] When compared to the cost of other preventative health programs, water fluoridation has repeatedly been shown to be the most cost-effective means for preventing tooth decay for both children and adults.[19]

IV. Stakeholder Perspectives

Process

The committee identified and engaged with community leaders and health experts on the topic of CWF. Stakeholders were consulted in-person, through phone calls, and through email

communication. After consultations were completed, the responses were analysed for themes that helped shape the policy recommendations.

Findings

Impact on Children School-Aged Children

- Water fluoridation would have the biggest impact on the lowest SES communities and those with no dental insurance, particularly for children.
- Preventing dental caries in children, and thereby preventing the pain they may feel from caries, may improve behaviour, attention in classrooms, sleep quality, and allow them to eat healthier foods with harder textures.

Low SES Communities

- Though a $1 dollar/month increase in a water bill may be significant to low SES populations, an increase in cost is necessary health equity, and can ultimately improve for long-term outcomes for oral health in these communities.
- Preventing dental caries can reduce spending on dental procedures for low SES individuals, and result in fewer days of work to recover from those procedures.
- Low SES populations are more likely to not have dental insurance, and would incur out-of-pocket costs for dental surgery. CWF therefore has the greatest cost-benefit benefit for these populations.

Emergency and Primary Care Settings

- Dental pain is a common complaint in the ED and at the family physician office
  - Dental pain typically presents as a fractured tooth, or decay with symptoms suggestive of a periapical abscess (pus at the root of the tooth).
- CWF prevents disease, and in some more mild cases, can reverse decay that is already present.
  - This can alleviate pressure on the healthcare system, with less visits to the ED and family physician.

V. Organizational Perspectives

Many national and international health, medical organizations and dental organizations are in support of water fluoridation. This section serves to highlight these recommendations.

American Dental Association[20]

"The Association endorses community water fluoridation as a safe, beneficial and cost-effective public health measure for preventing dental caries. This support has been the Association's policy since 1950."

Canadian Dental Association[21]

"CDA supports fluoridation of municipal drinking water (at minimum levels required for efficacy as recommended by the Federal-Provincial-Territorial Committee on Drinking Water) as a safe, effective and economical means of preventing dental caries in all age groups. Fluoride levels in the water supplies should be monitored and adjusted to ensure consistency in concentrations and avoid fluctuations."

Health Canada

"We support Community Water Fluoridation as an effective way to prevent tooth decay. It is universally accessible and provides benefits to all members of a community, regardless of their: age, gender, income, ethnicity, education, access to oral health services, ability to afford oral hygiene supplies."[22]

"Community Water Fluoridation has been proven to be a safe, effective and equitable way to prevent and reduce tooth decay (including root decay) for people of all ages - from children to seniors."[23]

KFL&A[24]

"KFL&A Public Health supports community water fluoridation as an effective way to prevent tooth decay".

Ontario Dental Association[5]

"Community water fluoridation (CWF) is a safe and effective means of preventing dental decay. Our position is based on decades' worth of overwhelming scientific evidence and is driven by our dedication to the provision of exemplary oral health care to our patients and communities".

American Academy of Pediatrics[20]

"Water fluoridation is a community-based intervention that optimizes the level of fluoride in drinking water, resulting in pre-eruptive and posteruptive protection of the teeth. Water fluoridation is a cost-effective means of preventing dental caries, with the lifetime cost per person equaling less than the cost of 1 dental restoration. In short, fluoridated water is the cheapest and most effective way to deliver anticaries benefits to communities."

Centers for Disease Control and Prevention (CDC)[20]

"During the 20th century, the health and life expectancy of persons residing in the United States improved dramatically. To highlight these advances, MMWR will profile 10 public health achievements in a series of reports published through December 1999 (Fluoridation of drinking water was chosen as one of these achievements and profiled in the October 22, 1999 MMWR). Fluoridation safely and inexpensively benefits both children and adults by effectively preventing tooth decay, regardless of socioeconomic status or access to care. Fluoridation has played an important role in the reductions in tooth decay (40%- 70% in children) and of tooth loss in adults (40%-60%)."

VI. Special Perspectives

Rural

A study observed that 18% (3 of 17) of Ontario rural distributors fluoridate their water all below the Health Canada recommended range. In contrast, far more urban distribution systems (82%) fluoridate their water. Most of the rural distribution systems had suboptimal fluoride levels.[25] Additionally, it is 6 times more expensive per person to fluoridate water in an area with a population less than 5,000 people, compared to an area with over 20 000 people.[26] This low population density has been highlighted as one of the barriers for rural community fluoridation systems to be put in place, as well as small and private well water use (20% in Ontario).[25]

Indigenous[11]

Only 2.3% of the Indigenous population (on reserve) have access to community water fluoridation nationwide. Those that do, have a Municipal Transfer Agreement that allows them to access water from a municipality. In Ontario, only the Aamjiwnaang community of 640 had access to fluoridated water out of the 51 000 Indigenous people of Ontario (1.2%).

International[27]

A 2014 study from Korea looked at the association of dental caries with SES and CWF, in 11-year olds. In areas of low SES, there was a significant association between SES and the number of decayed, filled, and missing permanent teeth in regions with no water fluoridation—this association was not found in areas with water fluoridation. This study demonstrates that fluoridation helps reduce the prevalence of dental caries and reduces the inequalities that individuals of low SES face in oral health.

VII. Misconceptions and Myths

Anti-Fluoridation Activist Perspective

One of the most prominent opponents of community water fluoridation is the Fluoride Action Network. It should be noted that while they research publications to support their claims, they use these studies in misleading ways (ex. not highlighting the fluoride levels in a study show adverse effects of fluoride, which are usually excessive).[28] Other studies that link water fluoridation to adverse events like neurological deficits and cancer are: not well designed, have limited scientific power, or falsely state a correlation as causation. For example, in 2019 the National Fluoridation Advisory Committee (NFAC) reviewed a paper, “National Toxicology Program Draft Monograph on the Systematic Review of Fluoride Exposure and Neurodevelopmental and Cognitive Health Effects”. This paper found a “moderate level of evidence that high fluoride exposure is associated with decreased IQ and other cognitive effects in children.”[29] The NFAC believes that claim is not well supported, as the study did not take into account a lack of support in other studies, did not properly determine the effect size, and does not distinguish effects from a high exposure of fluoride to any exposure of fluoride.[29]

An idea behind anti-fluoridation comes from not being able to consent to a “medical treatment”. However, many other foods we consume are fortified with other vitamins and minerals that are beneficial to health. For example, in Canada milk is fortified with vitamin D, as many people are unable to reach the recommended dose of vitamin D through diet alone.[30] In addition, fluoride is a naturally occuring mineral in all sources of water.[19] CWF simply gets fluoride levels to a concentration that can prevent tooth decay while minimizing dental fluorosis.[19]

More information on Misconceptions and Myths can be found here: Fluoridation Facts

VIII. Policy Recommendations

We ask that the Kingston City Council support the implementation of CWF in Kingston, considering the burden adverse oral health has on the population, and how CWF as a public health intervention can alleviate that burden. We ask that this is implemented in accordance with Ontario’s 2018 *Safe Drinking Water and Fluoride Monitoring Protocol*. As such, the following are our policy recommendations:

1. Ensure the fluoride concentration is kept within the therapeutic range of 0.6-0.8 ppm, ideally at the optimal concentration of 0.7 ppm.
2. Continue working with KFL&A Public Health to educate the public on the benefit of community water fluoridation and safe oral health practices.
3. Work with KFL&A Public Health to track oral health outcomes after the implementation of water fluoridation.

The 2018 Safe Drinking Water and Fluoride Monitoring Protocol can be found here: Safe Drinking Water and Fluoride Monitoring Protocol

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