

Ethics Consultation Report
Ethical Considerations in Community Water Fluoridation

Presented to
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by the
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Public Health Ethics Consultative Group

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1. Summary

- The Public Health Ethics Consultative Group brought an ethics lens to the questions raised regarding the ethical acceptability of: (1) overriding individual consent to obtain the population-level health benefits associated with community water fluoridation; and (2) withholding a beneficial public health measure based on unknown risks. The following guiding principles were taken into account: respect for persons and communities; beneficence and stewardship; non-maleficence; trust; justice; least restrictive or coercive means; inclusiveness; and transparency.
- Community water fluoridation aims to protect oral health by preventing the development of dental caries. However, the nature of water fluoridation is such that it is impossible to seek informed consent from all individuals in a community and offer the intervention only to those who have consented. This raises ethical concerns with regard to respect for autonomy.
- The principles of beneficence and stewardship could be relied upon to argue that the state has a duty to provide interventions that reduce the risks of ill health, including dental caries, and that community water fluoridation is therefore ethically justifiable.
- It could also be argued that community water fluoridation fulfills public health's mandate to: (1) improve human well-being by improving health; and (2) to do so in particular by focusing on the needs of those who are most disadvantaged, or whose needs deserve special consideration, such as children.
- Community water fluoridation may entail limitations on individual choice that are no greater than those of other widely accepted public health interventions such as iodization of salt, fortification of milk and public health surveillance.
- Alternative public health measures for the prevention of dental caries include school programs that implement tooth brushing with fluoridated toothpaste, and programs that fund the topical application of fluoride gels, foams or varnishes by a professional. These options arguably entail less infringement of individual autonomy. If evidence shows that these alternatives are not as effective, all things considered, than community water fluoridation, the argument could be made that community water fluoridation and the limitation of individual choice that it entails, are ethically justifiable given that the

less coercive alternatives have failed. That being said, the legal validity of such a policy is a distinct question, one that is not within the mandate of this committee.

- Given the current state of evidence regarding water fluoridation, the most ethically appropriate way to decide whether to implement, continue or discontinue community water fluoridation programs may be to rely on democratic decision-making processes that include adequate efforts at community education and awareness, meaningful community consultation, and inclusive, open and transparent decision-making. This would engage community members in a collective deliberation about the relative value they assign to protection of the health of the most vulnerable members of the community and to the freedom to decide for oneself what chemicals a person ingests.
- It may be valuable for the Office of the Chief Dental Officer to seek a legal opinion on the authority of governments to make decisions regarding community water fluoridation and the circumstances under which such decisions are legally justifiable.
- Further research on the public's opinion regarding community water fluoridation and on the impact of cessation of water fluoridation programs on oral health would be valuable in order to gather high quality up-to-date evidence.

2. Ethics Advice Request

Dental decay remains a significant public health concern in Canada, particularly affecting disadvantaged populations. Community water fluoridation is recognised as a safe and cost-effective public health measure to address this concern. It contributes to oral health equity as it reaches all residents in a community, regardless of age, socioeconomic status, education, employment, dental insurance status, or access to oral health care. However, some advocates oppose community water fluoridation on scientific, ethical and political grounds.

While the fluoridation of drinking water supplies is a decision that is made by each municipality, in collaboration with the appropriate provincial or territorial authority, federal agencies are often called upon to provide authoritative technical advice on the subject. As a federal technical authority responsible for informing oral health issues from a national perspective, the Office of the Chief Dental Officer (OCDO) took the opportunity to engage the Public Health Ethics Consultative Group (PHECG) in a discussion about ethical considerations related to community water fluoridation. Dr. James Taylor, Chief Dental Officer, and members of his team (Lisette Dufour, Senior Oral Health Advisor, and Khady Ka, Senior Policy Analyst) met with members of the PHECG (Drs. Catherine Régis, Diego Silva, Ross Upshur, Eric Wasylenko and Daniel Weinstock, and Ms. Cassandra Opikokew Wajuntah) and its Secretariat on October 16, 2018, to discuss this issue.

2.1 Questions

The Chief Dental Officer asked two questions of the PHECG:

1. To what extent and under what circumstances is it ethical to allow for the infringements of individual rights to obtain a population-level health benefit – especially for the most vulnerable of our society? Does CWF meet these circumstances?
2. Is it ethical to withhold a public health measure known to be beneficial, particularly to the most vulnerable, based on a minimum of unknown risk?

2.2 Background information

Dr. Taylor delivered a presentation to the PHECG, in which he outlined the mandate of the OCDO, provided background information on community water fluoridation, and discussed the OCDO's past and current actions regarding community water fluoridation, as well as arguments presented by those who oppose fluoridation.

The PHECG understands that:

- Community water fluoridation is the process of monitoring and adjusting the fluoride level in drinking water to the optimal level for caries prevention.
- It is recognised by public health bodies such as the World Health Organization, the Canadian Dental Association and the Public Health Agency of Canada as a safe, equitable and cost-effective public health measure to prevent dental decay.
- Reviews of currently available evidence have concluded that water fluoridation is effective at reducing levels of dental caries in children. However the quality of evidence from the reviewed studies was such that confidence about the magnitude of benefits and risks for the overall population and for specific groups, and its applicability to current lifestyles, was limited.
- The principal risk associated with water fluoridation is fluorosis, which can occur when ingestion of fluoride during enamel formation significantly exceeds the maximum acceptable concentration.
- There is an emerging literature on other health risks, however, there is currently no consensus on the causal link between fluoridation and these risks.
- Community water fluoridation is an intervention that reaches all members of a community, including underprivileged and difficult to reach populations who may not have access to other prevention measures.
- The next best option for the prevention of dental caries is twice-daily brushing with the use of fluoridated toothpaste, following a prescribed protocol.
- When young children have extensive tooth decay, the treatment of cavities may require general anesthesia. Dental caries are the leading cause for elective general anaesthetic surgery in pediatric hospitals.¹ The largest group of children needing such surgery is Indigenous children.
- A small but vocal group of advocates opposes water fluoridation on the basis that it:
 - is associated with several adverse health effects, such as cancer, bone fractures, heart disease, birth defects, kidney problems, goiters, ulcers, anemia and spontaneous abortion;²
 - represents a form of mass medication;
 - interferes with freedom of choice; and

¹ A study conducted by the Canadian Institutes for Health Information concluded that, in Canada, there were 12.5 day surgery operations for early childhood caries per 1,000 children age 1 to younger than 5 during the period 2010 to 2012. Canadian Institute for Health Information, *Treatment of Preventable Dental Cavities in Preschoolers: A Focus on Day Surgery under General Anesthesia* (Ottawa: Canadian Institute for Health Information, 2013) at 6, online: Canadian Institute for Health Information <https://secure.cihi.ca/free_products/Dental_Caries_Report_en_web.pdf>.

² J. Stoneman, L. Wallar and A. Papadopoulos, *Community Water Fluoridation in Canada – Trends, Benefits and Risks* (Vancouver: National Collaborating Centre on Environmental Health, 2014) at 5, online: National Collaborating Centre on Environmental Health <http://www.nccch.ca/sites/default/files/Community_Water_Fluoridation_Feb_2014_0.pdf>.

- is harmful to the environment.
- Some municipalities such as Waterloo and Windsor in Ontario, Calgary in Alberta and Saint John and Moncton in New Brunswick have opted to remove fluoridation from the community water supply for various reasons, including: cost, lack of scientific consensus, the need to prove beyond a shadow of a doubt that fluoridation is not harmful, perceived risk of liability for any harms associated with fluoridation, the existence of other sources of fluoride and other means of preventing tooth decay, ethical concerns related to medicating whole populations, and libertarian arguments.³
- There is little evidence regarding the long term impact of fluoridation cessation on the dental health of the affected populations and of specific groups within these populations. However, there is anecdotal evidence showing an increase in number of cavities, their severity, and the speed at which they deteriorate.⁴

3. Ethics Analysis

3.1 Guiding principles

During its deliberations, the PHECG was guided by the following ethical dimensions, which are set out in public health ethics sources such as the *Framework for Ethical Deliberation and Decision-Making in Public Health*,⁵ the Nuffield Council on Bioethics' report, *Public Health: Ethical Issues*⁶ and *Principles for the Justification of Public Health Intervention*⁷:

³ T. Weldon, "Moncton Votes to Keep Fluoride Out of Water" (19 September 2017) CBC News, online: Canadian Broadcasting Corporation <<https://www.cbc.ca/news/canada/new-brunswick/fluoride-moncton-debate-vote-no-1.4296075>>; T. Howell, "Calgary City Councillors Defend Fluoride Decision" (18 February 2016) Calgary Herald, online: Calgary Herald <<https://calgaryherald.com/news/local-news/calgary-city-councillors-defend-fluoride-decision>>; J. Gerson, "Calgary's Poor Suffered When City Councillors Bought Into Conspiracy Theories About Fluoride" (12 September 2016) National Post, online: National Post: <<https://www.cbc.ca/news/canada/new-brunswick/fluoride-moncton-debate-vote-no-1.4296075>>; CBC News, "Saint John Council Votes to Stop Putting Fluoride in Water" (11 March 2014) CBC News, online: Canadian Broadcasting Corporation <<https://www.cbc.ca/news/canada/new-brunswick/saint-john-council-votes-to-stop-putting-fluoride-in-water-1.2567770>>.

⁴ J. Lagerquist, "Dentists not Smiling 5 Years After Fluoride Removed from Moncton Water" (19 December 2016) CTV News, online: CTV News <<https://www.ctvnews.ca/health/dentists-not-smiling-5-years-after-fluoride-removed-from-moncton-water-1.3210382>>; CBC News, "Tooth Decay Up in Calgary Kids After Fluoride Removed from Drinking Water: Study" (14 September 2016) The Current, online: Canadian Broadcasting Corporation <<https://www.cbc.ca/radio/thecurrent/the-current-for-september-14-2016-1.3761300/tooth-decay-up-in-calgary-kids-after-fluoride-removed-from-drinking-water-study-1.3761326>>; E. Ferguson, "Years After Calgary Dumped Fluoride, Schools and Dentists Ramp Up Efforts to Battle Cavities" (31 July 2017) Calgary Herald, online: Calgary Herald <<https://calgaryherald.com/news/local-news/years-after-calgary-dumped-fluoride-schools-dentists-ramp-up-efforts-to-battle-cavities>>.

⁵ Public Health Agency of Canada, *Framework for Ethical Deliberation and Decision-Making in Public Health* (Ottawa: Public Health Agency of Canada, 2016), online: Public Health Agency of Canada

- **respect for persons and communities**, which entails recognition that all persons have unconditional worth and, as such, are due consideration and respect. Respect for persons also includes respect for autonomy, *i.e.* acknowledging people’s capacity and interest in making choices about their own destiny;
- **beneficence or stewardship**, or the duty of public health authorities to act for the welfare of persons and the population, and to pay special attention to groups whose circumstances may be a source of vulnerability, including children;
- **non-maleficence**, which entails an obligation to avoid causing harm to others or to minimise the risk of harm so that any harms, and the risk that they may occur, are lesser in proportion to the benefits being pursued and the need addressed;
- **trust**, which refers to the confidence that individuals and the public have in public health institutions, in particular in their reliability, integrity, and good will;
- **justice**, which entails an obligation to minimise as much as possible inequities in the distribution of burdens and benefits linked to a public health initiative, and considering the potential impact of initiatives on different groups, individuals and populations, including ones that can easily become invisible or be overlooked, such as children;
- **least restrictive or coercive means**, which recognises that a variety of actions can be implemented to attain a public health objective, and that more intrusive or coercive interventions should be used only when less intrusive or coercive ones are unsuccessful.
- **inclusiveness**, which requires that groups or individuals who have a stake in an initiative have the opportunity to be engaged, provide input into deliberations, and challenge proposed initiatives; and

<<https://www.canada.ca/content/dam/phac-aspc/documents/corporate/transparency/corporate-management-reporting/internal-audits/audit-reports/framework-ethical-deliberation-decision-making/pub-eng.pdf>>.

⁶ Nuffield Council on Bioethics, *Public Health: Ethical Issues* (London: Cambridge Publishers, 2007), online: Nuffield Council of Bioethics <<http://nuffieldbioethics.org/wp-content/uploads/2014/07/Public-health-ethical-issues.pdf>>.

⁷ R.E.G. Upshur, “Principles for the Justification of Public Health Intervention” (2002) 93:2 Can J Public Health 101. Other public health ethics frameworks include: N.E.. Kass, “An Ethics Framework for public Health” (2001) 91:11 Am J Public Health 1776; J.F. Childress *et. al.*, “Public Health Ethics: Mapping the Terrain” (2002) 30:2 J. Law, Medicine & Ethics 170; J.F> Childress and R.G. Bernheim *et al.*, “Introduction: A Framework for Public Health Ethics” in *Essentials of Public Health Ethics* (Burlington, MA.: Jones and Bartlett Learning, 2013) at 3.

- **transparency**, or operating in such a way that stakeholders know, in a full, accurate and timely manner, what decisions are being made, why and what criteria were applied.

3.2 Limiting individual choice to protect the public good

Many public health measures involve interventions that have an impact on whole populations or communities. Given the nature of these interventions, it is generally impossible to seek informed consent from all those who are affected by the intervention and to then offer the intervention only to those who have consented. This, it can be argued, constitutes an infringement of individuals' autonomy and their interest in self-determination. In certain circumstances however, it is ethically acceptable to limit individuals' choice in order to obtain a population-level health benefit.

Community water fluoridation is an example of a public health measure that involves a limitation of individuals' interest in choosing for themselves, for the benefit of the population. A number of factors must be considered in order to determine whether these limitations are ethically justified in this specific case. The first step is to identify the public health goals of community water fluoridation. It aims to protect oral health by preventing the development of dental caries. The question therefore arises: what is the likelihood that community water fluoridation will achieve this goal for all members of the community?

3.2.1 Evidence of benefits and potential harms of water fluoridation

Much research has been carried out since the introduction of community water fluoridation in order to assess its impact on oral health.⁸ These studies have been relied upon to state that community water fluoridation has been instrumental in the overall global reduction of dental caries. However, systematic reviews of research related to water fluoridation concluded that there were relatively few high-quality studies, the reviewers citing concerns about methodology, reporting of results and confidence intervals. The reviewers also noted that many of the studies were conducted prior to the widespread availability of fluoridated

⁸ Two widely cited systematic reviews have assessed the literature on water fluoridation: Z. Iheozor-Ejiofor *et al.*, "Water Fluoridation for the Prevention of Dental Caries" (2015) 5 Cochrane Database of Systematic Reviews, Art. No.: CD010856, online: Cochrane Library <<https://www.cochranelibrary.com/cdsr/doi/10.1002/14651858.CD010856.pub2/full>> [hereinafter Cochrane Review]; and M. McDonagh *et al.*, *A Systematic Review of Public Water Fluoridation* (York: NHS Centre for Reviews and Dissemination: 2000) [hereinafter York Review]. Evidence reviews also include: Stoneman, Wallar and Papadopoulos, *Supra* note 2, and L. MacLaren and L. McIntyre, *Drinking Water Fluoridation in Canada: Review and Synthesis of the Published Literature* (Ottawa: Public Health Agency of Canada, 2011), online: ResearchGate <https://www.researchgate.net/publication/268048427_Drinking_water_fluoridation_in_Canada_Review_and_synthesis_of_published_literature_Prepared_by>.

toothpaste and other fluoridated products.⁹ Nonetheless, some reviewers conclude that on balance the evidence supports the effectiveness of water fluoridation in the reduction of dental caries more than it refutes it.¹⁰

Those who oppose fluoridation can use that same research to argue that the evidence is insufficient to justify the infringement of individual rights. They could argue for example that these studies are not applicable today given the availability of other sources of fluoride, that the methodologies were flawed and the study limitations too great, and that recent research shows that the effectiveness of fluoridation has declined. They could also argue that fluoridation is harmful, that associations have been observed between dental fluorosis and fluoride levels, and that recent studies have identified other detrimental health effects associated with fluoride exposure.¹¹

A number of municipalities have opted to stop fluoridating their water in recent years. This raises another evidentiary question: does cessation of community water fluoridation lead to an increase in dental caries? A 2016 study of Calgary and Edmonton children concluded that dental caries in primary teeth increased more in Calgary after fluoridation cessation, and that there were indications of deleterious effects for permanent teeth. The authors also concluded that the impact of fluoridation cessation “varies by time and place,” that the reasons for these variations are unclear, and that further research was needed.¹² There is an opportunity, and arguably a duty, to gather evidence through well-designed longitudinal studies about the longer term impact of these decisions on the rate of dental caries in the overall population, and in specific sub-populations, of municipalities who discontinue water fluoridation.

3.2.2 Arguments based on individual rights

It is possible to argue that community water fluoridation raises ethical concerns because it does not respect the autonomy of individuals and their right to choose whether or not to be subject to an intervention that has an impact on their health or touches on another important area of their lives.

⁹ Cochrane Review, *ibid.*; York Review, *ibid.*

¹⁰ MacLaren and McIntyre, *supra* note 8 at 30.

¹¹ See for example S. Kirkey, “Researchers Urge Caution Over Study Linking Fluoride Exposure in Pregnancy to Lower IQs in Children” (20 September 2017) National Post, online: National Post <<https://nationalpost.com/health/researchers-urge-caution-over-study-linking-fluoride-exposure-in-pregnancy-to-lower-iqs-in-children>>.

¹² L. McLaren *et al.*, “Measuring Short-Term Impact of Fluoridation Cessation on Dental Caries in Grade 2 Children Using Tooth Surface Indices” (2016) 44 Community Dent Oral Epidemiol 274 at 280. The Cochrane Review concluded that there was insufficient information in the literature to determine the impact of discontinuing water fluoridation programs on levels of dental caries in the population. *Supra* note 8.

From a libertarian perspective, the role of the state is to ensure that members of the population are able to enjoy their natural rights to life, liberty and property without interference from others. Public health programs should be limited to those that are essential for the enjoyment of natural rights.¹³ Interventions should therefore be minimised, even if they confer benefits. This approach could be used to claim that community water fluoridation would be considered acceptable only if all individuals in the community consent to receive fluoridated water, with full knowledge of the potential benefits and risks. However, the nature of community water fluoridation is such that it would be impossible to give each individual in a community the right to choose to receive fluoridated water or not. Municipal water systems provide the same water to all homes and buildings within the territory they serve; there is no ability to accommodate individual choice for fluoridated or non-fluoridated water. Even if a water fluoridation program was implemented only after obtaining the consent of all individuals who reside in the implicated area, there would still be individuals who receive fluoridated water without having the opportunity to choose, namely those who are not residents of the area, but are nonetheless in the area temporarily (*e.g.* visitors, individuals who work in the area but do not reside there), and those who become residents of the area after the consultation has been concluded.¹⁴ In this view, given that it is impossible in practice to obtain the consent of all affected individuals, and consequently to respect their autonomy, community water fluoridation is ethically problematic.

Arguments based on the primacy of individual rights could also be used to argue in favour of initiating and maintaining community water fluoridation. Individuals could argue that they have an individual right to public health and to health protection, including to measures that protect their oral health.¹⁵ That should include water fluoridation given that it is the most efficient, safe and cost-effective measure for the prevention of dental caries.

The weight of these arguments depends on the impact of water fluoridation on the health of the implicated individuals, in particular the benefits expected in relation to potential harms to which people would be exposed. Willingness to accept even a minor risk of harm could be dependent on perception of the importance of the health issue that is being addressed. If dental caries and disease are not perceived as an important health issue, individuals may believe that infringement of their ability to choose is not justified. As noted above, reviews of currently available evidence identified tangible benefits associated with community water fluoridation, however the strength of these studies and their applicability to the contemporary

¹³ Nuffield Council on Bioethics, *supra* note 6 at 13-14.

¹⁴ *Ibid.* at 129.

¹⁵ J. Wilson, "The Right to Public Health" (2016) 42 J Med Ethics 367, online: British Medical Journal <<https://jme.bmj.com/content/medethics/42/6/367.full.pdf>>, DOI: <<http://dx.doi.org/10.1136/medethics-2015-103263>>.

context has been questioned. The reviews also identified dental fluorosis as the main risk, which is principally an aesthetic concern rather than a serious health threat. The reviews concluded that there was no evidence of association between fluoridation and other alleged health threats such as cancer or bone fractures.¹⁶ Given the nature of the potential harms of fluoridation and the quality of the available evidence, it could be argued that accepting these arguments would give too much weight to individual rights.

3.2.3 The mandate to protect the public's health

The principles of beneficence and stewardship support the argument that states have a duty to take action to protect and promote the health and well-being of the population. Governments currently use a myriad of instruments to reduce the risks of ill health and injuries, and to create conditions that support good health. For example, environmental regulations set standards for air quality; sanitation and water treatment services reduce the spread of pathogens through the environment and the municipal water supply; transportation plans favor active modes of transportation; inspection of food outlets and personal care service providers verify that food safety and sanitary standards are followed; public funding of childhood vaccinations prevent the spread of infectious diseases; and support for smoking cessation programs aims to prevent chronic diseases. It can be argued that with community water fluoridation, municipal governments have access to an easy to use, safe, efficient and cost-effective means of reducing dental caries and thus protecting the health of their populations. They should therefore provide this intervention. This extent of this duty however depends on the extent of the benefits conferred by water fluoridation and the potential risks of harms.

3.2.4 Addressing the needs of disadvantaged populations

One of the fundamental values that underpin public health is social justice. Indeed, the central goals of public health can be described as “to improve human well-being by improving health and to do so in particular by focusing on the needs of those who are most disadvantaged.”¹⁷ In planning and making decisions about public health interventions, governments should therefore take stock of “existing patterns of disadvantage and their detrimental consequences,”¹⁸ and aim to remedy these so that all members of society can benefit from the intervention, thus attaining ameliorated levels of well-being.

In order to promote social justice, it is therefore necessary to consider the existence of inequalities in dental health in the community, and to identify the factors that contribute to

¹⁶ Cochrane Review, *supra* note 8; York Review, *supra* note 8 at 67.

¹⁷ M. Powers and R. Faden, *Social Justice: The Moral Foundations of Public Health and Health Policy* (New York: Oxford University Press, 2006) at 81-82.

¹⁸ *Ibid.* at 87.

these inequalities. Given that in Canada, most dental health services are not covered by Medicare or other public insurance, access to these services is highly dependent on ability to pay for them. Recent data shows that 32 percent of all Canadians have no dental insurance, and that this percentage rises to 50 percent for Canadians who are in the lower income bracket.¹⁹ Not surprisingly, Canadians from lower income families have worse oral health outcomes than those from higher income families.²⁰ Lack of access to oral health care has a significant impact on overall health, well-being and quality of life. Dental disease can cause pain, interfere with eating, disrupt sleep and productivity, and lead to tooth loss, which compromises diet and nutrition and increases the risk of infection. It also negatively affects psychological and social well-being, given its impact on self-esteem and the potential for stigma that limits opportunities for education, employment and social relationships.²¹

Community water fluoridation could therefore be justified on the basis that it may potentially improve dental health, particularly for disadvantaged populations. Further, when considering cessation of community water fluoridation, particular consideration should be given to the disproportionate impact of that decision on those who face various disadvantages, including poor oral health and lesser access to dental health services.

3.2.5 Specific concerns for the well-being of children

From the perspective of social justice, the well-being of children is of particular concern because the level of well-being during a person's young years has an impact on his or her capabilities in adulthood and therefore on available opportunities and choices later in life. Moreover, children's needs deserve particular consideration because they are not in a position to exercise control over their own well-being. Rather, much of their well-being depends on the actions of others.²² Children are at risk of developing dental caries, yet they are limited in their ability to make choices for themselves. They are dependent on parents or other caregivers for assistance with, or promotion of, tooth brushing and other preventative measures, and for accessing dental health care services. Children who live in precarious situations or who lack a stable environment are therefore particularly at risk. Dental caries in general can be painful and can lead to infection, but in early childhood they are difficult to

¹⁹ Health Canada, *Summary Report of the Findings of the Oral Health Component of the Canadian Health Measures Survey, 2007-2009* (Ottawa: Minister of Health, 2010) at 5, online: Health Canada <http://publications.gc.ca/collections/collection_2010/sc-hc/H34-221-1-2010-eng.pdf>.

²⁰ Health Canada, *Report on the Findings of the Oral Health Component of the Canadian Health Measures Survey, 2007-2009* (Ottawa: Minister of Health, 2010) at 53, online: Health Canada <http://publications.gc.ca/collections/collection_2010/sc-hc/H34-221-2010-eng.pdf>.

²¹ National Advisory Council on Dental Health, *Outcomes and Impact of Oral Disease*, online: Department of Health of Australia <http://www.health.gov.au/internet/publications/publishing.nsf/Content/report_nacdh~report_nacdh_ch1~report_nacdh_out>.

²² Powers and Faden, *supra* note 17 at 92.

treat.²³ Their treatment can increase risk to children's health, especially if the extent of tooth decay is such that general anaesthesia is required. Moreover, poor oral health in childhood has lasting effects on individuals' long-term health and well-being. It can therefore be argued that the state's duty to act to protect public health, including through water fluoridation, is greater when the affected population includes children.

3.2.6 Fluoridation compared to other public health interventions

It can also be argued that while community water fluoridation does interfere with personal choice, this interference is no greater than that of other public health interventions that are carried out for the benefit of the population's health. For example, various regulations require that substances be added to certain foods in order to address health issues resulting from nutritional deficiencies. Iodine deficiency is associated with developmental disabilities, low cognitive function and goitre.²⁴ In order to prevent these ill-health effects, salt sold in Canada for table or general household use must be iodised.²⁵ Similarly, vitamin D deficiency in children is associated with an increased risk of rickets, a condition in which children have soft bones and skeletal deformities. In adults, it is associated with a higher risk of osteoporosis.²⁶ The Canadian Food and Drug regulations therefore require that vitamin D be added to milk.²⁷ Iodization of salt and fortification of milk are similar to water fluoridation in that they involve the modification of products that are considered basic, if not essential, products in most kitchens, and are therefore commonly ingested. It would also be difficult for individuals who do not wish to consume iodised table salt or fortified milk to purchase salt and milk that do not contain these additives. Individual choices are therefore similarly limited through federal regulations. However, milk fortification and salt iodization are generally perceived as justifiable interventions for the protection of the population's health.

Public health surveillance also entails an infringement of individual rights for the benefit of the population's health. Potentially sensitive data is routinely collected about individuals without their consent, combined with data from various sources, analysed using in a number of different methodologies, and included in reports to various public health organisations so that it can inform public health actions, programs and interventions that aim to protect or improve

²³ Canadian Dental Association, *CDA Position on Use of Fluoride in Caries Prevention* (Ottawa: Canadian Dental Association, 2012), online: Canadian Dental Association <https://www.cda-adc.ca/files/position_statements/fluoride.pdf>.

²⁴ World Health Organization, *Guideline: Fortification of Food-Grade Salt With Iodine for the Prevention and Control of Iodine Deficiency Disorders* (Geneva: World Health Organization, 2014) at 12, online: World Health Organization <http://apps.who.int/iris/bitstream/handle/10665/136908/9789241507929_eng.pdf?ua=1>.

²⁵ Food and Drug Regulations, C.R.C. c. 870, s. B.17.003.

²⁶ T. Janz & C. Pearson, "Vitamin D Blood Levels of Canadians" (2013) Health at a Glance, catalogue # 82-624-X, online: Statistics Canada <<https://www150.statcan.gc.ca/n1/pub/82-624-x/2013001/article/11727-eng.htm>>.

²⁷ C.R.C. c. 870, s. B.08.003.

health. With many surveillance systems, individuals do not have the possibility of refusing that their data be collected, used and disclosed. Though they are of a different scale, the restriction, inherent in surveillance, of individuals' ability decide for themselves on an issue of personal importance (*i.e.* with whom to share intimate information about oneself), could be considered similar to the restrictions of freedom of choice that water fluoridation entails. Nonetheless, public health surveillance is considered ethically justified when it meets certain criteria. The claim could even be made that governments have a duty to collect information in order to identify existing and emerging public health threats and to provide programs and interventions that meet the needs of the population.

3.3 Alternative approaches to community water fluoridation

In determining whether it is ethically justifiable to override individual consent in order to provide the benefits of community water fluoridation, it is important to consider whether there are any less coercive approaches that can achieve the same goal. Other public health measures can be used to prevent dental caries in disadvantaged populations, such as:

- school programs that implement tooth brushing with fluoridated toothpaste; and
- programs that fund the topical application of fluoride gels, foams or varnishes by a professional.

These options are less coercive than community water fluoridation, given that they are carried out with parental consent and therefore respect the parents' choice whether to have their children participate in the programs or not. They however require individuals to take action proactively and potentially to change their behaviours. In contrast, water fluoridation does not require individuals to do anything to have access to the intervention or to do things differently; the measure, once implemented in a community, automatically reaches all members of the community. It should be noted that many Canadians, particularly those in remote and rural areas, do not have access to municipal water supplies. The reduction of oral health inequalities and their impact on overall health and well-being therefore requires efforts over and above community water fluoridation.²⁸

The question nonetheless arises, how do the effectiveness of these programs in preventing dental caries, their costs, and the associated benefits and harms compare to those of community water fluoridation? This requires assessing available evidence, addressing any gaps in the evidence, and finally carefully considering all the evidence, including that of differential impact on various groups within the population. If the evidence shows that the school programs for tooth brushing and community programs for the application of fluoride gels, foams or varnishes are not as effective, all things considered, as community water fluoridation

²⁸ MacLaren and McIntyre, *supra* note 8 at 3.

in caries prevention for all groups, the argument could be made that community water fluoridation and the infringement of individual choice that it entails, are ethically justifiable given that the less coercive alternatives have failed.

3.4 The value of democratic decision-making

The principles of inclusiveness and transparency highlight the importance of engaging the population who will be affected by a proposed public health measure in the decision-making process, as well as ensuring that members of the population have timely access to clear information about the decision process and the decision itself. Often times in public health, decisions appear to be made by experts or on the basis of expert evidence only. This can have a negative impact on the population's acceptance of health recommendations, interventions, or other public health measures such as community water fluoridation, particularly when an issue is polarised. Moreover, when scientific evidence is insufficient, lacks strength, or is complex, the decision may be more subject to criticism, and its impact on the population's health and well-being, unclear.

As noted in the sections above, the weight of many of the ethics arguments that can be made regarding community water fluoridation depends on available evidence. The evidence on water fluoridation is complex and continues to evolve. Recent systematic reviews have raised concerns about the strength of existing evidence and its applicability to the current context. Given the current state of knowledge, adding fluoride to water as well as discontinuing or not initiating fluoridation could entail harms. On one hand, ceasing to add, or not adding, fluoride could deprive community members of a measure that protects oral health. On the other, adding fluoride could limit individuals' ability to make personal choices and potentially contribute to fluorosis for some members of the community. The issue of community water fluoridation continues to be a source of controversy and polarization. In these circumstances, the most ethically appropriate way to decide whether to implement, continue or discontinue community water fluoridation programs may be to rely on democratic decision-making processes.²⁹ Such processes would include:

- carrying out community education and awareness initiatives;
- publishing clear and understandable plans in an accessible format, in a timely fashion;
- meaningful consultation with the community;
- the opportunity for community members to challenge the intervention and the rationales relied upon by proponents of the decision;
- a response to the issues raised during the consultation; and
- open and transparent decision-making.

²⁹ Nuffield Council on Bioethics, *supra* note 6 at 136.

Meaningful public engagement and consultation requires a certain level of knowledge about, and understanding of, the issues and options on which the community members are being asked to express their opinions. In a 2008 survey of Canadian adults' opinions on community water fluoridation, only 45 percent of respondents had heard of or read about community water fluoridation.³⁰ Any community consultation should therefore be accompanied by measures to increase public awareness of community water fluoridation and the links between fluoride and dental health.

Effective democratic decision-making also requires access, for all involved, to clear and accurate information that enables users to obtain a good understanding of current evidence, its strength, and its weaknesses.

To this end, the PHECG members recommend the following in order to address gaps in current knowledge or specific needs:

- seeking legal advice on the authority of governments to make decisions regarding community water fluoridation and the circumstances under which such decisions are legally justifiable.;
- conducting further research on Canadians' opinions about community water fluoridation;
- continuing to monitor the effects of water fluoridation on health; and
- designing and conducting longitudinal studies on the impact of cessation of community water fluoridation.

This will enable communities to make decisions that are informed by relevant social values and by the evidence base as it evolves.

While calling for this research to assist in best decisions, and recognizing that community water fluoridation will be a long term issue, guidance to current decision-makers is warranted.

After deliberating on this ethical analysis, the PHECG believes that well-developed community education programs and democratic decision-making processes that engage communities on this issue are warranted. From a public health benefits perspective, the PHECG is persuaded by the strength of arguments that suggest community water fluoridation is ethically permissible and justified, despite the infringement on individual liberty to choose for oneself.

³⁰ C.R. Quiñonez and D. Locker, "Public Opinions on Community Water Fluoridation" (2009) 100:2 Can J Public Health 96 at 97.