FDI and IADR Joint Statement on Fluoride Use

Purpose

This policy statement sets out IADR's and FDI's position on the use of fluoride as a public health measure for the prevention and management of dental caries. It is intended to guide member associations, health professionals, policymakers, and partner organizations in advocating for and implementing evidence-based fluoride use across diverse national and regional contexts.

Background

Dental caries remains the most prevalent chronic disease worldwide, affecting children, adults, and older people across all nations and socioeconomic groups. It causes pain, infection, tooth loss, and functional impairment and can contribute to broader systemic health consequences while also imposing substantial social and economic costs through reduced productivity (Dunleavy et al. 2024, Li et al. 2025). Despite ongoing public health efforts, it remains a major global public health challenge that hinders an individual's ability to speak, chew, and convey emotions with confidence and without discomfort. There are significant inequities in how populations and individuals access the required levels of prevention according to their needs.

Fluoride is the most extensively researched and proven agent for caries prevention. Over 80 years of research and systematic reviews have demonstrated that water fluoridation is an effective public health measure for preventing dental decay in both children and adults. The evidence base for fluoride toothpaste is equally robust: since the 1970s, fluoride toothpaste, independently or alongside water fluoridation, has been responsible for significant reductions in caries rates globally. Professional applications of fluoride provide further means to deliver higher levels of prevention and management to individuals with greater needs.

Policy Statement

The International Association for Dental Research (IADR) and the FDI World Dental Federation (FDI) strongly affirms that fluoride is a safe, effective, and essential component of dental caries prevention and management across the life course, at individual, community, and population levels. IADR and FDI align their position with the policy statements of the World Health Organization (WHO) and multiple national and professional organizations. It also supports global oral health priorities, including the WHO Global Strategy and Action Plan on Oral Health 2023–2030, universal health coverage, health equity, and the Sustainable Development Goals. Fluoride is most effective as one element of a comprehensive preventive approach that also includes reducing sugar intake, regular plaque removal, and routine professional care.

In supporting the use of fluoride for caries prevention, both FDI and IADR recognize the need for context-specific policies that reflect local geographic and climatic conditions. Such policies should consider the feasibility and appropriate level of water fluoridation, exposure from other fluoride sources, and evidence-based guidance on the different modalities of fluoride use.

Importance of Fluoride in Contemporary Society

With increasing sugar consumption in industrialized countries during the latter part of the nineteenth century and now in virtually all countries, dental caries became and remains a common disease, with tooth loss as a frequent consequence. WHO estimates that oral diseases affect almost 3.7 billion people worldwide, while untreated dental caries in permanent teeth remains the most prevalent condition identified in the Global Burden of Disease Study 2021 (WHO, 2022; Bernabé et al., 2025). As with many chronic diseases, socially and economically disadvantaged populations experience the greatest burden, creating a major global public health challenge (WHO, 2022; Bernabé et al., 2025). In this context, the prevention of dental caries aligns closely with several United Nations Sustainable Development Goals, particularly those relating to health and well-being, the reduction of inequalities, quality education, and sustainable communities.

The discovery of fluoride's role in preventing and controlling dental caries marked the beginning of a new era in preventive dentistry. Following extensive research demonstrating an association between naturally occurring fluoride in drinking water and lower levels of dental caries, fluoride was first added to the public water supply of Grand Rapids, Michigan, USA, in 1945 (Whelton et al., 2019). Since then, fluoride has been incorporated into a range of products, including toothpaste, mouth rinses, milk, salt and dental materials. More than 80 years of scientific research support the effectiveness, safety, and public health value of appropriately used fluoride interventions (Whelton et al., 2019; Iheozor-Ejiofor et al., 2015; Health Research Board, 2025). Contemporary preventive strategies increasingly recognize the importance of maintaining consistent low-level fluoride exposure across populations and throughout the life course to support caries prevention (ten Cate et al., 2019; Featherstone, 2009). This evidence supports fluoride-based prevention as an essential component of evidence-informed oral health policy and clinical practice.

Fluoride Delivery for Caries Control

Regardless of how fluoride is delivered, all methods share the same predominant mechanism of action: fluoride ions freely available in the oral fluids, in saliva and in the fluid phase of the dental biofilm, will favor the retention of minerals on the tooth, via two processes: reducing mineral loss and enhancing remineralization. Even at very low concentrations (for example, those provided by exposure to fluoridated water, around 0.7 ppm F), fluoride favors the formation of fluoride-containing minerals on tooth surfaces, effectively slowing caries progression. The practical challenge, then, is not the mechanism itself but how to deliver fluoride so that it can be available to exert its anticaries effect. Fluoride can be delivered through community-based programs, individual fluoride products for home use, or professional fluoride applications.

The main community-based program, community water fluoridation (CWF), is among the most intensively studied. CWF passively delivers fluoride within the recommended range to the entire population served by the water source, regardless of socioeconomic conditions or health behaviors. The effectiveness of CWF has been consistently confirmed by major reviews, including the UK Medical Research Council (MRC) (MRC, 2002), Cochrane (Iheozor-Ejiofor et al., 2015, Iheozor-Ejiofor et al., 2024), the US Centers for Disease Prevention and Control (CDC) (CDC, 2001), and Australia's National Health and Medical Research Council (NHMRC) (NHMRC, 2017). Recent population-based studies confirmed that CWF is effective in preventing dental caries in children when other fluoride modalities are available (Goodwin et al. 2024; Do et al. 2026). CWF can have a larger effect in disadvantaged population groups, so it is capable of reducing socioeconomic inequality in oral health (Sanders et al. 2019, Matsuo et al. 2020, Matsuyama et al. 2025). CWF is also one of the most cost-effective public health interventions. However, CWF requires public water supplies and relevant legislation to be implemented. Salt fluoridation and milk fluoridation are two other modes of community fluoride delivery. However, these programs have been less studied.

Toothbrushing with fluoride toothpaste is an individual mode of fluoride delivery. However, as a social norm, it has the potential to mimic a population-based program across most populations. The efficacy of fluoride toothpaste has been confirmed with high-level scientific evidence (Walsh et al. 2019). Its effectiveness, particularly in children, depends on toothbrushing routines, such as toothbrushing frequency, the age at which toothpaste use begins, and brushing under adult supervision. The main professional fluoride applications, fluoride varnish, gel, and silver diamine fluoride, have been confirmed as efficacious in preventing dental caries (Marinho, 2009, Seifo et al., 2019). Fluoride-containing dental preparations are included in the WHO Model List of Essential Medicines, underscoring their global recognition as essential tools for caries prevention and management (WHO, 2021). Their use requires access to health care, which varies widely across socioeconomic groups and populations. Individual fluoride delivery modes require active participation. They are often costly, particularly the professional fluoride applications, making them less accessible to people experiencing socioeconomic disadvantage, who often have a higher risk of oral disease.

IADR and FDI recommend an integrated, population-wide strategy to optimize fluoride delivery and maximize its caries-preventive benefits across all population segments. Rather than relying on any single delivery mode, the approach layers complementary mechanisms, from universal passive exposure through to targeted professional care, to achieve equitable and effective oral health outcomes.

The strategy involves advocating for and maintaining optimally fluoridated water supplies where feasible and appropriate together with regular monitoring of fluoride levels to ensure safe and consistent delivery. A second core component is universal access to affordable fluoride toothpaste, supported by policies and social and commercial measures that make twice-daily toothbrushing easy, socially normative, and sustainable throughout the life course. Together, community water fluoridation (where appropriate) and widespread use of fluoride toothpaste provide a strong population-level foundation for caries prevention (Nasciemento et al., 2026, Walsh et al.,2019).

However, their impact should be complemented by targeted professional and higher-concentration fluoride interventions according to individual caries risk and local disease burden.

The strategy should then be supported by accessible clinical applications and high-concentration fluoride products, targeting those at greatest risk. This involves deploying professionally applied fluoride treatments and prescription-strength products through dental services, with particular focus on high-risk and vulnerable groups such as young children, older adults, and those with complex health needs. Mechanisms to keep pace with scientific advances should be embedded in clinical guidelines and workforce training on an ongoing basis.

Safety of Fluoride Used in Preventive Programs

The scientific and policy assessment of fluoride safety requires a risk–benefit framework that distinguishes between recommended, population-level exposures used for caries prevention and excessive exposures, including those occurring in naturally high-fluoride settings. As with many preventive agents, dose, exposure route, duration, age at exposure, and total fluoride intake are central to interpreting both benefit and risk.

The most consistently documented adverse effect of excessive fluoride intake during tooth development is dental fluorosis. Dental fluorosis occurs when excess fluoride is ingested while enamel is forming, generally in early childhood. Dental fluorosis observed in optimally fluoridated communities is most often mild or very mild, presenting as faint white markings that are not of aesthetic concern and do not impair tooth function (American Academy of Pediatrics, 2024). Moderate and severe fluorosis, which may involve enamel pitting or staining, is rare and is primarily a concern in settings of excessive fluoride exposure, such as exposure to water with naturally high fluoride concentrations, rather than appropriately managed fluoridation programs (Beltrán-Aguilar et al., 2010). Public policy recommendations should be established to maintain the optimal balance between caries prevention and the risk of dental fluorosis, taking into account multiple sources of fluoride.

Recent scientific debate has focused on whether fluoride exposure is associated with adverse neurodevelopmental outcomes, particularly children's IQ. Studies reporting associations between higher fluoride exposure and cognitive outcomes have led the US National Toxicology Program (NTP) to conclude, in a 2024 report, that higher estimated fluoride exposures, such as drinking-water fluoride concentrations above the WHO guideline value of 1.5 mg/L, are associated with lower IQ in children (NTP, 2024). Recent hazard classifications, toxicological reviews, and risk assessments by other regional and national agencies, such as the European Food Safety Authority and Ministries of Health, should be interpreted according to their specific regulatory purpose and scope. Chemical hazard classification identifies the potential for harm under specified conditions, but it does not by itself establish risk at the exposure levels used for recommended fluoride interventions. Public health decisions require exposure-specific risk–benefit assessment, including dose, route, duration, age at exposure, total fluoride intake, population context, oral health benefits, and the consequences of reducing access to effective caries prevention. Additionally, when assessing these reports, one must consider substantial methodological heterogeneity: studies vary in exposure metrics, including drinking-water concentration, spot urinary fluoride, maternal urinary fluoride, estimated intake, and dental fluorosis. These measures are not interchangeable and may introduce exposure misclassification (IADR, 2026). Many studies also differ in timing of exposure assessment, cognitive outcome measures, study design, population characteristics, and adjustment for important confounders such as socioeconomic status, parental education, nutrition, iodine status, renal function, lead and other co-exposures, and clustering by community or study site (IADR, 2026). These limitations are especially relevant where effect estimates are small and observational designs predominate.

In contrast, meta-analyses focused on fluoride exposures relevant to community water fluoridation have not found consistent evidence that drinking-water fluoride at recommended or low concentrations is associated with lower IQ scores in children (Kumar et al., 2023; EFSA Scientific Committee, 2025). A population-based longitudinal study found no evidence that early childhood exposure to fluoridated water, or dental fluorosis as a biomarker of early-life fluoride intake, adversely affected cognitive neurodevelopment in young adulthood (Do et al., 2025). Another study evaluated U.S. population-wide longitudinal data and found that exposure to recommended fluoride levels in drinking water was not associated with cognition measured in secondary school or at the age of 60 (Warren et al., 2025).

Risk–benefit assessment should consider the consequences of reducing access to fluoride-based prevention. Restricting fluoride interventions without effective and equitable alternatives could increase preventable oral disease, particularly among populations already experiencing disproportionate disease burden. Conversely, maintaining access to fluoride should be paired with surveillance, exposure management, and continued research to ensure that prevention strategies remain safe, effective, and responsive to emerging evidence.

Recommendations

1. **Support evidence-based fluoride use for caries prevention and management.**
   Fluoride should remain an essential component of comprehensive strategies to prevent and manage dental caries across the life course. Policies should support appropriate fluoride use at individual, community, and population levels, taking into account local disease burden, health system capacity, infrastructure, and fluoride exposure.
2. **Integrate fluoride within comprehensive oral health prevention.**
   Fluoride should be implemented as part of a broader preventive approach that includes reducing sugar intake, supporting oral hygiene practices, improving oral health literacy, strengthening routine dental care, and integrating oral health into primary health care and public health systems.
3. **Promote equitable access to effective fluoride interventions.**
   Fluoride-based prevention should be accessible, affordable, and available to populations at all stages of life, with particular attention to communities experiencing the greatest burden of oral diseases and the least access to preventive care. Local disease burden, health-system capacity, infrastructure, affordability, and population needs should be considered when determining which fluoride delivery strategies are most appropriate.
4. **Apply a balanced risk–benefit approach.**
   Fluoride policies should preserve the substantial caries-preventive benefits of appropriate fluoride exposure while minimizing the risk of excessive intake. Decision-making should distinguish between recommended fluoride use for prevention and high-exposure settings where mitigation may be needed. Decision-makers should also consider that restricting

established fluoride interventions without effective alternatives may disproportionately affect populations with the highest burden of dental caries and the least access to preventive care, making fluoride policy an important health equity issue.

5. **Advance research, implementation science, and public engagement.**
   Continued research is needed to strengthen the evidence base on fluoride effectiveness, safety, exposure assessment, delivery models, communication strategies to actively combat misinformation and disinformation, equity impacts, and implementation across diverse settings. Research should help countries identify approaches that are scientifically sound, feasible, culturally appropriate, and responsive to local oral health needs. Community engagement and transparent public communication should be embedded in fluoride policy development and implementation to support trust, address questions and concerns, and ensure that policies reflect local context.

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