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## SCIENCE POLICY

### COMMUNITY WATER FLUORIDATION

AADR supports community water fluoridation as a safe and effective, evidence-based intervention for the prevention of dental caries. While fluoride occurs naturally in water, fluoridation is the controlled addition of fluoride to community water systems to the level recommended for caries prevention. The practice of adding fluoride to community water supplies began after Dr. H. Trendley Dean – the first director of what later became the National Institute of Dental and Craniofacial Research – observed that residents of communities who drank from naturally fluoridated water supplies experienced less tooth decay than those living in communities without naturally fluoridated water. What began as a small trial of the controlled addition of fluoride to water in Grand Rapids, Michigan has now reached 75% of the United States population who drink from a community water system and has resulted in a significant decrease in dental caries.<sup>1,2</sup>

Dental caries – the destruction of dental hard tissues – can result in pain, infection and tooth loss. Caries is caused by acidic byproducts produced from bacterial fermentation of sugar.<sup>5,6</sup> Dental caries is a very common disease that affects both adults and children. Over one-third of children ages 2-8 experience caries in their primary teeth. One in 5 children ages 6-11 and over half of adolescents ages 12-19 experience caries in their permanent teeth. On average older adults can expect at least one new decayed tooth surface per year. Children with poor oral health are more likely to miss school and suffer academically. Parents may also accrue absences from school or work to seek treatment for their children. Both children and adults with caries may experience embarrassment, exhibit withdrawal, have difficulty eating and sleeping, and limit facial expressions and behaviors that facilitate social interaction.<sup>3-9</sup>

Many studies point to the effectiveness of community water fluoridation in decreasing dental caries. A systematic review of 20 studies by Cochrane, an independent group that reviews medical research to inform evidence-based policies and health guidelines, showed that water fluoridation decreased tooth decay in both the primary and permanent teeth of children and increased the number of children free of decay in primary and permanent teeth.<sup>10,11\*</sup> Another review by the Community Preventive Services Task Force (CPSTF), an independent panel of public health experts appointed by the Director of the Centers for Disease Control and Prevention (CDC), found that starting water fluoridation decreased caries in children ages 4-17 by 30-50% and that stopping

water fluoridation increased caries by 18%.<sup>12></sup> Furthermore, reducing childhood caries experience and severity may have benefits into adulthood by halting disease progression that can result in adult tooth loss. Lifelong exposure to fluoridated water has been associated with reduced tooth decay in adults.<sup>13, 14</sup> Community water fluoridation is a cost-effective method of delivering caries prevention to a large population. A systematic review by the CPSTF compared the cost of fluoridation to the money saved on dental restorations in communities that drink from fluoridated water sources. CPSTF found that water fluoridation is cost saving. In other words, the savings from fewer dental restorations are greater than the cost of fluoridation for communities of greater than 1,000 people, and the larger the community, the greater the cost saving.<sup>15</sup> A 2016 analysis confirmed this finding.<sup>16</sup>

Community water fluoridation may also reduce oral health disparities. Children and adults from socioeconomically disadvantaged backgrounds are more likely to suffer from dental caries and are less likely to be treated for the disease.<sup>6.</sup>

<sup>17</sup> When added to drinking water, fluoride can be delivered to community residents regardless of socioeconomic status or ability to access dental services. Some studies have shown decreased inequalities in caries in communities that drink from a fluoridated community water source, revealing that children of a lower socioeconomic status who have access to a fluoridated water source have less severe tooth decay and require less expensive care than children of lower socioeconomic status who do not drink fluoridated water. More research is needed to determine the circumstances in which water fluoridation reduces disparities, as not all fluoridated communities show reduced disparities.<sup>10, 18</sup>

Community water fluoridation is a safe method of delivering fluoride on a population level. There have been numerous systematic reviews on claims of the potential adverse health effects of water fluoridation. None has concluded that there is a significant or consistent association between water fluoridation and the outcomes examined, including neurologic conditions, cancer or osteoporosis.<sup>19-23</sup> Dental fluorosis resulting in tooth discoloration is the only known adverse health effect of water fluoridation. Teeth are only at risk of fluorosis until about age 8 during enamel formation. The United States Public Health Service recommends a concentration of 0.7 milligrams of fluoride per liter of water to achieve caries prevention while minimizing the risk of dental fluorosis.<sup>24</sup> While people who drink from fluoridated water sources are at greater risk of dental fluorosis, most people who drink fluoridated water do not develop dental fluorosis. The cases of dental fluorosis that do develop are very mild, such that discoloration is not usually visible to the naked eye and does not affect the function of the teeth. Severe cases of dental fluorosis are rare. Some studies have shown that Black/African-American and Mexican-American children are at greater risk of developing dental fluorosis. However, this has not been clearly linked to fluoridated water and may be due to cumulative fluoride intake from various sources, such as toothpaste, supplements and food and beverages prepared with fluoridated water.<sup>10, 17, 25</sup>

Community water fluoridation is supported by various groups, including the American Association of Public Health Dentistry, the American Public Health Association, the American Dental Association and the American Academy of Pediatrics, among others. Additionally, in 1999, the CDC identified community water fluoridation as one of 10 great public health achievements of the

20<sup>th</sup> century because of its effectiveness and ability to distribute fluoride equitably and cost-effectively.<sup>26</sup> Information about the fluoride concentration of communities participating in water fluoridation can be found on the CDC website “My Water’s Fluoride”.<sup>27</sup>

While AADR always welcomes research on water fluoridation safety and effectiveness in the current context of fluoride availability, the balance of evidence currently shows that community water fluoridation is safe, effective and cost-saving and in some communities, reduces oral health disparities. Therefore, AADR supports community water fluoridation and recommends the fluoridation of community water sources to a level of 0.7 milligrams of fluoride per liter of water.

### References

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- \* The authors of the Cochrane systematic review determined that the evidence for community water fluoridation for the prevention of dental caries was low quality and that many studies were conducted before 1975. The Cochrane review method considers randomized clinical trials as the gold standard of evidence and automatically rates common methods for evaluating public health interventions as low. However, randomized trials are usually not feasible for interventions at the population level. The authors noted this gap in their evidence grading system and that the evidence pointed in the same direction of fluoridation reducing tooth decay.  
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