

## Problem

Dental caries (tooth decay) is a chronic, progressive, multi-factorial, infectious disease that can begin in early infancy. By adulthood, dental caries will affect the majority of the U.S. population.<sup>1</sup> A smaller proportion of the population will develop moderate to severe dental caries. Dental caries prevalence and severity vary by age, dentition, and type of tooth surface.<sup>2</sup> Dental caries is highly related to socio-environmental determinants, with the greatest burden on disadvantaged and socially-marginalized populations.<sup>3,4</sup> Historically, efforts to prevent and control dental caries have primarily focused on daily brushing, modifying dietary practices, and improving the resistance of tooth enamel to acid attack. However, only fluorides and dental sealants have been shown to be highly effective in preventing or reducing dental caries. Benefiting from fluoridated water and toothpastes, baby boomers will be the first generation to routinely maintain their natural teeth throughout their lives.<sup>5</sup>

## Methods

Fluoride modalities are systemic and topical, and include water (natural and adjusted levels), dietary fluoride supplements, toothpaste, mouthrinse, and professional application of concentrated fluoride in gels, foams, or varnishes. The degree of caries protection, lifetime cost, and the appropriateness for use in populations will vary by the fluoride method or combination of fluoride methods selected.<sup>6,7,8,9,10,11,12</sup> Fluorides are most effective when used in combination with other modalities to prevent, control, and reverse the progression of dental caries early in the disease process.<sup>13,14,15,16</sup> Fluorides are more effective in preventing dental caries on the smooth surfaces rather than the pits and fissures of teeth.<sup>17</sup> For the prevention of carious lesions limited to the pits and fissures of permanent molar teeth, dental sealants alone or combined with fluoride are more effective than fluoride alone.<sup>18,19</sup> Daily, multiple, low-dose topical exposures to fluorides facilitate the balance between remineralization and demineralization of tooth enamel, thus reducing the incidence of dental caries throughout life.<sup>20</sup>

## Actions

The advantage of fluoride in drinking water is its ability to deliver a low level of fluoride frequently, to large numbers of individuals, at low cost, with a resultant substantial cost savings due to a decrease in tooth decay. Communities that adjust the fluoride level in drinking water provide lower concentration and consistent fluoride exposures compared to other fluoride choices.<sup>21</sup> Community water fluoridation has been demonstrated to be safe, cost-effective, and beneficial through every stage of life and for all people, regardless of age, race, ethnicity, or socioeconomic status.<sup>22,23,24,25,26</sup> Water fluoridation reduces oral health disparities by creating a healthy environment.<sup>27,28</sup> Reports show that water fluoridation, a community level intervention, continues to be an efficient method for the delivery of fluoride in many countries.<sup>29, 30</sup>

Community water fluoridation has an individual lifetime cost less than the cost of a single filling.<sup>31,32,33</sup> Other forms of fluoride, such as fluoride toothpaste, and clinical interventions complement community water fluoridation.<sup>34,35</sup>

The primary action of community water fluoridation is topical. Fluoride is ingested, and returns to the oral cavity through saliva secretion, via the salivary glands. The main implication of this mechanism of action is that the teeth are continuously bathed by fluoride-enriched saliva.<sup>36</sup> Pre-eruptive systemic fluoride exposure remains important; however, current consensus recognizes that optimal oral health occurs when fluoride exposure continues after tooth eruption.<sup>37</sup>

Since the epidemiologic, environmental, and laboratory studies confirmed the association between naturally-occurring optimal levels of fluoride in water supplies, improved dental health and absence of any negative health impacts, community water fluoridation has been the cornerstone of caries prevention in the United States.<sup>38</sup> The proportion of the US population receiving fluoridated water has increased annually since 1940, with 74.6% of the US population with public water systems benefitting from community water fluoridation by 2012.<sup>39,40</sup> There is also a benefit from diffusion to people living in communities without fluoridated drinking water, also known as the halo-effect, via the export of bottled beverages and processed foods from fluoridated communities to surrounding non-fluoridated communities.<sup>41</sup> This diffusion effect also reduced the absolute and proportional benefits of water fluoridation, as measured between fluoridated and non-fluoridated communities, from 60% in the 1950 to 1970 era to 18% to 40% since the 1980s.<sup>42</sup> However, in the Pacific region of the United States when a smaller proportion of public water supplies was fluoridated, there was a greater difference in tooth decay experience between fluoridated and non-fluoridated communities.<sup>43</sup> The benefits are higher among populations at higher risk for tooth decay.<sup>44</sup> Communities continue to be encouraged to adjust the level of fluoride in drinking water to a level that reduces tooth decay while protecting the cosmetic appearance of teeth. Indeed, the Centers for Disease Control and Prevention (CDC) has recognized water fluoridation as one of ten most important public health achievements of the twentieth century.<sup>45</sup>

Since the 1945 field trials were completed, all US Surgeons General have supported water fluoridation.<sup>46,47,48</sup> The American Dental Association (ADA) unreservedly supports fluoridation as being “safe, effective and necessary in preventing tooth decay.”<sup>49</sup> Since 1989, ASTDD, ADA and CDC jointly recognize specific individuals, organizations, and agencies for their contributions toward the progress and quality of community water fluoridation.

**Policy Statement:** The Association of State and Territorial Dental Directors (ASTDD) fully supports and endorses community water fluoridation in all public water systems at the optimal level recommended by the US Public Health Service.

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