



Centers for Disease Control  
and Prevention (CDC)  
Atlanta, GA 30341-3724

January 30, 2017

## STATEMENT ON THE EVIDENCE SUPPORTING THE SAFETY AND EFFECTIVENESS OF COMMUNITY WATER FLUORIDATION

On behalf of the Centers for Disease Control and Prevention (CDC), we are pleased to provide a statement on the evidence regarding the safety and benefits of community water fluoridation. For the record, this statement is not testimony for or against any specific legislative proposal.

Good oral health is an important part of good overall health and an essential part of our everyday lives. Diet, sleep, psychological status, social interaction, school, and work are all affected by impaired oral health. Over the past several decades, there have been major improvements in the nation's oral health that have benefitted most Americans.<sup>1</sup>

However, profound disparities in oral health status remain for some population subgroups, such as the poor, the elderly, and many members of racial and ethnic minority groups.<sup>1</sup> Tooth decay is one of the most common chronic diseases among American children with 1 of 4 children living below the federal poverty level experiencing untreated tooth decay.<sup>2</sup> Untreated decay can cause pain, school absences, difficulty concentrating, and poor appearance—all contributing to decreased quality of life and ability to succeed.<sup>3</sup>

Tooth decay and its complications are preventable, and several preventive and early treatment options are safe, effective, and economical. The CDC leads national efforts to improve oral health by using proven strategies such as community water fluoridation and school-based dental sealant programs that prevent oral diseases.

### An Effective Intervention

Community water fluoridation is “the controlled addition of a fluoride compound to a public water supply to achieve a concentration optimal for dental caries prevention.”<sup>1</sup> The process of adding fluoride to public water systems in the United States began in 1945 in Grand Rapids, Michigan. Soon after, dramatic declines in dental caries were noted among school children in Grand Rapids compared with school children from surrounding areas. Since then, community water fluoridation has been adopted by communities across the country, providing the cornerstone of caries prevention in the United States.<sup>1</sup> In 2012, more than 210 million people, or 74.6% of the U.S. population served by public water supplies, drank water with optimal fluoride levels to prevent tooth decay.<sup>4</sup>

Water fluoridation is beneficial for reducing and controlling tooth decay and promoting oral health across the lifespan. Evidence shows that water fluoridation prevents tooth decay by providing frequent and consistent contact with low levels of fluoride, ultimately reducing tooth decay by 25% in children and adults.<sup>5-8</sup> Additional evidence shows that schoolchildren living in communities where water is

fluoridated have, on average, 2.25 fewer decayed teeth compared to similar children not living in fluoridated communities.<sup>9</sup>

The safety and benefits of fluoride are well documented and have been reviewed comprehensively by several scientific and public health organizations. The U.S. Public Health Service; the United Kingdom's National Institute for Health Research, Centre for Reviews and Dissemination, at the University of York; and the National Health and Medical Research Council, Australia have all conducted scientific reviews by expert panels and concluded that community water fluoridation is a safe and effective way to promote good oral health and prevent decay.<sup>10-12</sup> The U.S. Community Preventive Services Task Force, on the basis of systematic reviews of scientific literature, issued a strong recommendation in 2001 and again in 2013, for community water fluoridation for the prevention and control of tooth decay.<sup>9,13</sup>

### A Cost-saving Intervention

Although other fluoride-containing products such as toothpaste, mouth rinses, and dietary supplements are available and contribute to the prevention and control of dental caries, community water fluoridation has been identified as the most cost-effective method of delivering fluoride to all members of the community regardless of age, educational attainment, or income level.<sup>14,15</sup> Analyses have also shown that water fluoridation provides additional benefits across the lifespan beyond what is gained from using other fluoride-containing products.<sup>8,11,16</sup>

By preventing tooth decay, community water fluoridation has been shown to save money, both for families and the health care system.<sup>7,17</sup> The return on investment (ROI) for community water fluoridation varies with size of the community, increasing as community size increases, but, as noted by the U.S. Community Preventive Services Task Force, community water fluoridation is cost-saving even for small communities.<sup>17,18</sup> The estimated annual ROI for community water fluoridation, excluding productivity losses, ranged from \$5.03 in small communities of 5,000 people or less, to \$31.88 in large communities of 20,000 or more people.<sup>7</sup> The estimated ROI for community water fluoridation including productivity losses was \$6.71 in small communities and \$42.57 in large communities.<sup>19</sup>

A study of a community water fluoridation program in Colorado used an economic model to compare the program costs associated with community water fluoridation with treatment savings achieved through reduced tooth decay. The analysis, which included 172 public water systems, each serving populations of 1,000 individuals or more, found that 1 year of exposure to fluoridated water yielded an average savings of \$60 per person when the lifetime costs of maintaining a restoration were included.<sup>20</sup> Analyses of Medicaid claims data in 3 other states (Louisiana, New York, and Texas), have also found that children living in fluoridated communities have lower caries related treatment costs than do similar children living in non-fluoridated communities; the difference in annual per child treatment costs ranged from \$28 to \$67.<sup>21-23</sup>

### A Safe Intervention

Expert panels consisting of scientists from the United States and other countries, with expertise in various health and scientific disciplines, have considered the available evidence in peer-reviewed literature and have not found convincing scientific evidence linking community water fluoridation with any potential adverse health effect or systemic disorder such as an increased risk for cancer, Down syndrome, heart disease, osteoporosis and bone fracture, immune disorders, low intelligence, renal disorders, Alzheimer disease, or allergic reactions.<sup>9,11</sup>

Documented risks of community water fluoridation are limited to dental fluorosis, a change in dental enamel that is cosmetic in its most common form. Changes range from barely visible lacy white markings in milder cases to pitting of the teeth in the rare, severe form. In the United States, most dental fluorosis seen today is of the mildest form, affecting neither aesthetics nor dental function.<sup>24</sup> Fluorosis can occur when young children—typically less than 8 years of age, whose permanent teeth are still forming under the gums—take in fluoride from any source.<sup>9,11</sup> Recommendations provided by the U.S. Public Health Service for the optimal level of fluoride in public water systems take into account levels of water consumption as well as the availability of other fluoride products.<sup>25</sup>

### Conclusion

In the seminal report, *Oral Health in America: A Report of the Surgeon General*, Surgeon General David Satcher observed a “‘silent epidemic’ of dental and oral diseases [...] with those suffering the most found among the poor of all ages.”<sup>1</sup> The report affirms that community water fluoridation is “an inexpensive means of improving oral health that benefits all residents of a community, young and old, rich and poor alike.” Because of its contribution to the dramatic decline in tooth decay over the past 70 years, CDC named community water fluoridation 1 of 10 great public health achievements of the 20th century.<sup>14</sup>



Casey Hannan, MPH  
Director (Acting), Division of Oral Health  
National Center for Chronic Disease  
Prevention and Health Promotion  
Centers for Disease Control and Prevention



Lorena Espinoza, DDS, MPH  
Associate Director for Science, Division of Oral Health  
National Center for Chronic Disease  
Prevention and Health Promotion  
Centers for Disease Control and Prevention

### References

1. US Department of Health and Human Services. *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: US Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health; 2000.
2. Dye BA, Li X, Thornton-Evans G. Oral Health Disparities as Determined by Selected Healthy People 2020 Oral Health Objectives for the United States, 2009–2010. NCHS data brief no. 104. Hyattsville, MD: National Center for Health Statistics; 2012.  
<http://www.cdc.gov/nchs/data/databriefs/db104.htm>. Accessed February 17, 2015.
3. Guarnizo-Herreno CC, Wehby GL. Children's dental health, school performance, and psychosocial well-being. *J Pediatr*. 2012;161:1153-9.
4. Centers for Disease Control and Prevention. 2012 Water Fluoridation Statistics website.  
<http://www.cdc.gov/fluoridation/statistics/2012stats.htm>. Accessed February 17, 2015.

5. Koulourides T. Summary of session II: fluoride and the caries process. *J Dent Res.* 1990;69(Spec Iss):558.
6. Featherstone JD. Prevention and reversal of dental caries: role of low level fluoride. *Community Dent Oral Epidemiol.* 1999;27:30-40.
7. Truman BI, Gooch BF, Sulemana I, et al. Reviews of evidence on interventions to prevent dental caries, oral and pharyngeal cancers, and sports-related craniofacial injuries. *Am J Prev Med.* 2002(1S):21-54.
8. Griffin SO, Regnier E, Griffin PM, Huntley V. Effectiveness of fluoride in preventing caries in adults. *J Dent Res.* 2007;86:410-415.
9. Community Preventive Services Task Force. Guide to Community Preventive Services: Preventing Dental Caries: Community Water Fluoridation website. <http://www.thecommunityguide.org/oral/fluoridation.html>. Accessed February 17, 2015.
10. Public Health Service. Review of fluoride: benefits and risks. Report of the Ad Hoc Subcommittee on Fluoride of the Committee to Coordinate Environmental Health and Related Programs. Washington, DC: US Department of Health and Human Services; 1991. <http://www.health.gov/environment/ReviewofFluoride/default.htm>. Accessed February 17, 2015.
11. McDonagh MS, Whiting PF, Bradley M, et al. *A Systematic Review of Public Water Fluoridation.* University of York, York: NHS Centre for Reviews and Dissemination; 2000. [http://www.york.ac.uk/inst/crd/CRD\\_Reports/crdreport18.pdf](http://www.york.ac.uk/inst/crd/CRD_Reports/crdreport18.pdf). Accessed February 17, 2015.
12. Australian Research Centre for Population Oral Health. The use of fluorides in Australia: Guidelines. *Aust Dent J.* 2006;51:195-199.
13. Community Preventive Services Task Force. Guide to Community Preventive Services: Preventing Dental Caries: Community Water Fluoridation website (2000 archived review). [http://www.thecommunityguide.org/oral/fluoridation\\_archive.html](http://www.thecommunityguide.org/oral/fluoridation_archive.html). Accessed February 17, 2015.
14. Centers for Disease Control and Prevention. Achievements in public health, 1900-1999: fluoridation of drinking water to prevent dental caries. *MMWR.* 1999;48(41):933-940.
15. Burt BA, ed. Proceedings for the workshop: cost-effectiveness of caries prevention in dental public health, Ann Arbor, Michigan, May 17--19, 1989. *J Public Health Dent.* 1989;49(special issue):331-337.
16. Slade GD, Sanders AE, Do L, Roberts-Thompson K, Spencer AJ. Effects of fluoridated drinking water on dental caries in Australian adults. *J Dent Res.* 2013;92:376-82.
17. Griffin SO, Jones K, Tomar SL. An economic evaluation of community water fluoridation. *J Public Health Dent.* 2001;61:78-86.
18. Ran T, Chattopadhyay S. Economic evaluation of community water fluoridation: a Community Guide systematic review (working paper).
19. Griffin S, Jones K, Tomar S. Unpublished data, January 2015.
20. O'Connell JM, Brunson D, Anselmo T, Sullivan PW. Costs and savings associated with community water fluoridation programs in Colorado. *Prev Chronic Dis.* 2005. [http://www.cdc.gov/pcd/issues/2005/nov/05\\_0082.htm](http://www.cdc.gov/pcd/issues/2005/nov/05_0082.htm). Accessed February 17, 2015.
21. Water fluoridation and costs of medicaid treatment for dental decay—Louisiana, 1995–1996. *MMWR.* 1999;48(34):753-7.
22. Kumar JV, Olubunmi A, Melnik TA. Geographic Variation in Medicaid Claims for Dental Procedures in New York State: Role of Fluoridation Under Contemporary Conditions. *Public Health Reports.* 2010;125:647-654.
23. Texas Department of State Health Services. *Water fluoridation costs in Texas: Texas Health Steps (EPSDT-MEDICAID).* Austin, TX: Texas Department of State Health Services; 2000. [www.dshs.state.tx.us/dental/pdf/flstudy.pdf](http://www.dshs.state.tx.us/dental/pdf/flstudy.pdf). Accessed March 10, 2015.

24. Beltrán-Aguilar ED, Barker L, Dye BA. Prevalence and severity of dental fluorosis in the United States, 1999-2004. NCHS Data Brief no. 53. Hyattsville, MD: National Center for Health Statistics; 2010. <http://www.cdc.gov/nchs/data/databriefs/db53.pdf>. Accessed February 17, 2015.
25. US Department of Health and Human Services. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for Prevention of Dental Caries. Federal Register 80 FR 24936, May 1, 2015. <https://federalregister.gov/a/2015-10201>. Accessed June 8, 2015.