

# Surgeon General's Perspectives

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## COMMUNITY WATER FLUORIDATION: ONE OF CDC'S "10 GREAT PUBLIC HEALTH ACHIEVEMENTS OF THE 20TH CENTURY"

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Seventy years ago, nearly everyone in the United States had tooth decay. No one knew how to prevent it. It was not uncommon for 13-year-olds to have lost one or more permanent teeth to decay.<sup>1</sup> As recently as the late 1950s, about half of Americans older than 65 years of age lost all their natural teeth, which many replaced with dentures.<sup>2</sup>

In some areas of the United States, dentists observed that the enamel on many of their patients' teeth looked stained or mottled. However, these same teeth appeared to be protected from tooth decay. After some sleuthing, it was determined that fluoride in the local water supply was the reason for both phenomena. In 1945, as one of the first in a series of landmark studies, the city of Grand Rapids, Michigan, added low amounts of fluoride (i.e., much lower than the levels determined to cause the staining and mottling, which later became known as "dental fluorosis") to its community water system.<sup>3</sup> This study and others like it<sup>4-6</sup> ultimately demonstrated that people living in communities with fluoridated water had fewer cavities and healthier teeth than those living in communities where the water was not fluoridated.

These findings led the U.S. Public Health Service (PHS), in 1962, to recommend that community water systems add fluoride to drinking water to prevent tooth decay.<sup>7</sup> After the recommendations were published, more and more state and local governments implemented this public health measure. As a result, more than 210 million people across the country—about 75% of all people served by community water systems—currently benefit from this safe and effective intervention.<sup>8,9</sup>

Community water fluoridation, which celebrates its 70th anniversary this year, has been so successful—leading to dramatic declines in both the prevalence and severity of tooth decay—that the Centers for Disease Control and Prevention identified it as one of 10 great public health achievements of the 20th century.<sup>9,10</sup>

As Surgeon General, I encourage all Americans to make choices that enable them to prevent illness and promote well-being. Community water fluoridation is



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one of the most practical, cost-effective, equitable, and safe measures communities can take to prevent tooth decay and improve oral health.<sup>9</sup>

Water fluoridation's biggest advantage is that it is the best method for delivering fluoride to all members of the community regardless of age, education, income level, or access to routine dental care. Fluoride's effectiveness in preventing tooth decay extends throughout life, resulting in fewer and less severe cavities. In fact, each generation born since the implementation of water fluoridation has enjoyed better dental health than the preceding generation.<sup>9,10</sup>

Based on further research, we have concluded that it is time to update the original 1962 PHS recommendations on fluoridation. Americans now have access to more sources of fluoride, such as toothpaste and mouth rinses, than they did when water fluoridation was first introduced in the United States. The result has been an increase in dental fluorosis, which, in most cases, manifests as barely visible lacy white markings or spots on the tooth enamel.<sup>11,12</sup> A severe form of dental fluorosis, with staining and pitting of the tooth surface, is rare in the United States.<sup>11</sup> Dental fluorosis can occur when children younger than 8 years of age, whose permanent teeth are still forming, regularly ingest fluoride.<sup>13</sup>

Given this changed landscape of fluoride sources and dental fluorosis, the U.S. Department of Health and Human Services (HHS), in 2010, convened a federal, interdepartmental, interagency panel of scientists to review the 1962 recommendations. The panel, which included physicians, epidemiologists, environmental health experts, dental professionals, toxicologists, health policy professionals, statisticians, and economists, has continued to meet over the years. The panel considered:

- The scientific evidence related to the effectiveness of community water fluoridation in the prevention and control of dental caries across all age groups,
- Fluoride in drinking water as one of several available sources of fluoride,
- Trends in the prevalence and severity of dental fluorosis,
- Current evidence regarding children's water intake at various outdoor air temperatures,
- An extensive review by the National Research Council (NRC) of potential adverse effects of naturally occurring fluoride in drinking water at 2–4 milligrams per liter (mg/L)—a level much higher than the 1962 recommendation of 0.7–1.2 mg/L of fluoride in drinking water,<sup>14</sup>
- Public comments submitted in response to a January 2011 *Federal Register* notice<sup>15</sup> of the panel's proposed recommendation that community water systems use a fluoride concentration of 0.7 mg/L (the low end of the previously recommended range of 0.7–1.2 mg/L) to maintain caries prevention benefits and reduce the risk of dental fluorosis, and
- Independent peer review of the draft recommendation document, including summary and response to public comment, by experts in toxicology, environmental health, and epidemiology. This peer review demonstrated compliance with the specific requirements of the Information Quality Act (2000)<sup>16</sup> and of peer review standards developed by the Office of Management and Budget<sup>17</sup> and HHS.<sup>18</sup>

The panel carefully considered public comments concerning fluoride in drinking water, including possible adverse health effects. As described in the updated guideline,<sup>19</sup> the panel reviewed and accepted the scientific evidence in the 2006 NRC report on fluoride.<sup>14</sup> Even at higher concentrations (i.e., 2–4 mg/L), the NRC found no evidence substantial enough to

support claims of unwanted health effects, other than severe dental fluorosis. The NRC review noted that prevalence of severe dental fluorosis is nearly zero at fluoride concentrations <2 mg/L.

The panel's assessment of the best available science concluded that community water fluoridation remains an effective public health strategy for delivering fluoride to prevent tooth decay and is the most feasible and cost-effective strategy for reaching entire communities. It agreed that community water fluoridation continues to offer substantial protection against tooth decay beyond that provided by other fluoride products. In studies conducted after other fluoride products (e.g., toothpaste) became widely available, scientists found up to 25% reductions in tooth decay among people in communities with water fluoridation as compared with those without fluoridation.<sup>20–22</sup>

The panel also decided that reductions in tooth decay can be maintained with a lower concentration of fluoride in drinking water, given the increase in other sources of fluoride during the past several decades, and that one universal target concentration for community water fluoridation can be used in all U.S. temperature zones.

Based on this comprehensive, multiyear assessment, PHS now recommends that community water systems use a single concentration of 0.7 mg/L of fluoride in drinking water to maintain cavity prevention benefits and reduce the risk of dental fluorosis. This new recommendation revises and replaces the previously recommended range of 0.7–1.2 mg/L.

We urge you to review our updated guideline and adopt it in your communities.

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