

# The Fluoridation Status of U.S. Public Water Supplies

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## Synopsis .....

*It has been 40 years since the first community in the United States added a regulated amount of fluoride to its public water supply to prevent tooth decay. Despite the proven benefits of fluoride,*

*today only 61 percent of the U.S. population on public water supplies receives fluoridated water.*

*Progress in fluoridating water is impeded by anti-fluoridation campaigns and a change in the way Federal funds are allocated for State and local fluoridation programs. Despite pro-fluoridation efforts by the Public Health Service, American Dental Association, and other organizations, the well-publicized claims of fluoride hazards by opponents have prevented many communities from initiating water fluoridation and have caused other communities to discontinue their programs.*

*The law and half a century of research are on the side of fluoridation, as are new scientific findings indicating that optimal amounts of fluoride may reduce the incidence or severity of osteoporosis.*

**M**ORE THAN 50 YEARS HAVE PASSED since investigators first discovered that fluoride—naturally occurring in the drinking water of various communities—protected children from tooth decay. That discovery prompted the city of Grand Rapids, MI, in 1945 to be the first community to add a regulated amount of fluoride to its public water supply. Ten years later, the prevalence of tooth decay for children born in the city had dropped to less than half of what it was before fluoridation (1).

Today, we recognize community water fluoridation as one of the most important and successful public health programs in the history of disease prevention. Because it is safe, economical, and effective in preventing tooth decay, community water fluoridation is endorsed by 75 national science and health organizations including the Public Health Service, American Medical Association, National Science Foundation, Society of Toxicology, and the World Health Organization. For every dollar spent on fluoridation, \$50 can be saved on dental treatment (2).

## Status of Fluoridation Legislation

As of October 1985, only 61 percent of the U.S. population drinking from public water supplies received fluoridated water, including the 4 percent who use naturally fluoridated water, according to Gwen Harvey, Statistics Specialist of the Dental

Disease Prevention Activity, Centers for Disease Control, Atlanta, GA. The population of the western States seems particularly resistant to water fluoridation. Seven of the nine largest U.S. cities that do not add fluoride to their water supplies are located in the West. The nine cities and their population in the 1980 census follow:

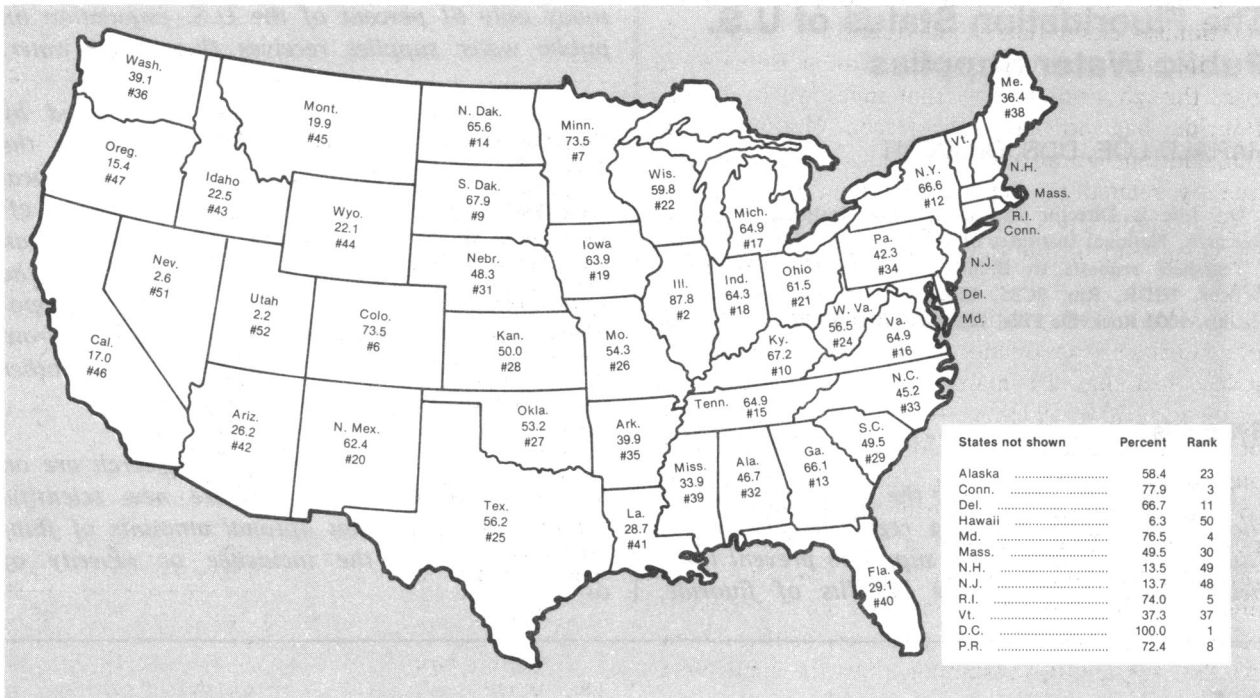
City	Population
Los Angeles, CA .....	2,966,763
San Diego, CA .....	875,504
Phoenix, AZ .....	789,704
San Antonio, TX .....	785,410
San Jose, CA .....	636,550
Portland, OR .....	366,383
Honolulu, HI .....	365,048
Tucson, AZ .....	330,537
Newark, NJ .....	329,248

As seen in figure 1, many western States rank low in the proportions of their populations that receive fluoridated water.

Only eight States have mandatory fluoridation laws. Minnesota and Illinois have the most comprehensive legislation which requires all public water supplies to be fluoridated. In contrast, Connecticut, Michigan, South Dakota, and Ohio require fluoridation in communities of a certain population size, and Nebraska, Georgia, Michigan, and Ohio laws provide a local referendum option to avoid fluoridation (3).

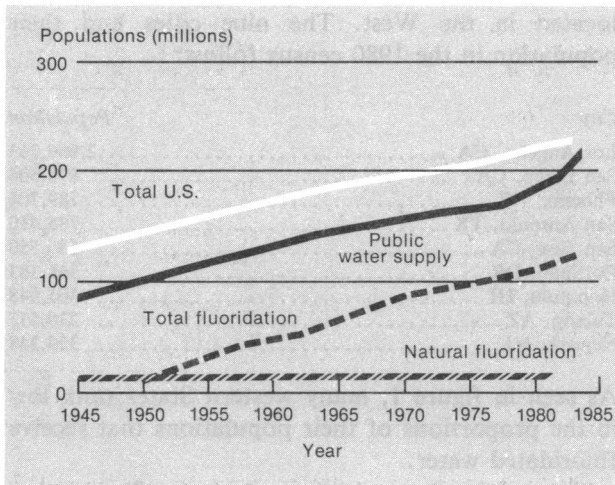
The U.S. population receiving fluoridated water has only increased about 10 percent over the last

Figure 1. Percent of State's population using fluoridated water and the State's ranking



SOURCE: Centers for Disease Control: 1980 fluoridation census.

Figure 2. Fluoridation growth, by population, United States, 1945-84



NOTE: Figure 2 is adapted from reference 13, p. 79.

20 years (fig. 2). This slow progress in fluoridation will not meet the Public Health Service's goal—that at least 95 percent of the population on community water systems should receive the benefits of optimally fluoridated water by 1990 (4).

## Antifluoridation Campaigns

Although a general resistance to change can explain why some communities lack fluoridated water, a prime reason for the slow progress in fluoridation is antifluoridation campaigns by individuals and groups such as the National Health Federation, the Center for Health Action, and the National Fluoridation News (5).

The antifluoridationists claim that 1 ppm fluoride in drinking water does nothing to curb tooth decay and instead promotes cancer, sickle cell anemia, kidney and heart disease, birth defects, accelerated aging, and even acquired immune deficiency syndrome (AIDS). Fluoridation has also been viewed as a communist plot, a conspiracy by chemical suppliers and government officials, and an invasion of civil liberties (6).

Many of the antifluoridationists' claims are based on misinterpreted epidemiologic data, statements taken out of context, or half-truths. Some claim that the incidence of cancer is 5 percent higher in fluoridated areas, for example, despite the fact that several extensive studies have found no evidence that fluoridation promotes cancer. Because the majority of AIDS victims come from fluoridated cities, antifluoridationists claim fluoridated water fosters AIDS, but there is no real link

between the two. Large quantities of fluoride were once used in commercial rat poison. Antifluoridationists claim that small quantities of fluoride in drinking water, consequently, can poison people even though studies show that ingestion of 1 ppm fluoride has no harmful effects. Opponents of fluoridation ignore the fact that toxicity is frequently related to the size of the dose and that several compounds, such as table salt and water, are beneficial in low doses but toxic in high doses (5).

In addition to publicizing the so-called hazards of fluorides, opponents also are active in the political arena. In many communities, the city council decides whether to fluoridate water. But once an ordinance to fluoridate is introduced, antifluoridation groups urge government officials to remain neutral by putting fluoridation to a public vote. Prior to such a vote, opponents of fluoridation conduct media blitzes. In newspapers and on radio and television, fluoride is linked to scare words such as poison, cancer, artificial, and AIDS. Apparently assuming that the antifluoridationists' repeated coverage by the media validates their claims, the public frequently votes against fluoridation in city referenda (5).

This situation recently occurred in San Antonio, TX, the nation's 10th largest city. In May 1985, San Antonio's city council voted 7 to 4 to fluoridate the city's water. A referendum on the issue was forced, however, by citizen petitions. Prior to the referendum, an antifluoridationist who has worked on campaigns in Jersey City, NJ, Portland, OR, Los Angeles, CA, and many other cities participated in a vocal antifluoridation campaign in San Antonio. The campaign was waged on television and radio talk shows, and several antifluoridation advertisements were aired, particularly on Spanish-language television stations in San Antonio, where 53 percent of the population is Hispanic. One advertisement showed a skeletal hand holding a glass of fluoridated water, and another depicted fluoride as a can of rat poison.

An umbrella organization of San Antonian medical and dental professionals, citizens, and civic groups conducted a profluoride media campaign. But on November 5, 1985, San Antonians voted 52 percent to 48 percent to overturn the city council's vote for fluoridation.

Over the past 2 years, similar scenarios have evolved in Springfield, MA, and Spokane, WA, where fluoridation was defeated in public referenda. On a more positive note, Renton, WA, and Amherst, MA, recently voted to support fluorida-

Table 1. Results of public referenda on fluoridation in U.S. communities, 1983-85

Place	Month	Yes	No
<i>1983</i>			
Randolph, MA	March		X
Toledo, OR	March		X
Holbrook, MA	April		X
South Milwaukee, WI	April	X	
New Lisbon, WI	April		X
New Braunfels, TX	April	X	
Leslie, MI	May		X
Hinton, WV	May		X
Sheridan, OR	May	X	
Helena, GA	October		X
Springfield, MA	November		X
Chicopee, MA	November		X
Agawam, MA	November		X
Wooster, OH	November		X
Bronson, MI	November	X	
Three Rivers, MI	November		X
Frankfort, MI	November		X
Dexter, ME	November	X	
Indian Township, ME	November	X	
Total	19	6	13
<i>1984</i>			
Seaside, OR	March	X	
Gladstone, MO	April		X
Pelham, AL	July	X	
Spokane, WA	November		X
Olympia, WA	November		X
Wellesley, MA	November	X	
Amherst, MA	November	X	
Pepperell, MA	November		X
Tewkesbury, MA	November	X	
Lenox, MA	November		X
Tell City, IN	November	X	
Total	11	6	5
<i>1985</i>			
Duxbury, MA	March	X	
Glenwood Springs, CO	August	X	
Leominster, MA	November		X
Westfield, MA	November		X
Renton, WA	November	X	
Bellair, FL	December	X	
San Antonio, TX	December		X
Crystal River, FL	December	X	
Total	8	5	3

Table 2. Decisions on fluoridating the water supplies in U.S. communities, by decision-making process, 1980-83

Year	By referendum		By government body	
	Yes	No	Yes	No
1980	7	33	19	14
1981	4	10	26	8
1982	6	13	28	6
1983	6	13	20	14
Total	23	69	93	42

tion. Opponents of fluoridation have won the majority (21 of 38) of fluoride referenda battles, however, over the past 3 years (table 1).

But the city councils or health boards of 93 communities have opted to begin or continue fluoridation without a public referendum (table 2). In San Francisco, for example, opponents of fluoridation put pressure on the city's board of supervisors to stop San Francisco's 34-year-old practice of fluoridating its public water supply. Newspapers publicized widely the opponents' claims, including the statement that fluoridation renders people susceptible to AIDS by destroying the body's defense mechanisms. On the basis of the city health department's report on the benefits and safety of fluoridation, the board voted in August 1985 to continue the support of fluoridation of the city's water supply.

### **Court Rulings**

When public referenda tactics fail, anti-fluoridation groups often pursue legal avenues. In several court cases, these groups have claimed that fluoridation is unconstitutional because it is class legislation that benefits only children. This argument has never held up in court. "Of course it is apparent that children become adults," said the Missouri Supreme Court in response to this contention (6).

The most popular argument, that fluoridation invades civil liberties guaranteed by the Constitution, has also not been upheld in court. Plaintiffs contend that they have the ultimate right to control what substances they take into their bodies. But because fluoridation is shown to be a public health measure that benefits the majority of individuals, the courts have taken the view that no abuse of due process is involved. "Liberty implies the absence of arbitrary restraint, not immunity from reasonable regulations," summarized one judge (6).

Claiming that fluoridation is "compulsory medication," opponents have also argued in court that fluoridation ordinances deprive certain persons of religious freedom guaranteed under the First Amendment. This argument has been countered by the assertion that cities which fluoridate their water are no more practicing medicine than are mothers who give their children a well-balanced diet. Furthermore, in a 1980 case, a letter submitted to the court by an official of the Christian Science Church affirmed that the Church recognizes the greater public interest fluoridation serves, and does not take a stand that would deprive

others of health care that they feel desirable and necessary (7).

In contrast to the majority of fluoridation cases in the past, which have relied on legal technicalities to overturn a decision to fluoridate, most of the more recent cases have leaned on supposed evidence that fluoride is harmful. Because fluoridation is unsafe, plaintiffs argue, fluoridation regulations are arbitrary and unreasonable and thus unconstitutional (8).

Opponents of fluoridation have relied on virtually the same evidence in cases tried in Clinton, IN, Pittsburgh, PA, Charleston, SC, and Alton, IL. The plaintiffs' primary weapon is a study which claims to show a 5-percent increase in the cancer death rate in cities after fluoridation has begun (9). Other evidence presented by the plaintiffs are studies that link fluoridation to chromosome damage (10,11) and toxic and allergic reactions (12). Plaintiffs also cite their own studies alleging that water fluoridation has no effect on dental caries.

Most courts are hesitant to second guess the scientific assessments made by a legislature deciding to enact water fluoridation. Plaintiffs frequently argue, consequently, that the legislature did not consider new studies linking fluoride to various disorders. Defendants usually counter that the proper place for new evidence is before the legislative body that originally decided to fluoridate (8).

Regardless of the legal technicalities, courts will overturn a legislative decision to fluoridate if the preponderance of evidence presented to the court indicates fluoridation is dangerous to the public health. In a 1982 case in Alton, IL, a trial court granted an injunction preventing the continued fluoridation of the public water supply. The decision was based on findings presented by the plaintiff that fluoridation is harmful. The State of Illinois, the defendant in the case, did not present evidence about the safety of fluoridation and instead primarily attacked the plaintiff's evidence. An appeal to the Supreme Court of Illinois reversed the earlier decision, but this case illustrates the importance of presenting scientific evidence to the court in defense of fluoridation (3).

In summary, arguments based on scientific merit and public benefit have been extremely successful in defending fluoridation in the courts. In the more than 30 completed court cases in the United States between 1953 and 1985, fluoridation has been repeatedly upheld, and the U.S. Supreme Court still refuses to accept fluoridation cases on

appeal. Given the already established legal precedents, local, State, and national governments will probably soon be relieved of the labor and expense involved in defending optimum water fluoridation in the courts.

### **Other Factors Slowing Progress**

A combination of other factors has also hampered progress in fluoridating water supplies. There have been changes in the allocation of Federal funds for fluoridation programs. For 3 years prior to 1981, any State could apply to the Centers for Disease Control (CDC) for a grant to support a wide range of fluoridation endeavors, including developing educational materials and a fluoridation plan, hiring a fluoridation coordinator, and buying supplies of fluoride. Funding came through a Federal program for fluoridation that the CDC administered. But in 1981, when the program expired, it was incorporated in the preventive health block grants given to the States to administer. Consequently, fluoridation now must compete with other preventive health measures such as immunization and mental health programs. As a result, the emphasis on fluoridation appears to be diminished.

The pace of progress has also slowed recently because of the nature of the water systems that are unfluoridated. Of the 52,000 public water supplies in the United States that are unfluoridated, about 46,000 serve populations of under 1,000. Although the length of time needed to implement fluoridation in a community is not necessarily related to the community's size, fluoridating several small water systems costs more than making this improvement in one large water system (13).

Substantial increases in the numbers of people receiving fluoridated water also cannot be achieved as frequently as they could in the past because the majority of large cities in the United States already fluoridate their public water supplies. Of the 50 largest U.S. cities, only 9 (listed previously) do not fluoridate.

### **PHS Activities**

Several Public Health Service agencies and private organizations are actively involved in the fluoridation effort. The National Institute of Dental Research (NIDR) has led the research effort since its establishment in 1948. NIDR-sponsored investigations have validated the benefits of fluoride, confirmed its safety, and elucidated its role in the process of remineralization. In 1973, the Institute initiated 17 school-based fluoride demon-

stration programs that made use of self-applied regimens. The success of these projects has led to their adoption in many parts of the country that lack fluoridated water systems. Current fluoride research at NIDR is aimed at identifying the many properties of fluoride and its physiological mechanisms; expanding present fluoride programs; and developing new regimens and methods of delivery to reach a wider public—especially individuals and target populations at higher risk. As with its other areas of research, the NIDR places high priority on the transfer of new scientific information about fluoride to the public and the health professions.

The Centers for Disease Control, through its Dental Disease Prevention Activity in Atlanta, GA, has produced a number of educational and promotional materials on fluoridation, which are used in community consulting efforts. The agency recently created and distributed an educational kit on community water fluoridation to the leadership of more than 40 key organizations, including the leadership of health, hospital, and school administration associations. In cooperation with the American Dental Association (ADA), the agency also developed a public service announcement for television that discusses the safety and benefits of fluoride. The announcement was sent to a wide range of dental societies, and it has been used in local fluoridation campaigns. Through its water supply engineers who specialize in fluoridation, CDC also provides technical assistance to communities that fluoridate their water supplies and assists in the development of State training programs for water supply personnel.

### **Other Profluoridation Advocates**

The American Dental Association is actively involved in a number of profluoridation efforts. Its staff has developed preventive dentistry pamphlets, radio announcements, and press releases about the benefits of fluoridation. The association made a \$25,000 grant to the city of San Antonio's fluoridation campaign, and it is also currently developing a fluoridation campaign manual. For future fluoridation campaigns, the association is working to gather funding from a variety of private sources, including insurance companies.

Several other associations actively promote fluoridation of public water supplies, including the American Association of Public Health Dentistry, Association of State and Territorial Dental Directors, American Public Health Association, International and American Associations for Dental

Research, American Dental Hygienists Association, and the newly established American Oral Health Institute.

Future profluoridation campaigns should be aided by the results of a recent Finnish study that indicate fluoridated water supplies can help reduce the incidence or severity of osteoporosis, a prevalent and debilitating disease of the elderly. Researchers reported in the August 24, 1985, issue of *Lancet* that elderly persons in an optimally fluoridated community experienced fewer hip fractures than those in nonfluoridated communities. "One mg/l [of fluoride] seems to be near the optimum concentration for the prevention of bone fragility. . ." the investigators stated (14).

### Conclusion

Fluoridation of public water supplies remains one of the most effective public health strategies for preventing disease. Fluoridation enables a reduction in tooth decay as high as 65 percent at an annual cost as low as about 15 cents a person (15). Although the United States has made substantial progress in fluoridating its public water supplies over the past 40 years, more than 70 million Americans live in communities with central water supplies that are not yet fluoridated, and surveys suggest that many people today are confused about what fluoride is and why it is added to water in fluoride-deficient areas. Education and re-education are essential if community water fluoridation and other prevention programs are to be expanded or even maintained.

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