

An update on water fluoridation: triumphs and challenges*

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Abstract

This paper encompasses information on the status of community and school water fluoridation in the U.S. and abroad, the status and action on State fluoridation laws, an explanation and effect of the Safe Drinking Water Act, dental benefits, and identification and refutation of the three most common areas of allegations against fluoridation.

Status of community water fluoridation in U.S.

Extent of fluoridation

Thirty-three years ago, in January 1945, Grand Rapids, Michigan, became the first community in the world to adjust the fluoride content of its water supply under the aegis of the U.S. Public Health Service.

Two other communities on this continent, Newburgh, New York, and Brantford, Ontario, joined Grand Rapids that same year to demonstrate that the dental benefits, discovered through extensive epidemiological research in naturally fluoridated communities, could be replicated by man through the upward adjustment of the fluoride content in the water.

By the end of 1975, the last time a nationwide fluoridation census was taken, it was estimated that slightly more than 105,000,000 people in the U.S. had access to water fluoridated at optimum (0.7-1.2 ppm depending on the climate), or higher levels.¹ This included approximately 10,000,000 people whose water supplies are naturally fluoridated at 0.7 ppm or higher. About 60% of the population who have access to public water supplies, or 50% of the total population, had fluoridated water.

Since that time, the natural population growth, the fluoridation of the Boston area, and numerous small

communities have increased the number benefiting from fluoridation to at least 108,000,000.

The magnitude of the problem of extending fluoridation universally is perhaps best emphasized by the fact that this 50% of the total population is served by only about 13% of the community water supplies. Thus, to reach the last half of the population who are served by community water supplies, some 87% of the water supplies still need to be fluoridated.

There are great variations in the location and size of the communities which are fluoridating. Based on the 1975 fluoridation census, 22 states, the District of Columbia, and Puerto Rico provided fluoridated water to more than half of their population. In comparison, states in the western third of the country, the Deep South and New England, and the state of New Jersey have been particularly slow in adopting fluoridation.

Over 9,000 areas had fluoridated water: 6,795 adjusted and 2,630 natural. Approximately 70% of all cities having a population of 100,000 or more are fluoridated. The vast majority of communities which are not fluoridated have populations of less than 25,000. It is estimated that these are served by over 50,000 community water systems.

The duration of the experience with adjusted fluoridation is impressive. At last count 108 cities with populations of 50,000 or more, distributed throughout 27 States, the District of Columbia, and Puerto Rico have been fluoridating their water supplies for 20 years or more. It is estimated that these water supplies provide fluoridated water to more than 24,000,000 people in cities such as Chicago, San Francisco, Pittsburgh, Philadelphia, Miami, Denver, Baltimore, St. Louis, Cleveland, Milwaukee, San Juan, Buffalo, Louisville, Indianapolis, St. Paul, Toledo, Oklahoma City, Tulsa, and Washington, D.C.

Over 700 communities have been fluoridated for 25 years or more, and some few have been fluoridated for 30 years or more. Among the latter group are Newburgh, New York; Grand Rapids, Michigan; Skokie and Evanston, Illinois; Lewiston, Idaho; Madison and Sheboygan, Wisconsin; and Marshall, Texas.

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State laws

In 1965, Connecticut became the first state to pass a law requiring fluoridation. Many states have attempted to follow suit with varying degrees of success. At present, eight states have laws intended to provide statewide fluoridation: Connecticut, 1965; Minnesota and Illinois, 1967; Michigan, 1968; Ohio and South Dakota, 1969; and Georgia and Nebraska, 1973.

Laws of four states, Georgia, Michigan, Nebraska, and Ohio, contained provisions which allowed a community to exempt itself from compliance with the state law if a community decided it did not wish to institute this public health measure. Two states placed a time limit, which has now been passed, on the period during which a referendum could be held: Michigan, 5 years; and Ohio, a maximum of 240 days.

Four states set a lower limit on the population of the community which must comply: Connecticut, 20,000; Michigan, 1,000; South Dakota, 500; Ohio, systems serving 5,000. Two states include funding provisions: Ohio and Georgia.

Kentucky statutes clearly delegated to the State Board of Health powers to adopt regulations necessary to protect the dental health of the people. Under this law, Kentucky established standards for approval of public water supplies. This is not a mandatory law since a water supply can serve the public with a Provisional rating, but the water supply must be fluoridated before an Approved rating is issued.

Puerto Rico, by the passage of legislation in 1952, provided money for adding fluoride to water supplies. This, in effect, made fluoridation mandatory in Puerto Rico.

In 1970, South Dakota fought back a challenge to rescind its law by winning a statewide referendum. The 1977 Minnesota legislature extended the deadline for further compliance with their law until July 1979, pending the results of a study by a Governmental Commission on the health effects of fluoridation. This was done as the result of pressure from the residents of Brainerd who did not want to comply with the law. After failure to obtain exemption from the State law through various procedures, including the Supreme Court, the deadline was extended by including the provision in the State appropriations bill.

In July of this year, while codifying its public health laws, Michigan passed an amendment to its fluoridation law, which now allows communities to vote to discontinue existing fluoridation programs by either council action or referendum. While the work on the laws was being conducted, the Governor had called for a study on whether or not the amount of fluoride being ingested had increased since fluoridation.

The results of the study, delivered too late to have any impact in preventing a change in the law, concluded that there was a slight increase, but that there

was no evidence of any adverse health effects from such a slight increase, and that the possibility that such would occur was remote.

Five states have laws which require a public vote before fluoridation can be instituted: Delaware (1974); Maine (1957); New Hampshire (1959); Nevada (1967); and Utah (1976). This was a step backward for Delaware, which had previously passed a mandatory law in 1968, but changed it to require a referendum in 1974.

Massachusetts had a required referendum law which was repealed in 1968. The current law enables a community to implement fluoridation through a Board of Health order. Implementation is subject to a 90-day waiting period during which a petition for referendum may be filed.

Required referenda are a deterrent to fluoridation. They are costly. They frequently are only advisory and may be subsequently repeated with a reversal of the decision even after equipment has been installed. They favor the opposition, since they are conducted in an atmosphere that needs only to plant a suspicion of doubt—easily done by scare tactics and dissemination of irrelevant or misleading information.

Those states which have mandatory referenda are among those with the least fluoridation: Maine, 40.6%; New Hampshire, 13.3%; Delaware, 39.5%; Nevada, 3.0%; and Utah, 2.4%. In 1968, when Massachusetts repealed its required referendum law, fluoridation was available to only about 7% of the population. Ten years later, about 51% of the population had access to fluoridation.

In 1976, those opposed to fluoridation adopted a new technique. Three states, Washington, Oregon, and Utah, were confronted with statewide referenda. The intent was to prohibit fluoridation or make it more difficult to implement.²⁻⁴

It appears that these states may have been selected by the opposition in anticipation of victory because (1) their populations had limited exposure to fluoridation: Utah, 2.4%; Oregon, 10.7%; and Washington, 39.8%; (2) they were literally surrounded by states with similar limited experience; and (3) they were relatively close to the headquarters of the National Health Federation in Monrovia, California, which was actively assisting in planning and organizing the campaigns for the opposition.

Fortunately, both Oregon and Washington were able to defeat the ballot measures. In Utah, the referendum resulted in a requirement to have a public vote on fluoridation in each community before it can be implemented.

Regional action

Through the years, fluoridation campaigns have moved from the local community to the state level and now, more recently, to regional approaches. Fluor-

idation of Boston and some 31 communities served by the Metropolitan District Commission was accomplished by a regional approach, enlisting the support and active participation of all relevant community health departments. The strong endorsement and recommendation of the Regional Health Administrator, with the support of each State health officer in the region, is emerging as another approach.

Status of community water fluoridation in foreign countries

Much confusion has arisen over the status of fluoridation outside the U.S. It is important to know the facts, since action in foreign countries, inaccurately publicized in the U.S., can adversely impact on the fluoridation program. Inaction of a foreign government or dental association should not be interpreted as banning fluoridation; nor should political actions contrary to recommendations of health authorities be interpreted as confirmation of opponent allegations of health hazards. Some of the countries cited as banning fluoridation actually have enabling laws or fluoridation programs in effect, such as West Germany, Greece, Yugoslavia, and Switzerland.⁵

Perhaps it would not be amiss to explain the situation in Sweden, the Netherlands, and Denmark, where fluoridation currently cannot be implemented.

Sweden repealed its fluoridation enabling act in 1971. Only one community was fluoridating under this act. The National Board of Health and Welfare of Sweden has stated that the repeal of the fluoridation law in 1971 was strictly the result of general political considerations. Fluoridation lost by a 137 to 126 vote in the Parliament and the decision was against the majority report issued by the Parliament's Social Insurance Committee. Sweden now has a governmental committee reexamining the question.

Fluoridation in the Netherlands was proceeding under a 1961 Water Supply Act. Opponents of fluoridation challenged the right of the Minister to authorize fluoridation under the Act, and in 1973, the High Court ruled that fluoridation was not covered by this specific Act.

Subsequently, the Public Health Minister prepared a national fluoridation bill to be presented to Parliament. The Minister was unsuccessful in his attempt to secure the passage of the bill in 1976. This resulted in the stoppage of existing fluoridation programs.

Denmark has long had a law prohibiting the addition of fluoride to food and cosmetics. This is interpreted to prohibit water fluoridation. It is generally understood that this was done to permit control of all sources of fluoride.

Opponents of fluoridation frequently draw attention to countries which are not implementing fluoridation,

ignoring the many countries that supply fluoridated water to over 155,000,000 people.⁶

It is interesting to note that, while opponents in the U.S. are trying to stop fluoridation here by claims of banning in Europe, opponents in foreign countries are trying to stop fluoridation by misinterpretation of U.S. research and claims that the U.S. is abandoning fluoridation.

School fluoridation

As a public health measure, fluoridation has one obvious limitation—it can only reach those who have access to community water supplies. Since it is estimated that some 40,000,000 people are not served by community water supplies, it becomes important to find ways in which these people might also derive fluoride benefits.

Research has shown that schools which have independent water supplies can fluoridate such supplies. These supplies, fluoridated at 4.5 times the optimum to compensate for the time that children are not in school, can provide the children with 39% fewer cavities than their counterparts in unfluoridated communities.⁷

North Carolina was the first state to follow up on the results of the research. Now, about 400 school fluoridation programs are in existence in some 14 states: Florida, Indiana, Kentucky, Maine, Montana, Nebraska, New Mexico, New York, North Carolina, Pennsylvania, Tennessee, Vermont, Wisconsin, and Wyoming.

Defluoridation

In 1974, Congress passed the Safe Drinking Water Act (PL 93-523). This Act is intended to improve the quality and safety of drinking water supplies. It required the Federal Government to set maximum acceptable levels for all "contaminants," in reality, constituents, of water supplies which could have an adverse effect on health. It also prohibited the Federal Government from mandating the addition of any substance to water supplies except for water treatment.

Communities whose water supplies naturally contain more than 2 times the optimum level of fluoride for dental health will be required to reduce the fluoride content. Opponents of fluoridation have misrepresented the intent of the law.⁸ There is nothing in the law to prohibit the public health program of fluoridation, nor is it intended to imply that adverse health effects occur from fluoridation at levels recommended for dental health.

The maximum contaminant level was established based on the original research which indicated that at that level, a community might expect to have some cosmetically objectionable mottling.

Based on the information on natural fluoride levels submitted by the states in 1969, two-thirds of the states will have one or more communities requiring defluoridation. Those states having the greatest number of communities with excess fluoride are Arizona, Illinois, Iowa, Missouri, New Mexico, Oklahoma, South Dakota, Texas, and Virginia. Over 500 communities reported fluoride levels over 2 ppm and one community reported a level of 13.5 ppm.

It becomes important that in complying with the Safe Drinking Water Act, these communities reduce the fluoride level only to the optimum level in order that those currently receiving the decay-preventive benefits of fluoride are not deprived of its benefits.

The surveillance regulations necessary to assure that fluoride levels are maintained at optimal levels are not provided by this law.

Benefits

For years, the systemic caries-preventive benefits for children from fluoridation have been stressed. Such a good job has been done that those who know about fluoridation think it is good only for children.

Fluoridation does prevent 50–70% of the cavities in young children who have drunk fluoridated water from birth. Research has also shown that fluoridation can benefit children who have not had lifetime exposure. "The 10 to 12, 13 to 14 and 16-year-old children, who were not exposed to fluoridated water all of their lives but who had continuous residence in Newburgh since May 2, 1945, had rates lower by 52%, 48% and 41%, respectively, compared with Kingston children of similar ages," (when examined 10 years after the start of fluoridation).⁹

Little attention has been given to the fact that community fluoridation also has a slight topical effect, nor has sufficient attention been paid to the 6-fold or more increase in the number of children who can be completely caries-free, or to the reduction in extractions due to caries, or to the lifetime benefits accruing to adults.

Research comparing a naturally fluoridated community (Hartlepool) with a fluoride-deficient community (York) in England, showed that the fluoridated community had a lower caries experience, a lower tooth mortality, and a smaller need for partial dentures for all ages up to 65 years. These results were apparent despite one of the lowest dentist to population ratios in the country in the fluoridated community.¹⁰

For years, the Naval Training Center at Great Lakes, Illinois, has been conducting a longitudinal study on caries-free recruits. In 1971, they reported that the increase in caries-free recruits was the result of gains made by the central and coastal cities, which

started fluoridation in the early 1950's. There had been barely any change in caries-free recruits from the fluoride-deficient cities.

Numerous research studies throughout the world have replicated the U.S. research. It is amazing that so many countries with dietary and cultural differences and varying levels of the normal constituents of water supplies have repeatedly replicated the benefits of adjusting the fluoride content of the water supply, and without adverse health effects. Evaluatory studies are no longer limited to 5 or 10 years of experience. Such studies cover as many as 20 years.

Opposition

Repeated public opinion surveys have shown that only 10–12% of the people oppose fluoridation, while 50%–70% favor it, and the remainder are undecided. If those early researchers could have glimpsed the future to see how their work would be misinterpreted and maligned, would they have ventured into this new area of public health?

The opponents of fluoridation are adept at linking fluoridation with whatever happens to be the popular whipping boy. When fear of communism was prevalent in the 1950's, one of their most potent arguments was to allege that fluoridation was a communist plot. And in Russia, it was referred to as a capitalist plot.

Today, the allegations more frequently center around alleged adverse side effects, unknown future harm, and interference with individual rights. There has never been a clinically substantiated case of harm to anyone from drinking optimally fluoridated water. A study by the National Health Federation has alleged a relationship between fluoridation and cancer. This organization has long actively opposed fluoridation.

Their study has been repeatedly refuted both by review of their work and by independent research studies conducted in Canada¹¹ and England,¹² and by the National Cancer Institute,¹³ the National Heart, Lung, and Blood Institute¹⁴ of the National Institutes of Health, and the Center for Disease Control.¹⁵

Evidence of the safety of fluoridation has been examined critically and repeatedly, and specific allegations of injury and hazard have been carefully evaluated. The conclusions reached in every instance have been the same—fluoridation is safe. Comprehensive reviews of the extensive scientific literature by both the American Medical Association and the Royal College of Physicians in England continue to support fluoridation.^{16, 17}

No court of last resort has ever ruled against fluoridation, regardless of the charge. The "individual rights" question has been repeatedly dealt with by the courts which have repeatedly found in favor of fluoridation. Opponents who object to the addition of fluo-

ride to fluoride-deficient waters to prevent caries could also consider the removal of excess fluoride from high-fluoride bearing waters to prevent mottling as equally infringing on their rights. Both are public health measures designed to improve the overall health of the Nation.

In raising the issue of the right to vote on fluoridation, one must recognize that those who stand to benefit or lose most, children, are not voters. The health benefits denied children by a negative action are lost forever and cannot be recovered by the children when they attain voting age.

A two-part report appears in the July and August issues of *Consumer Reports* under the titles of "Fluoridation: the Cancer Scare" and "The Attack on Fluoridation—Six Ways to Mislead the Public." This report puts the opposition in perspective and concludes that there is no scientific controversy, but that the continuing attack on fluoridation is a major triumph of quackery over science.¹⁸

Fluoridation continues to have the support of virtually every health and scientific organization with competence in the field. One of the most recent strong endorsements is that of the Nutrition Consortium, representing the American Dietetic Association, the American Institute of Nutrition, the American Society for Clinical Nutrition, Institute of Food Technologists, Society for Nutrition Education, American Academy of Pediatrics and the Food and Nutrition Board of the National Academy of Sciences—National Research Council.

The following excerpts emphasize their support:

"The use of this system (fluoridation) to provide an essential nutrient, fluoride, to the diets of children susceptible to dental caries who otherwise would have no fluoride, is a most laudable public health development. . . . It is not in the best interest of the health of the people of the United States to discontinue or to delay utilization of fluoridation of community water supplies. To delay is to deny good dental health to children and encourage the continued development of dental caries at all ages of the population."¹⁹

There are many challenges to be met if the full benefits of fluoridation are to be realized:

- Dental health must be given a higher priority in our value system.
- Apathy of many health professionals and reluctance to become involved in fluoridation campaigns must be overcome.
- A multifaceted approach which recognizes the political ramifications needs to be developed.
- A more effective and extensive method of communication is needed to convey information on the benefits of fluoridation and to counteract the misinformation circulated by the opposition.

—And an effective system of monitoring approved programs to assure maintenance of optimum fluoride levels must be implemented.

Perhaps the greatest triumph is that despite an unprecedented attack, and the dragging of public health into the political arena, 50% of the people can now benefit from fluoridation.

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ADA Survey Identifies States Banning School Confection Sales

Chicago—Only six states are presently taking statewide action to restrict the sale of confections in schools, according to the preliminary results of a survey conducted by the ADA's National Task Force for the Prohibition of the Sale of Confections in Schools.

Statewide action restricting the sale of confections in schools has been taken in Alabama, California, Kentucky, Massachusetts, Ohio and West Virginia.

However, other states and U.S. territories that prohibit the sale of foods that directly compete with the school lunch program are Colorado, Florida, Georgia, Guam, Hawaii, Illinois, Iowa, Kansas, Louisiana, Michigan, Minnesota, Mississippi, Nebraska, New Jersey, New Mexico, North Carolina, Oregon, Pennsylvania, Virginia and Wisconsin.

Arkansas, Idaho and New York have adopted policy regarding prohibition of sale of confections in schools, but it is enforced at local option only.

The objectives of the task force, formed in 1978, are to identify communities with successful confection

bans, stimulate local action in other areas to ban the confection sales in schools, and develop guidelines to work with other organizations on behalf of federal legislation to restrict confection sales in schools.

With the cooperation of the ADA Bureau of Health Education and Audio-visual Services, the task force is in the process of developing a "Good nutrition campaign kit." The kit, which is expected to be available for mass distribution early next year, will include materials for stimulating local activity to prohibit confection bans.

In addition, model legislation has been drafted to aid dental societies and other organizations in pursuing state action to restrict school confection sales.

The availability of confections in vending machines in dental schools also was discussed by the task force. The American Student Dental Association is being contacted and its assistance requested in an investigation of dental school confection sales.

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