A Best Practice Approach Report describes a public health strategy, assesses the strength of evidence on the effectiveness of the strategy, and uses practice examples to illustrate successful/innovative implementation.

Report last updated: May 23, 2011

Best Practice Approach
Use of Fluoride: Community Water Fluoridation

Summary of Evidence Supporting Community Water Fluoridation

Research	+++
Expert Opinion	+++
Field Lessons	++
Theoretical Rationale	+++

See **Attachment A** for details.

I. Description

A. Community Water Fluoridation – A Dental Public Health Approach

Community water fluoridation is the controlled adjustment and monitoring of fluoride in community drinking water to reach optimal fluoride concentrations for preventing tooth decay (caries).[1-4] Since 1962 the U.S. Public Health Service has recommended that community drinking waters contain 0.7 to 1.2 ppm fluoride depending on the annual average maximum daily air temperature of the area.[1,2] In January 2011, the U.S. Department of Health and Human Services (HHS) and the Environmental Protection Agency (EPA) have announced steps to ensure that standards and guidelines on fluoride in drinking water continue to provide the maximum protection to the American people to support good dental health, especially in children. HHS is proposing that the recommended level of fluoride in drinking water can be set at the lowest end of the current optimal range to prevent tooth decay, and EPA is initiating review of the maximum amount of fluoride allowed in drinking water.[5]

Healthy People (HP) 2020 Oral Health Objective OH-13 calls for 79.6 percent of the U.S. population served by community water systems to have optimally fluoridated water, placing this dental public health approach on a national agenda to improve health.[2]

Comparisons of fluoride-deficient and fluoridated communities in the United States, Australia, Britain, Canada, Ireland, and New Zealand have demonstrated caries reduction that ranged between 15 and 40 percent in fluoridated, as compared with fluoride-deficient, communities.[4,6] Other evidence of the benefits of fluoridation comes from studies of populations where fluoridation has ceased. Examples in the United States, Germany, and Scotland have shown that when fluoridation is withdrawn and there are few other fluoride exposures, the prevalence of caries increases.[6]

Given the modest cost of less than 1 dollar per person per year to fluoridate water systems serving most people, community water fluoridation is recommended as a very effective and cost-effective method of preventing caries.[6] The per capita cost of water fluoridation over a person's lifetime is less than the cost of one dental filling. For communities with more than 20,000 residents, every $1 invested in community water fluoridation yields $38 in savings each year from fewer cavities treated.[7] Fluoridation not only is cost-effective, but also is cost saving, which is rare for public health interventions.[8,9]

Good evidence that water fluoridation increases the proportion of children that are caries free.[10-11] Water fluoridation benefits all residents served by community water supplies regardless of socioeconomic status. Few barriers to its implementation exist, with the important exception of the political opposition that the measure often engenders and certain technical difficulties and costs involved in fluoridating very small water systems.[4,6]

B. Activities of a Community Water Fluoridation Program

State and territorial oral health programs have consistently devoted efforts to delivering the benefits of community water fluoridation to their residents. State water fluoridation program activities are described in this section. State practice examples of fluoridation program activities are provided in Section V:

1. Legislation/Policies

Implement and enforce laws and regulations to assure access to drinking water with optimal fluoride content for caries prevention and environments that are conducive to good oral health. These activities include:

- Implementing state laws and regulations that mandate fluoridation of public health systems ranging from all public water systems in the state to public water systems or cities/counties serving a minimum population.
- Ensuring that drinking water regulatory requirements and practices within a state support community water fluoridation quality including requiring sufficient sampling and reporting.
- Supporting local administrative actions or public votes (i.e., referendum) for water fluoridation.
- Developing policies and resolutions in support of community water fluoridation.

2. Advocacy, Promotion, and Collaboration

Organize and mobilize community resources (public and private) to promote water fluoridation. Activities include:

- Enlisting partners, such as the state water quality program, state dental association, chronic disease programs, Maternal & Child Health (MCH) programs, local health

departments, children advocacy groups, legislators, community leaders, and health providers, to support all aspects of community water fluoridation (e.g., legislation, policy development, advocacy promotion, monitoring, surveillance and reporting).
- Providing a forum for partners to communicate, plan and pool resources for efforts related to community water fluoridation (e.g., coalition, task force or workgroup).
- Working with partners to obtain independent foundation funding of new facilities.
- Developing strategies to deal with anti-fluoridation messages.

3. Knowledge on the Benefits, Safety and Status of Water Fluoridation

Improve the knowledge on the benefits, safety, and status of water fluoridation and support actions/behaviors favorable to its implementation by using community-wide health promotion interventions (educational, political, regulatory, and organizational efforts) directed toward the public, practitioners, and policymakers. Provide education and technical assistance to communities, organizations and advocacy groups. This Includes informing the public, practitioners, and policymakers about:

- Effectiveness, cost-effectiveness and safety of water fluoridation.
- Fluoridation status of the state.
- Fluoridation equipment needs and costs to implement and maintain.

4. Supporting Construction of Fluoridation Systems

Provide financial and technical support to communities building and maintaining fluoridation systems for optimal fluoridation of public water systems. Among key activities reported by some states are:

- Funding the purchase of fluoridation equipment for initial installation.
- Reviewing fluoridation system design/ equipment needs prior to construction.
- Developing design checklists to provide guidance to design engineers on types of facilities and appurtenances to include in new facilities.

5. Training, Monitoring, Surveillance, Reporting and Inspection

Comply with current engineering and administrative recommendations for water fluoridation including ongoing, routine monitoring of fluoride content. Activities include the following.

Training:

- Providing annual training for State fluoridation engineers and water plant operators. The Centers for Disease Control and Prevention (CDC) recommends a minimum of 6-8 hours of training annually for operators of fluoridated water plants.
- Facilitating opportunities for State fluoridation engineers/specialists to attend training that can improve fluoridation quality.

Monitoring, Surveillance and Reporting:

- Monitoring daily fluoride levels in the water distribution system by water system personnel.
- Taking split or check samples from each fluoridated system at least once each month to assure reliability of measurements.
- All participating fully in CDC's Water Fluoridation Reporting System (WFRS) providing at a minimum monthly updates of changes in the fluoridation status of water systems; for those systems that adjust the fluoride content of the water providing monthly average of daily testing for each system and compliance with state testing requirements.

- Ensuring that state drinking water regulatory requirements mandate submission by public water systems on adequate reporting of compliance testing.
- Annual reporting in ASTDD synopsis.
- Annual reporting of fluoridation equipment needs.

Inspection:

- State personnel providing a detailed, onsite inspection of each new fluoridation system before system start-up to ensure that construction and installation are in accordance with state-approved plans and specifications.
- State personnel providing a comprehensive inspection of individual water fluoridation systems at least once a year for compliance with engineering and administrative recommendations.

6. Human Resources to Support Community Water Fluoridation Efforts

Develop human resources to support community water fluoridation efforts. Activities include:

- Establishing a state fluoridation administrator who will be responsible for a) supporting fluoridation programs a; b) promoting water fluoridation; and c) providing liaison with other federal, state and local agencies. Ideally, the person selected would be from the oral health program or the drinking water program.
- Establishing a state fluoridation engineer or specialist whose primary responsibilities are to provide for: (a) site visits; (b) start-up visits; (c) training of water plant operators; (d) monitoring of all fluoridated water systems, and (e) resolution of problems.
- Establishing a trained water plant operator responsible for each fluoridated water system.

7. Financial Resources to Support Community Water Fluoridation Efforts

Secure financial resources to support community water fluoridation efforts. Source might include:

- State general funds.
- Federal block grants for states (MCH and Preventive Health and Health Services Block Grants).
- Other sources of federal support. These sources include funding through CDC (e.g., Cooperative Agreements for State-based Oral Disease Prevention Programs) and Health Resources and Services Administration (HRSA) [Special Projects of Regional and National Significance (SPRANS)].
- Funds available through local communities, counties, and water districts.
- Private foundations at the local, state and national levels.

C. Extent of Use

1. Worldwide approximately 350 million people drink adjusted fluoridated water in more than 60 countries and at least another 50 million drink water with natural fluoride at or around optimal level for caries prevention. Countries with water fluoridation include Australia, Brazil, Canada, Chile, France, Germany, Israel, Ireland, Malaysia, New Zealand, Singapore, South Korea, Spain, Sweden, United Kingdom, and United States. Fluoridation has not been banned anywhere.[12]

2. In the United States during 2000, about 162 million people (65.8%) of the population served by public water supplies received optimally fluoridated water compared with 144 million (62.1%) in 1992. State-specific percentages ranged from 2% (Utah) to 98.2% (Minnesota) and 100% (District of Columbia).[13] The national objective in Healthy People 2010 calls for 75% and in Healthy People 2020 calls for 79.6% of the population served by community water systems to have optimally fluoridated water.[2] In 2008, 26 states and the District of Columbia reached 75% or more of the population served by community water systems with optimally fluoridated water; 14 have 50.0-74.9%; 5 have 25.0-49.9%; and 5 have less than 25%.[14-15]

3. In 2008, nationwide approximately 16,900 community water systems provide optimally fluoridated water. To meet the national HP 2020 objective, however, more than 22 million people served by community water systems will need to join those who currently have access to optimally fluoridated public water systems.[15,16]

4. In 2002, 44 of the 50 largest cities in the United States were fluoridated. Residents of unfluoridated large cities are among the more than 100 million persons in the United States who lack this method of caries prevention.[6,12]

5. According to the 2009 Synopses of State and Territorial Dental Public Health Programs, all 50 states and the District of Columbia have programs for fluoridated community water. However, there is wide variation in the capacity of the programs in conducting the activities listed above, the human/funding resources devoted to the program, and the state/local environments' demands for the program.[17]

6. As of February 2010, 12 states and District of Columbia have laws that mandate fluoridation.[18] In March 2011, Arkansas passed a new law for statewide fluoridation.[19] The sizes of the public water systems or counties/communities affected and exemption provisions vary by state.

7. Although the Water Fluoridation Reporting System (WFRS) database contains information for all states and the District of Columbia, as of 2009, only 36 states have allowed access to their water fluoridation information on the public Web site.[20-21] WFRS data are used both to identify recipients of annual awards for fluoridation operational excellence and to determine states' achievement of the Healthy People 2020 water fluoridation objective. As more states routinely participate in WFRS, the reporting system will be an increasingly valuable tool for monitoring state and annually updating national water fluoridation data.

II. Guidelines & Recommendations from Authoritative Sources

A. Healthy People 2020

Healthy People 2020 Oral Health Objective OH-13 calls for 79.6 percent of the U.S. populations served by community water systems to have optimally fluoridated water.[2]

B. Centers for Disease Control and Prevention (CDC)

CDC has recognized water fluoridation as one of the great public health achievements of the twentieth century.[22-23] In 1995, CDC issued recommendations related to the technical aspects of water fluoridation, including engineering, administration, monitoring and surveillance, design, and safety procedures for both community and school public water supply systems.[24] In 2001, CDC published Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States. These recommendations promote the continuation and adoption of community water fluoridation in more communities as the foundation for sound caries-prevention programs.[1]

C. National Research Council (NCR)

1. Report on Fluoride in Drinking Water – A Scientific Review of EPA's Standards (2006)

In 2006, the NRC stated in this report that in developing regulatory standards for high levels of fluoride in drinking water, three adverse health effects warranted consideration: severe enamel fluorosis from exposure to high levels between birth and 8 years of age, risk of bone fractures, and severe forms of skeletal fluorosis after lifetime exposure (a rare condition in the United States). The NRC recommended that the U.S. Environmental Protection Agency (EPA) assess if 4 mg/L provided sufficient protection from these health conditions.[25-26]

2. Report on Earth Materials and Health: Research Priorities for Earth Sciences and Public Health (2007)

In this report, the NRC considered research issues related to the medical geology field on connections between earth science and public health, addressing both positive and negative societal impacts. This report identified fluoride as a mineral that can positively influence human health, and although earlier NRC reports were not conclusive in their opinions, this report concluded that fluoride was considered to be an element essential for human life based on its role in cellular functions involving metabolic or biochemical processes. The report further stated that fluoride in drinking water has two beneficial effects: preventing dental caries and contributing to bone mineralization and bone matrix integrity.[25,27]

3. National Academy of Sciences

In the NAS booklet Drinking Water: Understanding the Science and Policy behind a Critical Resource, the NAS spotlighted fluoride in drinking water and stated: In places where fluoride is artificially added to water, the fluoride concentration is kept at a safe level between 0.7 and 1.2 mg/L.[28]

D. Surgeon General's Report on Oral Health and A National Call to Action to Promote Oral Health

The Oral Health in America: A Report of the Surgeon General recommends community water fluoridation as a very effective and cost-effective method of preventing caries, which benefits all residents served by community water supplies regardless of socioeconomic status.[6]

A National Call to Action to Promote Oral Health, a report released by the Office of the Surgeon General, proposed that implementation strategies to overcome barriers in oral health disparities should include applying strategies to enhance the adoption and maintenance of proven community-based interventions, such as community water fluoridation.[3]

E. Task Force on Community Preventive Services

The Task Force on Community Preventive Services recently conducted a systematic review of studies of community water fluoridation. Based on strong evidence of effectiveness, the Task Force strongly recommends that community water fluoridation be included as part of a comprehensive population-based strategy to prevent or control tooth decay in communities.[29]

F. American Dental Association (ADA)

The ADA has endorsed fluoridation of community water supplies as safe and effective for preventing tooth decay for more than 40 years. The ADA Statement on Water Fluoridation Efficacy and Safety reported that nearly 100 national and international organizations recognize the public health benefits of community water fluoridation for preventing dental decay. They include the World Health Organization, the U.S. Public Health Service, the American Medical Association, the American Academy of Pediatrics, the American Academy of Family Physicians, the International Association for Dental Research, the National PTA, and the American Cancer Society.[30] Additional ADA statements reaffirming ADA's support of community water fluoridation and its effectiveness and safety can be found on the ADA web site (www.ada.org). The ADA also supports a National Fluoridation Advisory Committee to assist the Council on Access, Prevention, and Interprofessional Relations (CAPIR) in the promotion of water fluoridation.

G. American Academy of Pediatric Dentistry (AAPD)

The AAPD Policy Statement on the Use of Fluoride states that the AAPD "endorses and encourages the adjustment of fluoride content of domestic community water supplies where feasible."[31]

H. American Academy of Pediatrics (AAP)

The AAP policy statement on Preventive Oral Health Interventions for Pediatricians is a compilation of current concepts and scientific evidence required to understand and implement practice-based preventive oral health programs designed to improve oral health outcomes for all children and especially children at significant risk of dental decay. The policy reviews the cause of caries, preventive strategies and caries risk assessment and defines, through available evidence, appropriate recommendations for preventive oral health intervention by primary care pediatric practitioners. Optimal use of fluorides is reviewed and fluoridated water is recognized as the cheapest and most effective way to deliver anticaries benefits to communities.[32]

I. American Medical Association (AMA)

The AMA House of Delegates has developed the following water fluoridation policies:[33]

- **H-440.972 Statewide Fluoridation:** The AMA urges state health departments to consider the value of required statewide fluoridation (preferably a comprehensive program of fluoridation of all public water supplies, where these are fluoride deficient), and to initiate such action as deemed appropriate.
- **H440.945 Fluoride Content of Municipal Water Supplies:** Local and state medical societies and individual physicians have the opportunity to become involved in correcting the problem of fluoride underfeeding by (1) ascertaining whether municipal water supplies are optimally fluoridated and (2) working with public health agencies to take corrective action if suboptimal fluoridation is found.

J. American Water Works Association (AWWA)

AWWA publishes a manual for water supply practices called **Water Fluoridation Principles and Practice**. The publication provides data and guidance on the design, operation, and maintenance of fluoridation systems in water treatment. Covered topics also include the human health effects of fluoride, calculating dosage, feed systems, installation, operation, maintenance, and defluoridation.[34]

III. Research Evidence

A. Effectiveness

Recent systematic reviews agree that community water fluoridation is effective in decreasing dental caries prevalence in communities.[10-11,35-39] The Task Force on Community Preventive Services[40] found that in studies that measured decay rates before and after water fluoridation, the median decrease in tooth decay among children, ages 4 – 17 years, was 29.1%. Based on strong evidence of effectiveness, the Task Force strongly recommends in the Guide to Community Preventive Services that community water fluoridation be included as part of a comprehensive population-based strategy to prevent or control tooth decay in communities.[40,41] CDC's recommendations on the use of fluorides,[1] the Surgeon General's Report (SGR) on oral health,[6] the Institute of Medicine,[42] and the Canadian Task Force on Preventive Health Care,[43-45] and the Australian Systematic review[10,11] were in agreement with the Community Guide's strong recommendation for community water fluoridation.

B. Efficiency

CDC's recommendations on the use of fluorides[1] and the Surgeon General's Report on Oral Health[6] also highlighted findings that fluoridation was cost effective relative to other

interventions to prevent dental caries. Their conclusions are consistent with the Community Guide's systematic review of the economic evaluations that reported fluoridation to be cost saving.[40] The Community Guide's economic review found that costs of fluoridation vary greatly by water system, with lower costs in systems serving larger populations. The median cost per person per year ranged from $2.70 among 10 systems serving < 5000 people to $0.40 among 35 systems serving > 20,000 (1997 dollars).

IV. Best Practice Criteria

For the best practice approach of **Community Water Fluoridation**, the ASTDD Best Practices Committee has proposed the following **initial review standards** for five best practice criteria:

1. **Impact/Effectiveness**

   (Effectiveness of community water fluoridation in preventing dental caries has been established by extensive research – See Section III.)

   - Compare % population served by public water systems with optimally fluoridated water (CWF coverage) to Healthy People 2020 objective.
   - Document the number of communities or public water systems with optimally fluoridated water.
   - Document % of fluoridated systems consistently maintaining optimal levels of fluoride (documentation of monthly monitoring consistent with CDC's WFRS).

2. **Efficiency**

   - Compare average state cost for fluoridation (cost per person per year) to national estimates. (See **Attachment B**.)

3. **Demonstrated Sustainability**

   - Demonstrate sustainability through the number of years that identifiable water fluoridation program at state level has operated.
   - Demonstrate sustainability through the number of systems initiating, continuing, or discontinuing water fluoridation annually.
   - Has reported annually in ASTDD fluoridation synopsis.
   - Demonstrate sustainability through annual monitoring of fluoridation equipment requests.

4. **Collaboration/Integration**

   - Demonstrate partnerships/coalitions with key stakeholders and organizations (e.g., professional associations; grant makers; health departments; water authorities; universities including schools of dentistry, public health and medicine; dental hygiene programs; state environmental protection agencies; departments

of education; local community leaders, school nurses; and health advocates) to provide political, financial and scientific expertise to local constituents.
- Demonstrated coordination of fluoridation efforts with other health projects and issues (e.g. water quality, MCH, WIC, Chronic Disease; Medicaid services).

5. Objectives/Rationale

- Link of program goals/objectives to Healthy People 2020 objective for fluoridation.
- Link program goals/objectives to the Surgeon General's Report on Oral Health's recommendation for water fluoridation.

V. State Practice Examples

States provided descriptions of their successful practices to share their experiences and implementation strategies. The following practice examples illustrate various elements or dimensions of the best practice approach for **Community Water Fluoridation**. These reported success stories should be viewed in the context of the state's and program's environment, infrastructure and resources. End-users are encouraged to review the practice descriptions (click on the links of the practice names) and adapt ideas for a better fit to their states and programs.

A. Summary Listing of Practice Examples

Figure 1 provides a listing of community water fluoridation programs and activities submitted by states. Each practice name is linked to a detailed description report.

Figure 1.

State Practice Examples of Community Water Fluoridation

Item	Practice Name	State	Practice #
1	Financial Support for Community Water Fluoridation	AZ	04004
2	Policy for Private Water Source Fluoride Testing	AR	05003
3	California Water Fluoridation	CA	06002
4	Fluoridation Engineer in an Oral Health Program	CO	07003
5	Fluoridation Program	IL	16007
6	Indiana's Community Water Fluoridation Program	IN	17001
7	Fluoridation Surveillance	KY	20001
8	Community Water Fluoridation in Massachusetts	MA	24002
9	Community Water Fluoridation Program	MO	28004
10	Passage of the Fluoridation Bill in Nevada	NV	31002
11	New Hampshire Water Fluoridation Reporting System	NH	32002
12	Community Water Fluoridation of Manchester, New Hampshire	NH	32004
13	Oklahoma Water Fluoridation Program	OK	39001
14	Community Fluoridation Program	VA	53002

B. Highlights of Practice Examples

Highlights of state practice submissions are listed by the various community water fluoridation program activities described in Section I.B.

Legislation/Policies:

CA California Water Fluoridation (Practice #06002)
Law requires all public water systems with 10,000 service connections to fluoridate their systems once funds have been provided.

IL Fluoridation Program (Practice #16007)
State has mandatory fluoridation law.

KY Fluoridation Surveillance (Practice #20001)
Fluoridation law for public water supplies that serve more than 1,500 individuals.

MA Community Water Fluoridation in Massachusetts (Practice #24002)
Local Boards of Health have the authority to order community water fluoridation for their communities.

NV Passage of the Fluoridation Bill in Nevada (Practice #31002)
Law mandates fluoridation in counties with a population of 400,000 or more.

NH Community Water Fluoridation of Manchester, New Hampshire (Practice #32004)
State law requires that prior to the addition of fluoride, written application of 10% of the voters in any city must be submitted to the City Clerk and the majority of voters at the municipal election must approve the addition of fluoride.

OK Oklahoma Water Fluoridation Program (Practice #39001)
Program collaborated with organizations to develop resolutions and policy statements supporting fluoridation.

Advocacy/Promotion:

MA Community Water Fluoridation in Massachusetts (Practice #24002)
Role of the Office of Oral Health is to provide education and technical assistance on fluoridation to local Boards of Health and their community residents, as well as assists new communities to establish and older communities maintain fluoridation.

AR Policy for Private Water Source Fluoride Testing (Practice #05003)
Developed a policy within the state health department for testing drinking water to determine fluoride levels.

CA California Water Fluoridation (Practice #06002)
Community activities of a fluoridation workgroup increased community water fluoridation.

IL Fluoridation Program (Practice #16007)
Community-based fluoridation improvement program coordinates activities.

MO Community Water Fluoridation Program (Practice #28004)
Program mission includes having new communities fluoridate each year.

OK Oklahoma Water Fluoridation Program (Practice #39001)
Developed a coalition of supporters for fluoridation and collaborated with organizations to develop their resolutions and policy statements supporting fluoridation.

VA Community Fluoridation Program (Practice #53002)
Program's functions include assisting communities to initiate/maintain water fluoridation.

Supporting Communities Starting Fluoridation:

AZ Financial Support for Community Water Fluoridation (Practice #04004)
Funds community to partially support purchasing and installing fluoridation equipment.

CA California Water Fluoridation (Practice #06002)
Raised $15 million dollars to implement fluoridation in new communities.

MA Community Water Fluoridation in Massachusetts (Practice #24002)
MA Department of Public Health assumes initial costs of fluoridation for the community.

MO Community Water Fluoridation Program (Practice #28004)
Program provides fluoridation equipment at no cost to the community starting fluoridation.

OK Oklahoma Water Fluoridation Program (Practice #39001)
Provides start-up costs for initiating fluoridation with state appropriated dollars.

Training, Monitoring, Surveillance, Reporting and Inspection:

MA Community Water Fluoridation in Massachusetts (Practice #24002)
Program educates and trains all fluoride operators and monitors fluoride levels.

VA Community Fluoridation Program (Practice #53002)
Supports attendance of state personnel to CDC fluoridation course and trains local community water systems personnel.

IL Fluoridation Program (Practice #16007)
Program activities consist of surveillance, education and compliance monitoring.

IN Indiana's Community Water Fluoridation Program (Practice #17001)
Program provides monitoring & surveillance for Indiana with 96% of residents receiving optimally fluoridated water. Field employees perform site visits.

KY Fluoridation Surveillance (Practice #20001)
Surveillance involves water sampling and testing of water companies.

MO Community Water Fluoridation Program (Practice #28004)
Program monitors water systems and works with the Drinking Water Program and their state fluoridation engineer.

NH New Hampshire Water Fluoridation Reporting System (Practice #32002)
Participates in CDC's Water Fluoridation Reporting System (WFRS).

Collaboration with Water Quality & Other Partners:

CA California Water Fluoridation (Practice #06002)
Established workgroup of oral health community/political/financial power bases to implement state law and secure funds to fluoridate.

MA Community Water Fluoridation in Massachusetts (Practice #24002)
Collaborates with Board of Health members, water operators, and other community residents and partners with MA Department of Environmental Protection.

MO Community Water Fluoridation Program (Practice #28004)
Program collaborates extensively with the Dept. of Natural Resources, Public Drinking Water Program, where the state fluoridation engineer is located.

OK Oklahoma Water Fluoridation Program (Practice #39001)
Developed a coalition of fluoridation supporters.

Human Resources to Support Community Water Fluoridation Efforts:

CO Fluoridation Engineer in an Oral Health Program (Practice #07003)
Fluoridation engineer in the oral health program rather than water quality program.

IN Indiana's Community Water Fluoridation Program (Practice #17001)
Program has 4 FTE's: Director of Fluoridation and 3 field employees.

KY Fluoridation Surveillance (Practice #20001)
Fluoridation enforcement staff with 3.5 FTE's stationed in various regions monitors the fluoride levels and provides repairs/maintenance.

MA Community Water Fluoridation in Massachusetts (Practice #24002)
State Fluoridation Engineer and Program Coordinator assist communities and local Boards of Health.

MO Community Water Fluoridation Program (Practice #28004)
Program collaborates extensively with the Department of Natural Resources, Public Drinking Water Program, where the state fluoridation engineer is located.

OK Oklahoma Water Fluoridation Program (Practice #39001)
State dental director and administrative officer.

Financial Resources to Support Community Water Fluoridation Efforts:

KY Fluoridation Surveillance (Practice #20001)
As required by statute, program is supported by state general funds.

OK Oklahoma Water Fluoridation Program (Practice #39001)
Program supported by state appropriations.

IN Indiana's Community Water Fluoridation Program (Practice #17001)
Program is supported by MCH Block Grant.

MA Community Water Fluoridation in Massachusetts (Practice #24002)
PHHS Block Grant and State funds support fluoridation activities.

CO Fluoridation Engineer in an Oral Health Program (Practice #07003)
The fluoridation engineer position is supported by federal funds (PHHS Block Grant and CDC categorical funding).

CA California Water Fluoridation (Practice #06002)
The program's workgroup boosts funding for local fluoridation efforts.

NH Community Water Fluoridation of Manchester, New Hampshire (Practice #32004)
Healthy Manchester Community Collaborative, a designated local Turning Point Partnership, selected fluoridation as a priority.

VI. Acknowledgements

This report is the result of efforts by the ASTDD Best Practices Committee to identify and provide information on developing successful practices that promote community water fluoridation to improve the oral health of children and adults.

The ASTDD Best Practices Committee extends a special thank you to the ASTDD Fluorides Committee (http://www.astdd.org/about-us/) and CDC, Division of Oral Health (http://www.cdc.gov/ORALHEALTH/about.htm) for their partnership in the preparation of this report.

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VII. Attachments

ATTACHMENT A

Strength of Evidence Supporting Best Practice Approaches

The ASTDD Best Practices Committee takes a broad view of evidence to support best practice approaches for building effective state and community oral health programs. The Committee evaluated evidence in four categories: research, expert opinion, field lessons and theoretical rationale. Although all best practice approaches reported have a strong theoretical rationale, the strength of evidence from research, expert opinion and field lessons fall within a spectrum. On one end of the spectrum are promising best practice approaches, which may be supported by little research, a beginning of agreement in expert opinion, and very few field lessons evaluating effectiveness. On the other end of the spectrum are proven best practice approaches, ones that are supported by strong research, extensive expert opinion from multiple authoritative sources, and solid field lessons evaluating effectiveness.

Promising Best Practice Approaches			**Proven Best Practice Approaches**	
Research	+	⇨ ⇨	Research	+++
Expert Opinion	+		Expert Opinion	+++
Field Lessons	+		Field Lessons	+++
Theoretical Rationale	+++		Theoretical Rationale	+++

Research

+	A few studies in dental public health or other disciplines reporting effectiveness.
++	Descriptive review of scientific literature supporting effectiveness.
+++	Systematic review of scientific literature supporting effectiveness.

Expert Opinion

+	An expert group or general professional opinion supporting the practice.
++	One authoritative source (such as a national organization or agency) supporting the practice.
+++	Multiple authoritative sources (including national organizations, agencies or initiatives) supporting the practice.

Field Lessons

+	Successes in state practices reported without evaluation documenting effectiveness.
++	Evaluation by a few states separately documenting effectiveness.
+++	Cluster evaluation of several states (group evaluation) documenting effectiveness.

Theoretical Rationale

+++	Only practices which are linked by strong causal reasoning to the desired outcome of improving oral health and total well-being of priority populations will be reported on this website.

ATTACHMENT B

Estimating Annual Per Person Costs of Fluoridating a Water System[1]

To calculate annualized capital costs use two approaches – (a) book value of equipment and (b) replacement value of equipment.

A. Obtain the following information:
   - A-1 Obtain the population served by water system.
   - A-2 Obtain the initial cost (book value) of the capital equipment and the year it was purchased.[2]
   - A-3 Obtain the replacement cost of the capital equipment in current year dollars.[2]
   - A-4 Obtain the type of chemical used to fluoridate water.
   - A-5 Obtain the annual operational costs such as chemicals, human resources[3], maintenance and repair of equipment in current year dollars.

B. Calculate the following costs:
   - B-1 Convert the book value of the capital equipment item A-2 to current year dollars using the CPI.
   - B-2 Calculate the annual capital costs for the equipment values in items A-2 and A-3 using a 3% discount rates and assuming the equipment has a useful life of 15 years.[4]
   - B-3 Calculate the total annual direct costs using book value of equipment and replacement value of equipment by summing values in items B-2 and A-5.
   - B-4 Calculate annual cost per person by dividing item B-3 by item A-1.

Example: Calculating the annual per person cost of fluoridation in year 2000 dollars

A. Assume following information obtained:
   - A-1 The water system serves 1,100,000 people.
   - A-2 The cost of the equipment purchased in 1998 was $139,000.
   - A-3 Replacement cost of purchasing the equipment today would be $250,200.
   - A-4 The system uses H_2SiF_6.
   - A-5 The annual operating costs are $918,125.

B. Calculations:
   - B-1 Convert the book value of the capital equipment cost (item A-2) from 1998 to year 2000 dollars by multiplying $139,000 by 172.2/163 (values taken from CPI). Book value of equipment in year 2000 dollars equals $139,000*172.2/163=$146,845.
   - B-2 (a) Calculate the annual capital costs of the equipment using its book value in year 2000 dollars and using 3% discount rate. This value equals $146,845*0.08377=$12,301.
     (b) Calculate the annual capital costs of the equipment using its replacement value and using a 3% discount rate. This value equals $250,200*0.08377=$20,959.
   - B-3 Calculate the total annual direct cost:
     (a) Using the book value of the equipment ($12,301+918,125=$930,426).
     (b) Using the replacement value of the equipment ($20,959+$918,125=$939,084).
   - B-4 Calculate the annual direct cost per person:
     (a) Using the book value of equipment ($930,426/1,100,000=$0.85).
     (b) Using the replacement value of equipment ($939,084/1,100,000=$0.85).

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[1] Source: Garcia AI, Caries incidence and costs of prevention programs. J Public Health Dent 1989;49(5):259-71.
[2] Include installation costs, engineering expenses, and building improvements necessary to initiate fluoridation.
[3] Include value of 1) local water system personnel time spent on fluoridation activities and 2) state fluoridation engineer and fluoridation administrator time spent on local water system activities.
[4] Using a 3% discount rate for equipment with a useful life of 15 years multiply the value of the equipment by 0.08377. For example if the book value of the fluoridation equipment equaled $1,319,296 in current year dollars and you were using a 3% discount rate the annual capital cost would be $110,517.

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