Reasons To Not Fluoridate Alamo Heights Water

Compiled by W. F. Kiel - 8/25/2008

- Inappropriate demographics and high cost per capita
- Water Fluoridation is inefficient
- Fluoride benefit is topical, not systemic (ingested)
- NRC Report (2006) details health dangers of fluoride
- World Trends: most countries reject fluoridation
- Studies supporting fluoridation are flawed – no benefit!
- 91% of water systems in SA metro area are non-fluoridated
- Safety challenges to operate and maintain fluoridation

Reasons To Not Fluoridate Alamo Heights Water
Demographics And High Cost Per Capita

Fluoride proponents argue that fluoridated water primarily benefits children between the ages of 5-12, the period when permanent tooth development takes place. The socio-economic demographics of a city also comes into play when proponents argue that children whose families can't afford dental care need fluoride to protect against dental decay. This brings us to a target population of 5-12 year olds living at or below the poverty line. Based on 2000 census data, Alamo Heights has approximately 43 children in the target population. The estimated cost to fluoridate Alamo Heights is $34,500 per year, yielding a cost per child of $800 per year, far greater than the cost of dental insurance.

Fluoridation does not make much sense for Alamo Heights.

Cost To Fluoridate Alamo Heights Water in 2008

Method 1

1988 $2.12 per capita **Ringelberg ML Study for communities < 10,000 (1)**

2008 $4.65 per capita (adjusted to $2008 using 4% annual inflation)

2008 **$34,839 Total $/yr**

The initial cost was annualized a 4 percent over 15 years. Calculated operational costs included chemical costs, labor costs, and maintenance and repair costs.

Method 2

2004 $3.90 per capita **ADA figures for "small communities"**

2008 $4.56 per capita (adjusted to $2008 at 4% annual inflation)

2008 **$34,218 Total $/yr**

(1) **Cost of fluoridation: 44 Florida communities.**
Ringelberg ML, Allen SJ, Brown LJ. **1:** J Public Health Dent. 1992 Winter;52(2):75-80. HRS Public Health Dental Program, State Health Office, Tallahassee, FL 32301.

(2) From a ADA, CDC supported document: ***Fluoride: Natures way to prevent tooth decay***
"Fluoridation is cost-effective. The average cost for a community to fluoridate its water is estimated to range from approximately $0.62 a year per person in large communities to approximately $3.90 a year per person in small communities" (2004 dollars)

How Large Is The Target Population In Alamo Heights?

Assumptions for target population:

1) Children between 5 – 18 years of age.
2) Below the poverty line and can't afford dental care.

From the Alamo Heights 2000 census:

Population	7319
Number of families	1819
Median family income	$86,897
Median household income	$64,688
Children under 18 years	1632 (22.3% of pop.)
Families below the poverty line	29 (1.6% of families)
Children under 18 & below poverty line	60 (3.7% children)

43 children between 5 – 18 years of age

How Much Does Fluoride Cost Per Target Child Per Year?

Total cost per year / Target population = Cost per target child per year

$34,500* / 43 = $802

* Average of methods 1 & 2.

Reasons To Not Fluoridate Alamo Heights Water

Water Fluoridation Is Inefficient

Alamo Heights pumps over 600 million gallons of water a year. About one million gallons are consumed by people and the rest goes into the environment via sprinklers, sewers and leaks. Of the one million gallons approximately 6000 gallons are consumed by the target population of 5-12 year olds. Fluoridating our water means that only 6000 gallons out of over 600 million gallons will go to the intended purpose, or one-ten thousandths of a percent. Fluoridation would be very inefficient for Alamo Heights.

Is Water Fluoridation An Efficient Delivery System?

Alamo Heights pumps approximately 603 million gallons of water annually.

The average person consumes 1.5 liters or .39 gallons of water a day (ADA)

Alamo Heights Population is 7319 (2000 census)
and consumes approximately one million gallons annually.

0.17% of total water pumped is consumed!

One million gallons is consumed and 602 million gallons goes into the environment by way of lawn sprinklers, sewers and leaks. Not very efficient!

How Much Water Is Consumed By The Target Population?

Target pop. x water per day x 365 = water consumed annually

43 x .39 gallons x 365 = 6121 gallons

If Alamo Heights fluoridates it's 603 million gallons of water, approximately 6000 gallons is used for the purpose intended .

Reasons To Not Fluoridate Alamo Heights Water

Fluoride Benefit Is Topical, Not Systemic

Early in the history of fluoridation it was assumed that for fluoride to be effective it must be incorporated into the teeth during development and mineralization, in other words, ingested or systemic fluoride like fluoride supplements and fluoridated water, were the favored methods.

For 25 years it has been known that the topical application of fluoride provides most if not all of the benefit. Fluoride toothpaste, mouthwash and fluoride dental treatments are now viewed as the most effective way to fight cavities.

The chief proponents of fluoridation, the American Dental Association (ADA) and Center for Disease Control (CDC) both state on their websites that topical fluoride provides the benefit, although they continue to support fluoridation.

The obvious question is why support fluoridation, which is systemic, when is has been shown to be ineffective?

How Does Fluoride Work?

Achievements in Public Health, (CDC)
1900-1999: Fluoridation of Drinking Water to Prevent Dental Caries

Biologic Mechanism

"Fluoride's caries-preventive properties initially were attributed to changes in enamel during tooth development because of the association between fluoride and cosmetic changes in enamel and a belief that fluoride incorporated into enamel during tooth development would result in a more acid-resistant mineral. However, laboratory and epidemiologic research suggests that fluoride prevents dental caries predominately after eruption of the tooth into the mouth, and its actions primarily are topical for both adults and children (1).

These mechanisms include

1)inhibition of demineralization,

2)enhancement of re-mineralization, and

3)inhibition of bacterial activity in dental plaque. (1)"

(wfk comment: These mechanisms are all derived from topical applications)

Source: CDC MMWR Weekly October 22, 1999 /48(41);933-940

(1) Featherstone JD. Prevention and reversal of dental caries: role of low level fluoride. Community Dent Oral Epidemiol 1999;27:31-40.

Excerpts from the Scientific Literature - Topical s. Systemic:

"Fluoride is most effective when used topically, after the teeth have erupted."
SOURCE: Cheng KK, et al. (2007). Adding fluoride to water supplies. British Medical Journal 335(7622):699-702.

"it is now accepted that systemic fluoride plays a limited role in caries prevention."
SOURCE: Pizzo G, Piscopo MR, Pizzo I, Giuliana G. (2007). Community water fluoridation and caries prevention: a critical review. Clinical Oral Investigations 11(3):189-93.

“the major anticaries benefit of fluoride is topical and not systemic.”
SOURCE: National Research Council. (2006). Fluoride in Drinking Water: A Scientific Review of EPA's Standards. National Academies Press, Washington D.C. p 13.

"Since the current scientific thought is that the cariostatic activity of fluoride is mainly due to its topical effects, the need to provide systemic fluoride supplementation for caries prevention is questionable."
SOURCE: European Commission. (2005). *The Safety of Fluorine Compounds in Oral Hygiene Products for Children Under the Age of 6 Years*. European Commission, Health & Consumer Protection Directorate-General, Scientific Committee on Consumer Products, September 20.

“The results of more recent epidemiological and laboratory studies can be summarized by stating that post-eruptive (topical) application of fluoride plays the dominant role in caries prevention."
SOURCE: Hellwig E, Lennon AM. (2004). Systemic versus topical fluoride. *Caries Research* 38: 258-62.

★ "When it was thought that fluoride had to be present during tooth mineralization to 'improve' the biological apatite and the 'caries resistance' of the teeth, systemic fluoride administration was necessary for maximum benefit. Caries reduction therefore had to be balanced against increasing dental fluorosis. The 'caries resistance' concept was shown to be erroneous 25 years ago, but the new paradigm is not yet fully adopted in public health dentistry, so we still await real breakthroughs in more effective use of fluorides for caries prevention."
SOURCE: Fejerskov O. (2004). Changing paradigms in concepts on dental caries: consequences for oral health care. *Caries Research* 38: 182-91.

Excerpts from the Scientific Literature - Topical vs. Systemic:

★ “Current evidence strongly suggests that fluorides work primarily by topical means through direct action on the teeth and dental plaque. Thus ingestion of fluoride is not essential for caries prevention."
SOURCE: Warren JJ, Levy SM. (2003). Current and future role of fluoride in nutrition. *Dental Clinics of North America* 47: 225-43.

"[T]he majority of benefit from fluoride is now believed to be from its topical, rather than systemic, effects."
SOURCE: Brothwell D, Limeback H. (2003). Breastfeeding is protective against dental fluorosis in a nonfluoridated rural area of Ontario, Canada. *Journal of Human Lactation* 19: 386-90.

"For a long time, the systemic effect of fluoride was regarded to be most important, resulting in recommendations to use fluoride supplements such as tablets or drops. However, there is increasing evidence that the local effect of fluoride at the surface of the erupted teeth is by far more important."
SOURCE: Zimmer S, et al. (2003). Recommendations for the Use of Fluoride in Caries Prevention. *Oral Health & Preventive Dentistry* 1: 45-51.

"By 1981, it was therefore possible to propose a paradigm shift concerning the cariostatic mechanisms of fluorides in which it was argued that the predominant, if not the entire, explanation for how fluoride controls caries lesion development lies in its topical effect on de- and remineralization processes taking place at the interface between the tooth surface and the oral fluids. This concept has gained wide acceptance... With today's knowledge about the mechanisms of fluoride action, it is important to appreciate that, as fluoride exerts its predominant effect... at the tooth/oral fluid interface, it is possible for maximum caries protection to be obtained without the ingestion of fluorides to any significant extent."
SOURCE: Aoba T, Fejerskov O. (2002). *Critical Review of Oral Biology and Medicine* 13: 155-70

Excerpts from the Scientific Literature - Topical vs. Systemic:

★ "[F]luoride's predominant effect is posteruptive and topical."
"The prevalence of dental caries in a population is not inversely related to the concentration of fluoride in enamel, and a higher concentration of enamel fluoride is not necessarily more efficacious in preventing dental caries."
SOURCE: Centers for Disease Control and Prevention. (2001). Recommendations for Using Fluoride to Prevent and Control Dental Caries in the United States. *Morbidity and Mortality Weekly Report* 50(RR14): 1-42.

"Fluoride incorporated during tooth development is insufficient to play a significant role in caries protection."
SOURCE: Featherstone, JDB. (2000). The Science and Practice of Caries Prevention. *Journal of the American Dental Association* 131: 887-899.

"Current evidence suggests that the predominant beneficial effects of fluoride occur locally at the tooth surface, and that systemic (preeruptive) effects are of much less importance."
SOURCE: Formon, SJ; Ekstrand, J; Ziegler, E. (2000). Fluoride Intake and Prevalence of Dental Fluorosis: Trends in Fluoride Intake with Special Attention to Infants. *Journal of Public Health Dentistry* 60: 131-9.

"Fluoride supplementation regimens suffer from several shortcomings, the first of which may be their derivation from a time when the major effect of fluoride was thought to be systemic. Although evidence that fluoride exerts its effects mainly through topical contact is great, supplementation schemes still focus on the ingestion of fluoride."
SOURCE: Adair SM. (1999). Overview of the history and current status of fluoride supplementation schedules. *Journal of Public Health Dentistry* 1999 59:252-8.

"The case is essentially a risk-benefit issue - fluoride has little pre-eruptive impact on caries prevention, but presents a clear risk of fluorosis."
SOURCE: Burt BA. (1999). The case for eliminating the use of dietary fluoride supplements for young children. *Journal of Public Health Dentistry* 59: 260-274.

★ "Until recently the major caries-inhibitory effect of fluoride was thought to be due to its incorporation in tooth mineral during the development of the tooth prior to eruption...There is now overwhelming evidence that the primary caries-preventive mechanisms of action of fluoride are post-eruptive through 'topical' effects for both children and adults."
SOURCE: Featherstone JDB. (1999) Prevention and Reversal of Dental Caries: Role of Low Level Fluoride. *Community Dentistry & Oral Epidemiology* 27: 31-40.

Excerpts from the Scientific Literature - Topical vs. Systemic:

★ "[L]aboratory and epidemiologic research suggests that fluoride prevents dental caries predominately after eruption of the tooth into the mouth, and its actions primarily are topical for both adults and children."
SOURCE: Centers for Disease Control and Prevention. (1999). Achievements in Public Health, 1900-1999: Fluoridation of Drinking Water to Prevent Dental Caries. *Morbidity and Mortality Weekly Report* 48: 933-940.

"[R]esearchers are discovering that the topical effects of fluoride are likely to mask any benefits that ingesting fluoride might have... This has obvious implications for the use of systemic fluorides to prevent dental caries."
SOURCE: Limeback, H. (1999). A re-examination of the pre-eruptive and post-eruptive mechanism of the anti-caries effects of fluoride: is there any caries benefit from swallowing fluoride? *Community Dentistry and Oral Epidemiology* 27: 62-71.

"Although it was initially thought that the main mode of action of fluoride was through its incorporation into enamel, thereby reducing the solubility of the enamel, this pre-eruptive effect is likely to be minor. The evidence for a post-eruptive effect, particularly its role in inhibiting demineralization and promoting re-mineralization, is much stronger."
SOURCE: Locker D. (1999). Benefits and Risks of Water Fluoridation. An Update of the 1996 Federal-Provincial Sub-committee Report. Prepared for *Ontario Ministry of Health and Long Term Care.*

Reasons To Not Fluoridate Alamo Heights Water

NRC Report (2006) Details Health Dangers Of Fluoride

"In response to EPA's request, the NRC convened the Committee on Fluoride in Drinking Water…" "The Committee was charged to review toxicological, epidemiologic, and clinical data on fluoride … and exposure data on orally ingested fluoride from drinking water and other sources." …"The committee was asked to evaluate independently … the adequacy of EPA's fluoride maximum contaminant levels to protect children and others from adverse health effects." (1)

The NRC found numerous adverse health effects for fluoride levels below 2 mg/L. Those effects include moderate dental fluorosis, bone fractures, stage II and Stage III skeletal fluorosis, decreased thyroid function and effects on the brain in combination with aluminum. Non-nursing babies on formula using fluoridated water were found to exceed the upper limit for daily fluoride intake. In response to the NRC Report the ADA and CDC have recommended on their websites to not using fluoridated water with baby formula.

The NRC made the following recommendation: "In light of the collective evidence on various health end points and total exposure to fluoride, the committee concludes that EPA's MCLG of 4 mg/L should be lowered."

Based on these health risks Alamo Heights should not fluoridate its water.

CDC Statement on the 2006 National Research Council (NRC) Report on Fluoride in Drinking Water

…The purpose of the review of fluoride was to determine the adequacy of current guidelines set by the EPA on the maximum allowable concentration of fluoride in drinking water to protect children and others from adverse health effects. The National Research Council (NRC) Committee found that the current EPA maximum contaminant level goal (MCLG) of 4 milligrams of fluoride per Liter (mg/L) of drinking water should be lowered to better protect people from health risks associated with high natural fluoride levels. The report recommended that the EPA update its risk assessment in order to determine the appropriate level for the MCLG.

The NRC Committee evaluated many health effects that have the potential to be associated with fluoride in drinking water. The NRC concluded that **only three** adverse health effects warranted consideration in developing regulatory standards for high levels of fluoride in drinking water—**severe enamel fluorosis** from exposure to these high levels between birth to 8 years of age, and the potential **risk for bone fractures** and the more severe forms of **skeletal fluorosis** after lifetime exposure. Severe skeletal fluorosis is a rare condition in the United States.

Source: http://www.cdc.gov/fluoridation/safety/nrc_report.htm

CONCLUSIONS OF THE 2006 UNITED STATES NATIONAL RESEARCH COUNCIL REPORT : *FLUORIDE IN DRINKING WATER*

1) Moderate dental fluorosis is an adverse health effect occurring at fluoride levels of 0.7–1.2 mg/L, the levels of water fluoridation.

2) The Lowest Observed Adverse Effect Level (LOAEL) for bone fractures is at least as low as 1.5 mg/L and may be lower than this figure.

3) Stage II and Stage III skeletal fluorosis may be occurring at levels less than 2 mg/L.

4) Stage I skeletal fluorosis, (arthritis, clinically manifested as pain and stiffness in joints) is an adverse health effect which may be occurring with a daily fluoride intake of 1.42 mg/day, which is less than the amount the average person already obtains in their diet in non-fluoridated areas. The Maximum Contaminant Level Goal (MCLG) should be zero.

Source: **REVIEW OF THE 2006 UNITED STATES NATIONAL RESEARCH COUNCIL REPORT: *FLUORIDE IN DRINKING WATER***
Robert J Carton - Guest editorial review Fluoride 39(3)163–172 July-September 2006

CONCLUSIONS OF THE 2006 UNITED STATES NATIONAL RESEARCH COUNCIL REPORT : *FLUORIDE IN DRINKING WATER*

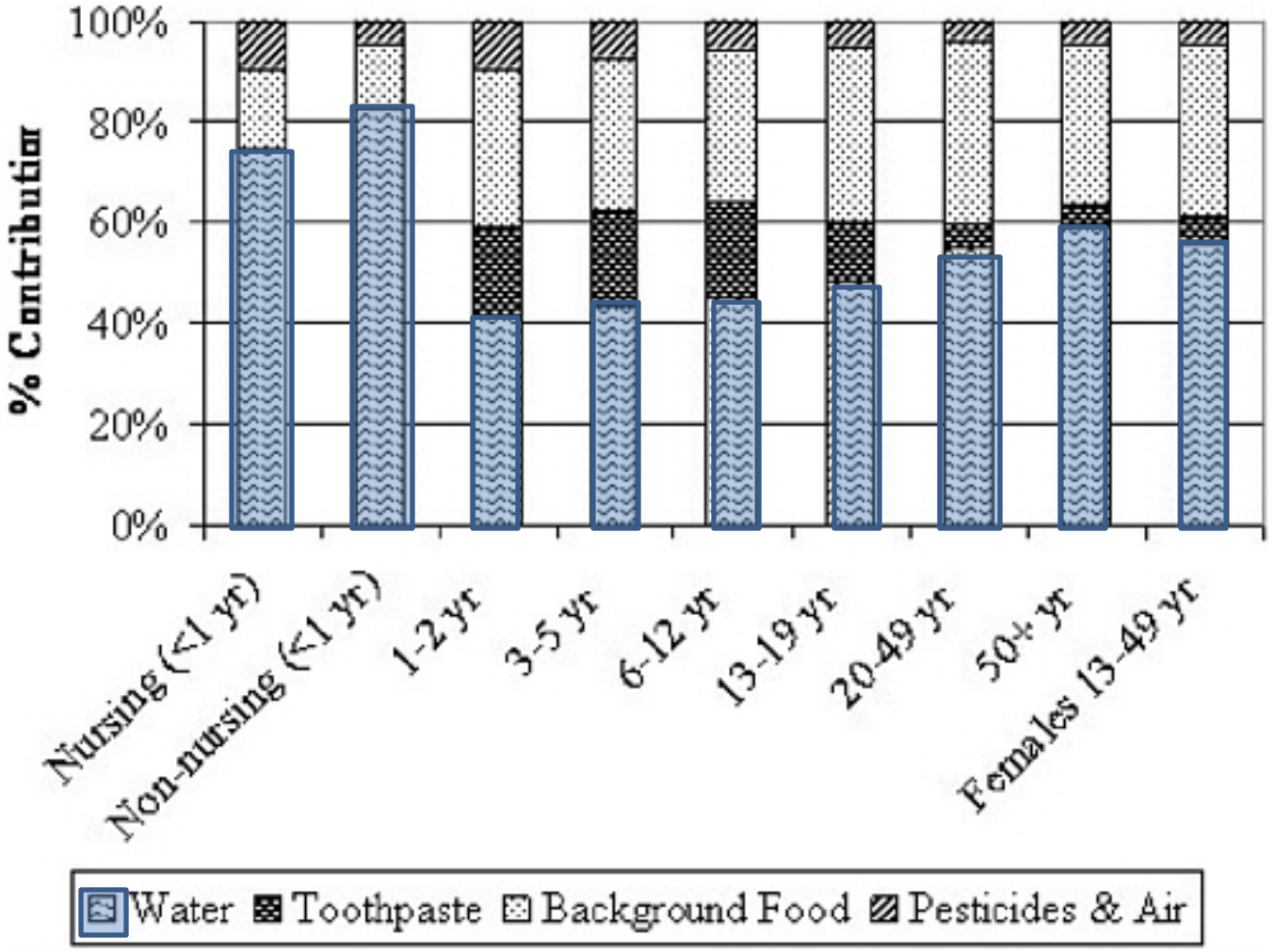
5) Decreased thyroid function is an adverse health effect, particularly to individuals with inadequate dietary iodine. These individuals could be affected with a daily fluoride dose of 0.7 mg/day (for a "standard man"). Since this is less than the amount already in the diet, the MCLG should be zero.

6) Fluoride has adverse effects on the brain, especially in combination with aluminum. Seriously detrimental effects are known to occur in animals at a fluoride level of 0.3 mg/L in conjunction with aluminum. The goal for this effect should also be zero.

Source: **REVIEW OF THE 2006 UNITED STATES NATIONAL RESEARCH COUNCIL REPORT: *FLUORIDE IN DRINKING WATER***
Robert J Carton - Guest editorial review Fluoride 39(3)163–172 July-September 2006

Where do we get the fluoride from?

Only half comes from water, except for babies

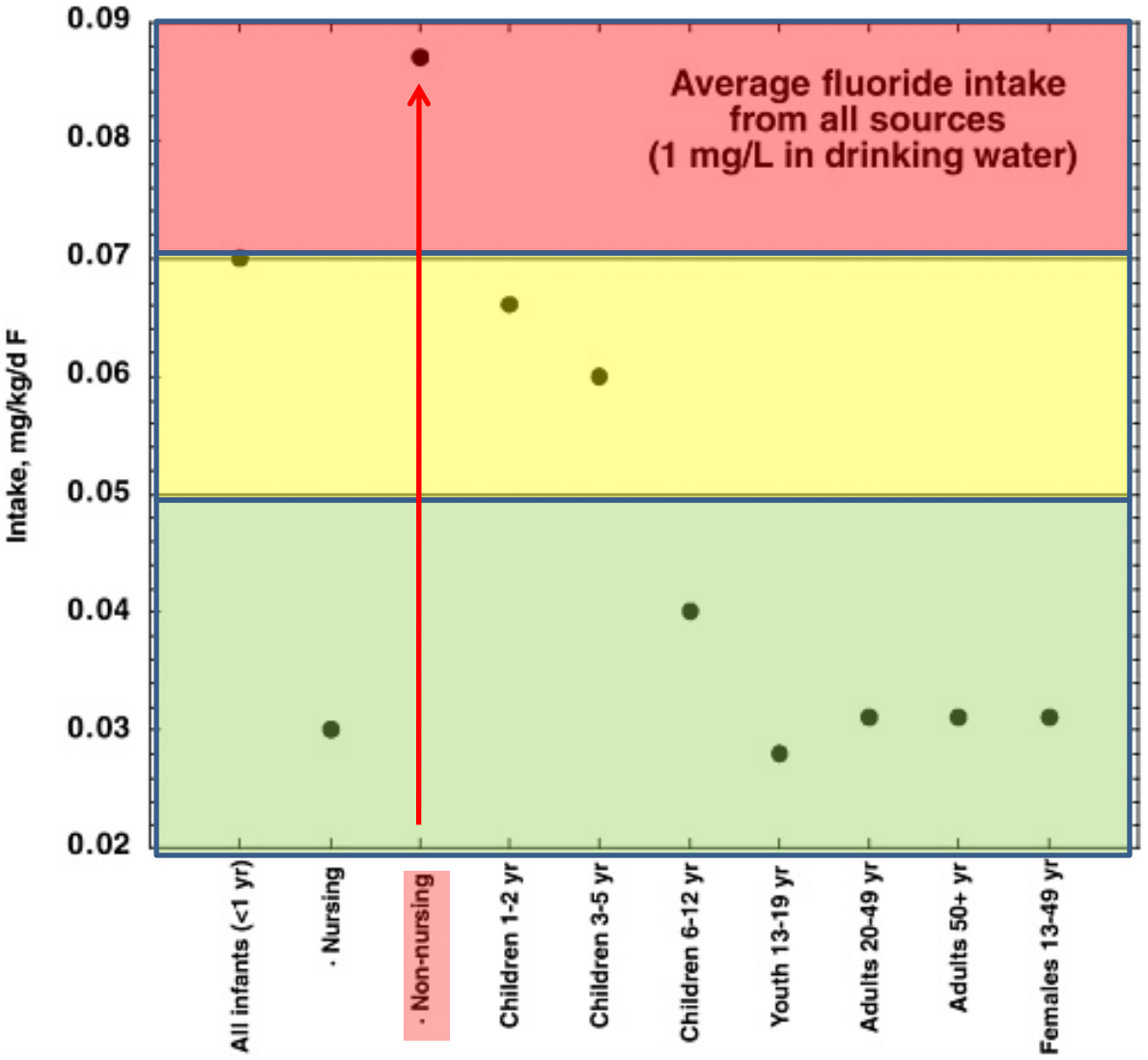


1 mg/L tap water

FIGURE 2-1 Source contribution to total inorganic fluoride exposure, including fluoride at 1 mg/L in tap water. The estimated chronic inorganic fluoride exposures from the various routes are presented in Tables 2-9 and 2-10. No fluoride supplement is included for any population subgroup.

Source: NRC Report (2006)

Source: National Research Council Report (2006)



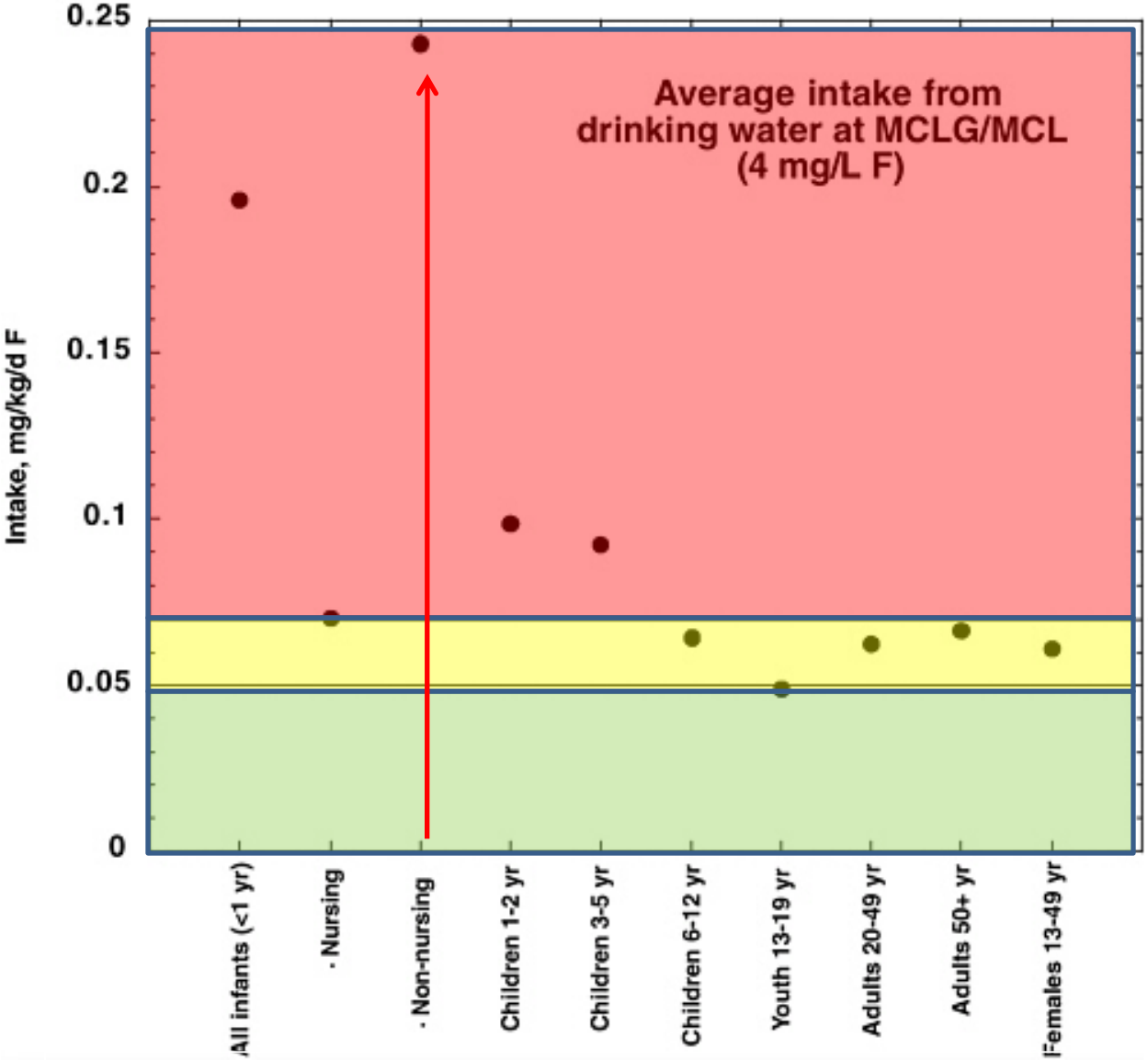
Danger of fluoridated Infant formula

.05 - .07 mg/kg/day: upper limit for fluoride intake in children.

Formula Feed Babies Exceed Safe Levels Of Fluoride With 1 mg/L Fluoridated Water.

FIGURE 2-8 Estimated average intake of fluoride from all sources, at 1 mg/L in drinking water (based on Table 2-11). Horizontal lines indicate an intake of 0.05-0.07 mg/kg/day.

Source: National Research Council Report (2006)



Danger of fluoridated Infant formula

Formula Feed Babies Exceed Safe Levels Of Fluoride By 3 ½ times with 4 mg/L* Fluoridated Water.

.05 - .07 mg/kg/day: upper limit for fluoride intake in children.

*4mg/L is considered "safe" by the EPA, CDC and ADA

FIGURE 2-9 Estimated average intake of fluoride from drinking water alone, based on a fluoride concentration of 4 mg/L (MCLGl/MCL; based on Table 2-10). Horizontal lines indicate an intake of 0.05-0.07 mg/kg/day.

Following The NRC 2006 Report The CDC Added The Following To It's Website:

"Background: Infant Formula and the Risk for Enamel Fluorosis
…The possibility of an association between fluoride in infant formula and the risk for enamel fluorosis has been studied for many years. Until now, most researchers concluded that fluoride intake during a child's first 10 to 12 months had little impact on the development of this condition in permanent teeth. A recent study, however, has raised the possibility that fluoride exposure during the first year of life may play a more important role on fluorosis development than was previously understood. It now appears that the amount of the fluoride contained in the water used for mixing **infant formula may influence a child's risk for developing enamel fluorosis**, particularly if the child's sole source of nutrition is from reconstituted infant formula. "

Source: http://www.cdc.gov/FLUORIDATION/safety/infant_formula.htm

Following The NRC 2006 Report, The ADA Proposed "Interim Guidelines":

"The ADA offers these recommendations so parents, caregivers and health care professionals have some simple and effective ways to reduce fluoride intake from reconstituted infant formula:
For infants who get most of their nutrition from formula during their first 12 months, ready-to-feed formula is preferred to help ensure that they do not exceed the optimal amount of fluoride intake.

If liquid concentrate or powdered infant formula is the primary source of nutrition, it can be mixed with water that is **fluoride free** or contains low levels of fluoride to reduce the risk of fluorosis. Examples are water that is labeled purified, demineralized, deionized, distilled or reverse osmosis filtered water. Many grocery stores sell these types of drinking water for less than $1 per gallon.

Breast milk is widely acknowledged as the most complete form of nutrition for infants. The American Academy of Pediatrics recommends human milk for all infants (except for the few for whom breastfeeding is determined to be harmful).
Parents and caregivers should consult with their pediatrician, family physician or dentist on the most appropriate water to use in their area to reconstitute infant formula. Ask your pediatrician or family physician whether water used in infant formula should be sterilized first (sterilization, however, will not remove fluoride)."

Source: http://www.ada.org/public/topics/fluoride/infantsformula.asp

What the NRC Report (2006) Says About Dental Fluorosis

FINDINGS

One of the functions of tooth enamel is to protect the dentin and, ultimately, the pulp from decay and infection. Severe enamel fluorosis compromises this health-protective function by causing structural damage to the tooth. The damage to teeth caused by severe enamel fluorosis is a toxic effect that the majority of the committee judged to be consistent with prevailing risk assessment definitions of adverse health effects. This view is consistent with the clinical practice of filling enamel pits in patients with severe enamel fluorosis and restoring the affected teeth.

In previous reports, all forms of enamel fluorosis, including the severest form, have been judged to be aesthetically displeasing but not adverse to health (EPA 1986; PHS 1991; IOM 1997; ADA 2005). This view has been based largely on the absence of direct evidence that severe enamel fluorosis results in tooth loss, loss of tooth function, or psychological, behavioral, or social problems. The majority of the present committee finds the rationale for considering severe enamel fluorosis only a cosmetic effect much weaker for discrete and confluent pitting, which constitutes enamel loss, than it is for the dark yellow to brown staining that is the other criterion symptom of severe fluorosis.

Source: NRC Report (2006) p.127

Examples of Dental Fluorosis

Mild Fluorosis
Photo by Hardy Limeback, DDS

Mild Fluorosis
Photo by Elke Babiuk

Mild Fluorosis
Photo by David Kennedy, DDS

Mild/Moderate Fluorosis
Photo by Elke Babiuk

Moderate/Severe Fluorosis
Photo by David Kennedy, DDS

Moderate/Severe Fluorosis
Photo by David Kennedy, DDS

Severe Fluorosis
Photo by Hardy Limeback, DDS

Severe Fluorosis
Photo by John Colquhoun, DDS

Severe Fluorosis
Source of photo unknown

HUMAN STUDIES **Possible Effect of Fluoride on Intelligence**

Cognitive Effects

Several studies from China have reported the effects of fluoride in drinking water on cognitive capacities (X. Li et al. 1995; Zhao et al. 1996; Lu et al. 2000; Xiang et al. 2003a,b). Among the studies, the one by Xiang et al. (2003a) had the strongest design. This study compared the intelligence of 512 children (ages 8-13) living in two villages with different fluoride concentrations in the water. The IQ test was administered in a double-blind manner. The high-fluoride area (Wamiao) had a mean water concentration of 2.47 ± 0.79 mg/L (range 0.57-4.50 milligrams per liter [mg/L]), and the low-fluoride area (Xinhuai) had a mean water concentration of 0.36 ± 0.15 mg/L (range 0.18-0.76 mg/L). The populations studied had comparable iodine and creatinine concentrations, family incomes, family educational levels, and other factors. The populations were not exposed to other significant sources of fluoride, such as smoke from coal fires, industrial pollution, or consumption of brick tea. Thus, the difference in fluoride exposure was attributed to the amount in the drinking water. Mean urinary fluoride[1] concentrations were found to be 3.47 ± 1.95 mg/L in Wamiao and 1.11 ± 0.39 mg/L in Xinhuai. Using the combined Raven's Test for Rural China, the average intelligence quotient (IQ) of the children in Wamiao was found to be significantly lower (92.2 ± 13.00; range, 54-126) than that in Xinhuai (100.41 ± 13.21; range, 60-128).

Source: National Research Council Report (2006)

Possible Effect of Fluoride On Intelligence

Xiang Cognitive Study 2003 (China)

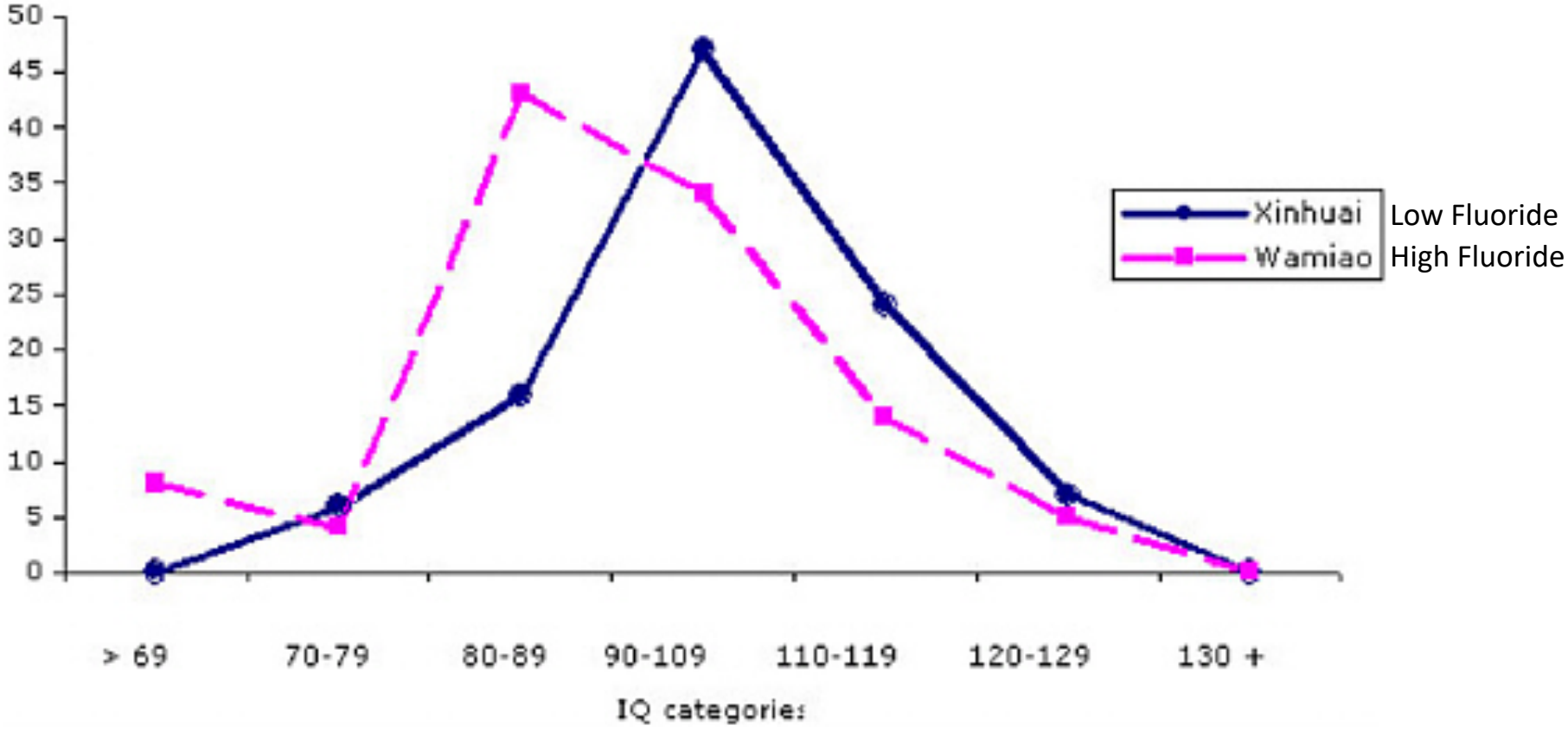


FIGURE 7-2 Distribution of IQ scores from males in Wiamiao and Xinuai. SOURCE: data from Xiang et al. 2003a.

Source: National Research Council Report (2006)

Possible Effect of Fluoride On Intelligence

Xiang Cognitive Study 2003 (China)

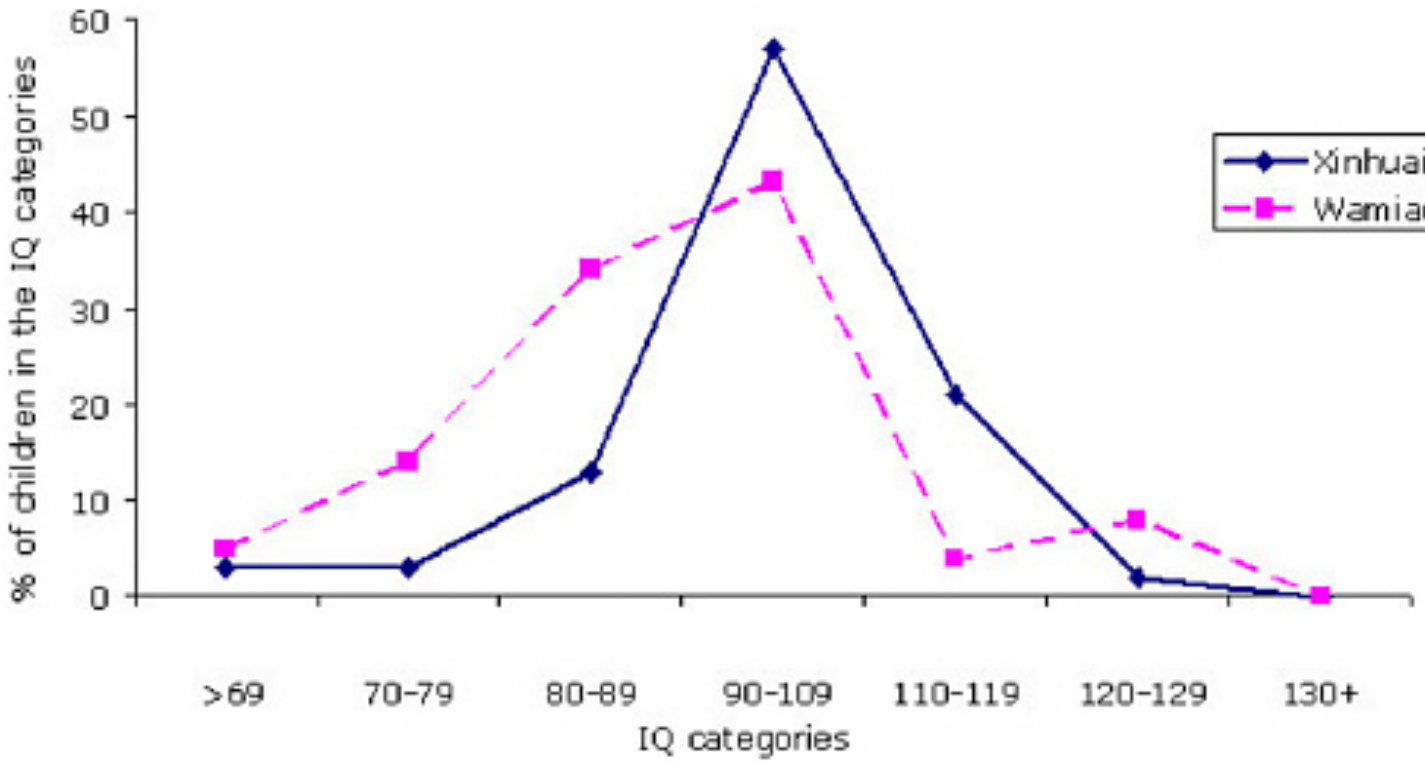


FIGURE 7-1 Distribution of IQ scores from females in Wamiao and Xinuai. SOURCE: data from Xiang et al. 2003a.

Source: National Research Council Report (2006)

Chinese Studies Reporting Effects Of Fluoride On Cognitive Capacity

Study	Fluoride Water Content	IQ Range
Xiang, et al. 2003	High Fluoride: 2.47 + or - .79 mg/L	92.2 +or- 13.00
	Low Fluoride: 0.36 + or - .15 mg/L	100.41 +or- 13.21
Lu, et al. 2000	High Fluoride: 3.15 +or- 0.61 mg/L	92.27 +or- 20.45
	Low Fluoride: 0.37+or- 0.04 mg/L	103.05 +or-13.86

Li, et al. 1995 The average IQ of 900 children (ages 8-13) from an area with severe enamel fluorosis was 9-15 points lower than the average IQ of children from an area with low or no enamel fluorosis. Urinary fluoride concentrations were found to be inversely correlated with IQ, …

Zhao et al. (1996) …enamel fluorosis was present in 86% of the children in the high-exposure group and 14% of the children in the low-exposure group and that skeletal fluorosis was found only in the high-exposure group at 9%.

Comment from the NRC Committee:
…the consistency of the collective results warrants additional research on the effects of fluoride on intelligence… source: NRC Report – Fluoride in Drinking Water (2006)

Possible Effect of Fluoride On Intelligence

RECOMMENDATIONS

On the basis of information largely derived from histological, chemical, and molecular studies, it is apparent that fluorides have the ability to interfere with the functions of the brain and the body by direct and indirect means. To determine the possible adverse effects of fluoride, additional data from both the experimental and the clinical sciences are needed. The possibility has been raised by the studies conducted in China that fluoride can lower intellectual abilities. Thus, studies of populations exposed to different concentrations of fluoride in drinking water should include measurements of reasoning ability, problem solving, IQ, and short-and long-term memory. Care should be taken to ensure that proper testing methods are used, that all sources of exposure to fluoride are assessed, and that comparison populations have similar cultures and socioeconomic status.

Source: National Research Council Report (2006)

NRC Recommends Lowering Maximum Contaminant Level Goal for Fluoride

FLUORIDE IN DRINKING WATER
A SCIENTIFIC REVIEW OF EPA'S STANDARDS
Committee on Fluoride in Drinking Water
NATIONAL RESEARCH COUNCIL *OF THE NATIONAL ACADEMIES (2006 Report)*

FINDINGS AND RECOMMENDATIONS
Maximum-Contaminant-Level Goal

In light of the collective evidence on various health end points and total exposure to fluoride, the committee concludes that EPA's MCLG of 4 mg/L should be lowered. Lowering the MCLG will prevent children from developing severe enamel fluorosis and will reduce the lifetime accumulation of fluoride into bone that the majority of the committee concluded is likely to put individuals at increased risk of bone fracture and possibly skeletal fluorosis, which are particular concerns for subpopulations that are prone to accumulating fluoride in their bone.

Recommendation: To develop an MCLG that is protective of severe enamel fluorosis, clinical stage II skeletal fluorosis, and bone fractures, EPA should update the risk assessment of fluoride to include new data on health risks and better estimates of total exposure (relative source contribution) in individuals and to use current approaches to quantifying risk, considering susceptible subpopulations, and characterizing uncertainties and variability.

Reasons To Not Fluoridate Alamo Heights Water
World Trends: Most Countries Reject Fluoridation

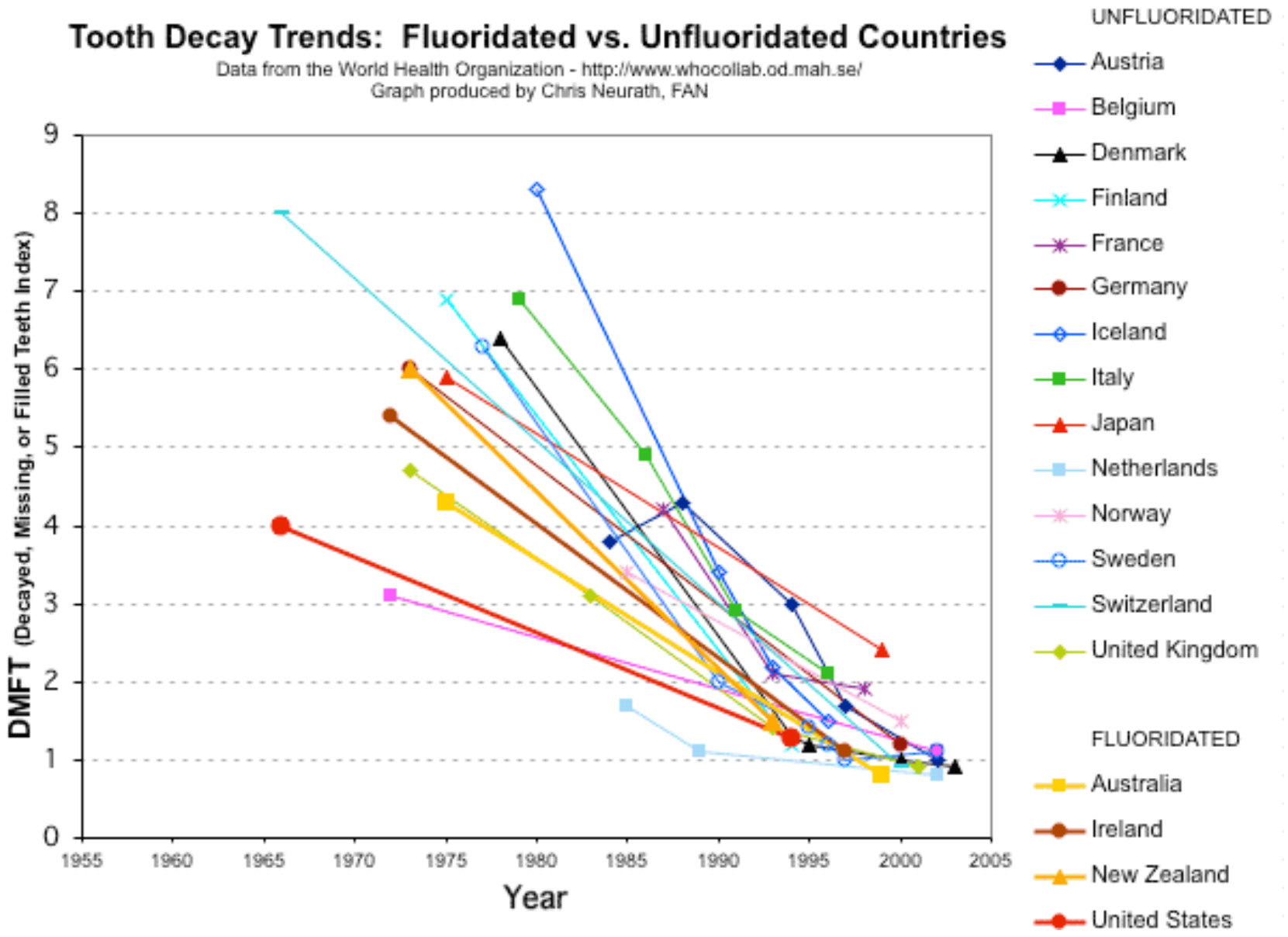
Most of the world rejects fluoride, including 98% of Europe, China, Japan and India.

World trends on dental health compiled by the World Health Organization (WHO), a proponent of fluoridation, have shown dramatic declines in dental cavities (DMFT) over the last 30 years.

Interestingly, average comparisons for 2004 between fluoridated and non-fluoridated populations of 12 year olds show no difference in dental health, indicating that water fluoridation does not provide the benefit claimed by proponents. New Zealand has reported a decline in cavities going back to 1930, 35 years before fluoridation.

Topical fluoride applications (toothpaste), improved dental care, improved diet and antibiotics are thought to be some of the factors responsible for the improved dental health observed, not systemic fluoride applications like water fluoridation.

What's happening around the rest of the world?



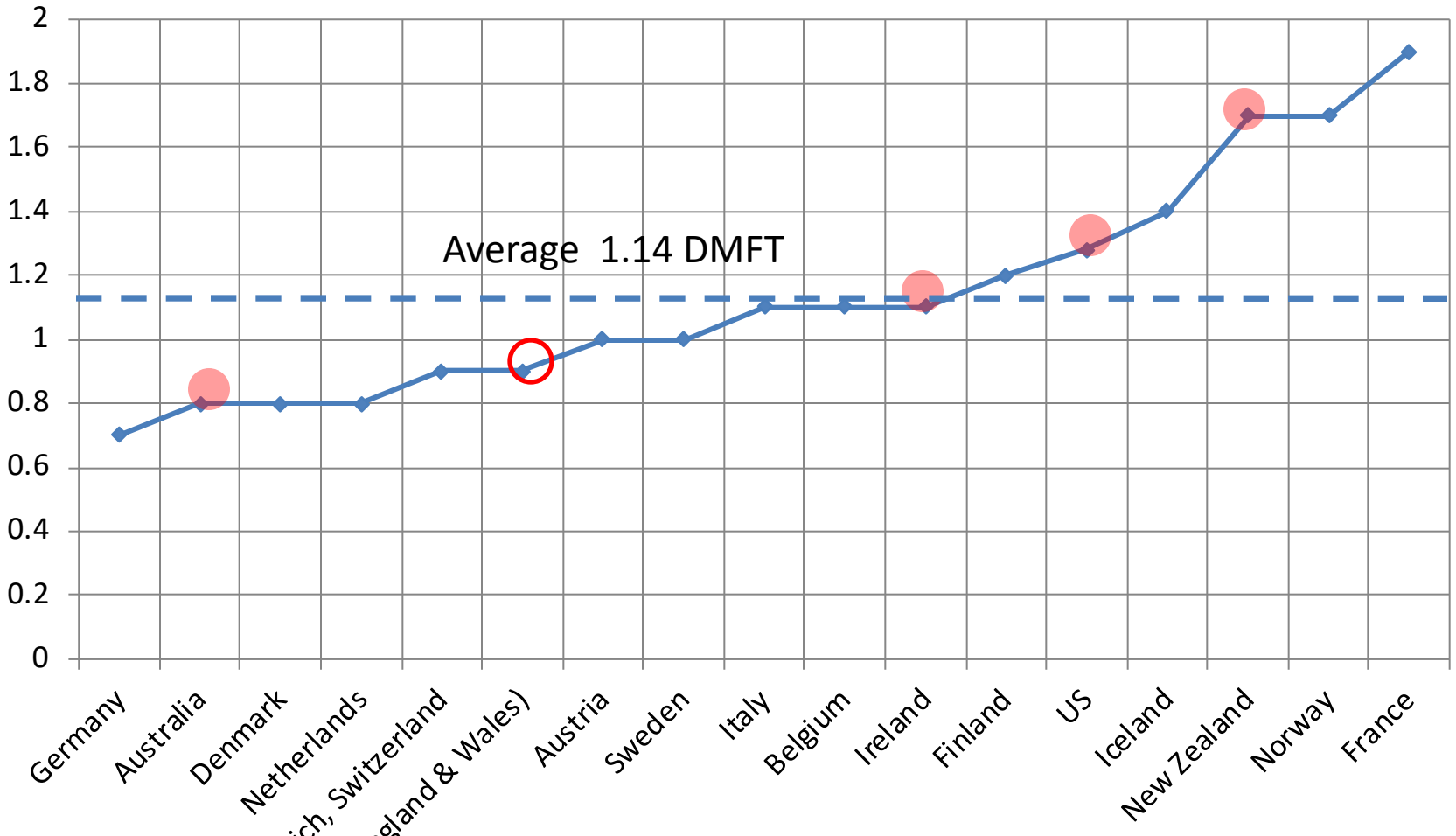
How do fluoridated areas compare with non-fluoridated areas?

DMFT (Decayed, Missing & Filled teeth) Status for 12 year olds by Country

- World Health Organization Data (2004) -

Country	DMFTs	Year	Status*
Australia	0.8	1999	More than 50% of water is fluoridated; no salt fluoridation
Ireland	1.1	1997	More than 50% of water is fluoridated; no salt fluoridation
US	1.28	1992-1994	More than 50% of water is fluoridated; no salt fluoridation
New Zealand	1.7	2005	More than 50% of water is fluoridated; no salt fluoridation
UK *(England & Wales)*	0.9	2000	11% of water supplies are fluoridated; no salt fluoridation
Germany	0.7	2005	No water fluoridation, but salt fluoridation is common
Denmark	0.8	2006	No water fluoridation or salt fluoridation
Netherlands	0.8	2002	No water fluoridation or salt fluoridation
Zurich, Switzerland	0.9	2000	No water fluoridation, but salt fluoridation is common
Austria	1	2002	No water fluoridation, but salt fluoridation is available to a limited extent.
Sweden	1	2005	No water fluoridation or salt fluoridation
Italy	1.1	2004	No water fluoridation or salt fluoridation
Belgium	1.1	2002	No water fluoridation or salt fluoridation
Finland	1.2	2006	No water fluoridation or salt fluoridation
Iceland	1.4	2005	No water fluoridation or salt fluoridation
Norway	1.7	2004	No water fluoridation or salt fluoridation
France	1.9	1998	No water fluoridation, but salt fluoridation is common
Average	1.14	DMFT	
No fluoridation	1.13	DMFT	Fluoridated Water Makes No Difference!
Fluoridation	1.16	DMFT	

DMFT (Decayed, Missing & Filled teeth) Status for 12 year olds
World Health Organization Data (2004)



Fluoridation >50%

Fluoridation <50%

Average Unfluoridated = 1.13 DMFT
Average Fluoridated = 1.16 DMFT (incl UK)
Average All Countries = 1.14 DMFT

Worldwide Dental Trends

WHY I CHANGED MY MIND ABOUT WATER FLUORIDATION

John Colquhoun © 1997 University of Chicago Press

Principal Dental Officer, Auckland, New Zealand

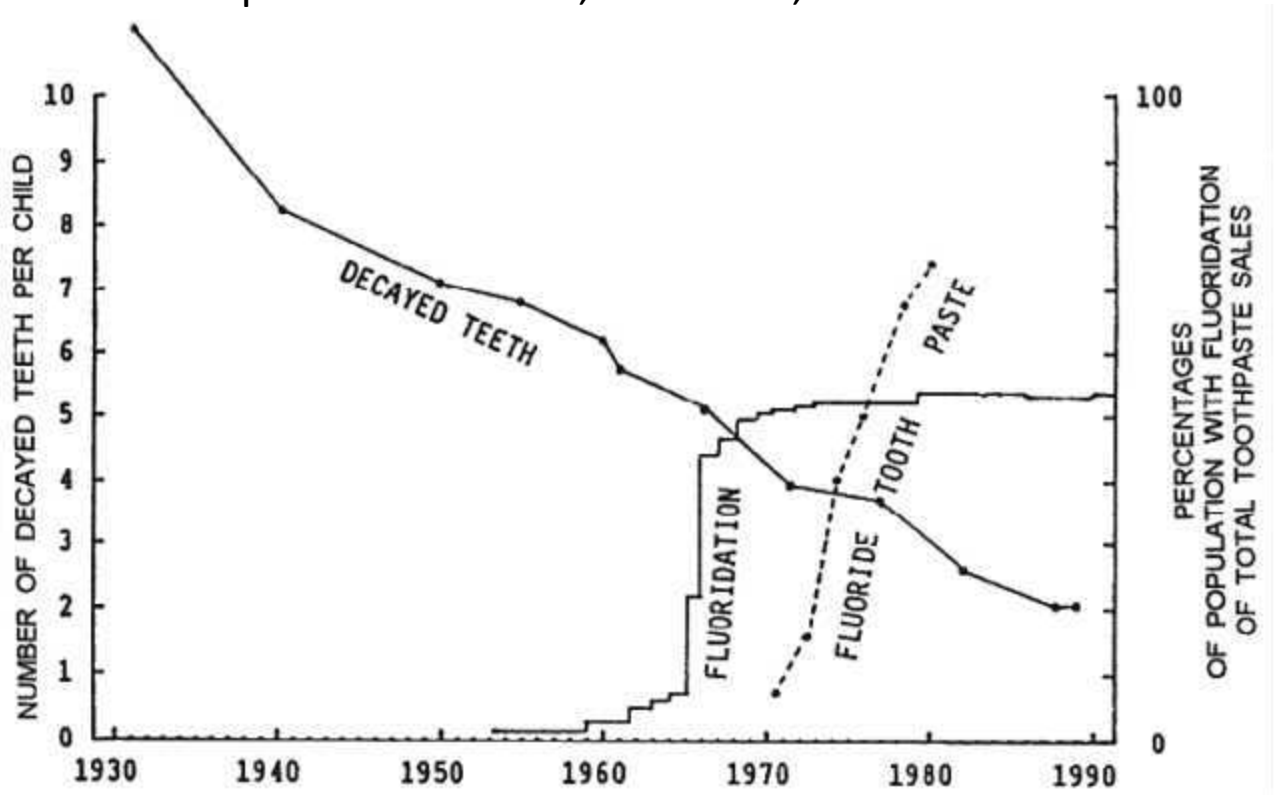


FIGURE 1. -- 50-year decline in tooth decay of 5-year-olds. SOURCE. -- Compiled from Health Department records of 5-year-olds' tooth decay 1930-1990, fluoridation, and fluoride toothpaste sales.

Reasons To Not Fluoridate Alamo Heights Water

Studies supporting water fluoridation are flawed

Fluoride proponents like ADA quote studies that report declines in cavities of 20-60% for fluoridated communities. The largest (39,000 children) and most recent study by Brunelle JA and Carlos JP was sponsored by the National Institute of Dental Health (NIDR) in 1990. The study looked at 5-18 year olds by year and comparisons were made between fluoridated and non-fluoridated communities.

The average difference was 18% fewer cavities in the fluoridated areas. The flaw in the study, and all others before, is that it fails to take into account the observation that systemic fluoride delays the eruption of the permanent teeth by approximately a year. The delayed teeth have less exposure time and, therefore, fewer cavities for a given year. When the delay is accounted for, by shifting the data for fluoridated children by one year, the 18% difference disappears and the curves for both populations lay virtually on top of each other. Water fluoridation does not provide the dental benefits claimed by proponents.

What the fluoride proponents say about benefits of fluoridation:

Excerpt from: ***American Dental Association Fluoridation Facts (p.9)***

Water Fluoridation's Role in Reducing Dental Decay

Water fluoridation and the use of topical fluoride played a significant role in improving oral health. Early studies showed that water fluoridation can reduce the amount of cavities children get in their baby teeth by as much as 60% and can reduce dental decay in permanent adult teeth by nearly 35%. Since that time, numerous studies have been published making fluoridation one of the most widely studied public health measures in history.

Later studies prove water fluoridation continues to be effective in reducing dental decay by 20-40%, even in an era with widespread availability of fluoride from sources, such as fluoride toothpaste. 28,**29**

28. Newbrun E. Effectiveness of water fluoridation. J Public Health Dent 1989;49(5):279-89

29. Brunelle JA, Carlos JP. Recent trends in dental caries in U.S. children and the effect of water fluoridation. J Dent Res 1990;69(Spe Iss):723-7.

Source: American Dental Association www.ada.org *Fluoridation Facts* (2005 version)

The critical study used by fluoride proponents to demonstrate the benefits:

Journal of Dental Research
February 1990 (Volume 69, Special Issue, Pages 723-727)

★ **Recent Trends in Dental Caries in U.S. Children and the Effect of Water Fluoridation**

by J.A. Brunelle and J.P. Carlos
Epidemiology Branch, National Institute of Dental Research, National Institutes of Health, Westwood Building, Room 538, Bethesda, Maryland 20892

SUMMARY: The decline in dental caries in US schoolchildren, first observed nationwide in 1979-1980, was confirmed further by a second national epidemiological survey completed in 1987. Mean DMFS scores in persons aged 5-17 years had decreased about 36% during the interval, and, in 1987, approximately 50% of children were caries-free in the permanent dentition. **Children who had always been exposed to community water fluoridation had mean DMFS scores about 18% lower than those who had never lived in fluoridated communities**. When some of the "background" effect of topical fluoride was controlled, this difference increased to 25%. The results suggest that water fluoridation has played a dominant role in the decline in caries and must continue to be a major prevention methodology.

Comment: This important 1990 study was conducted by the NIDR, and is the largest dental survey ever done in the US (39,000+ children).

As shown in Table 6, the mean DMFS of children with continuous residence in fluoridated areas was about 18% lower than in those with no exposure to fluoridation. This pattern was fairly consistent over age, except at 5 and 6 years old, where very little caries had occurred in either group.

J.A. Brunelle and J.P. Carlos - 1990

6

MEAN DMFS OF U.S. CHILDREN WITH PERMANENT TEETH BY AGE AND WATER FLUORIDATION EXPOSURE

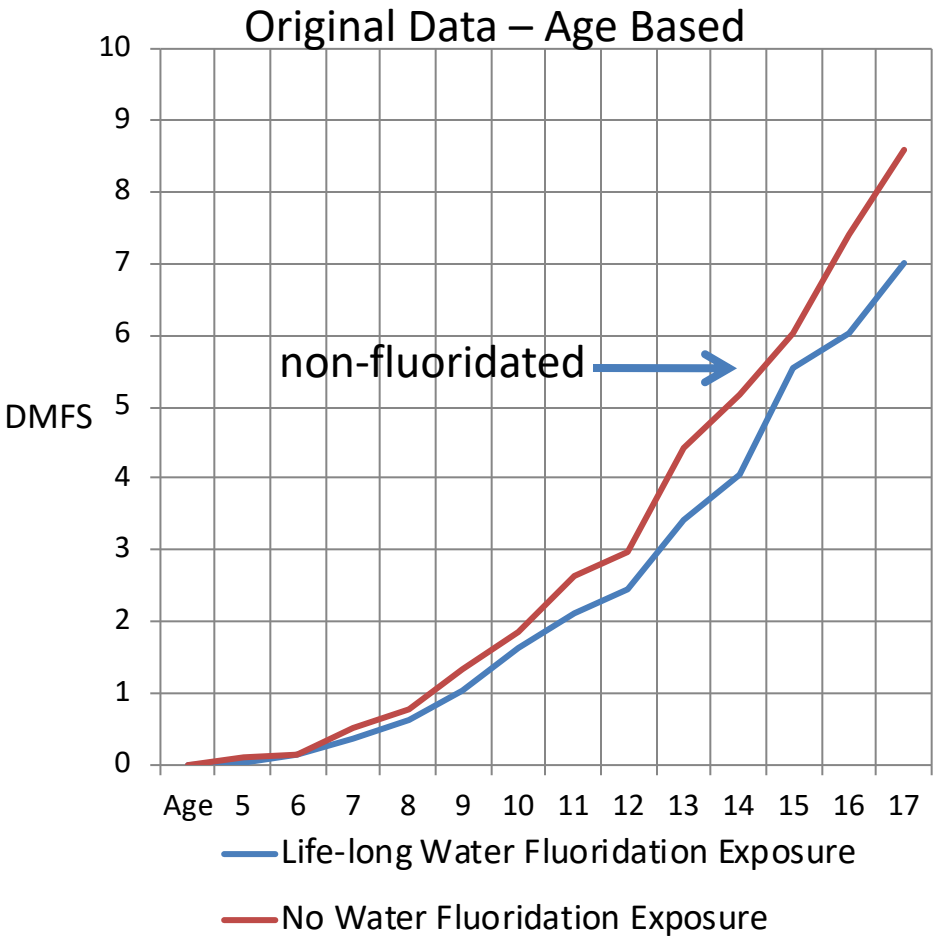
Age	Life-long Water Fluoridation Exposure Mean DMFS*	No Water Fluoridation Exposure Mean DMFS*	Percent Difference
5	0.03	0.10	70
6	0.14	0.14	0
7	0.36	0.53	32
8	0.64	0.79	19
9	1.05	1.33	21
10	1.64	1.85	11
11	2.12	2.63	19
12	2.46	2.97	17
13	3.43	4.41	22
14	4.05	5.18	22
15	5.53	6.03	8
16	6.02	7.41	19
17	7.01	8.59	18
All Ages	2.79	3.39	18

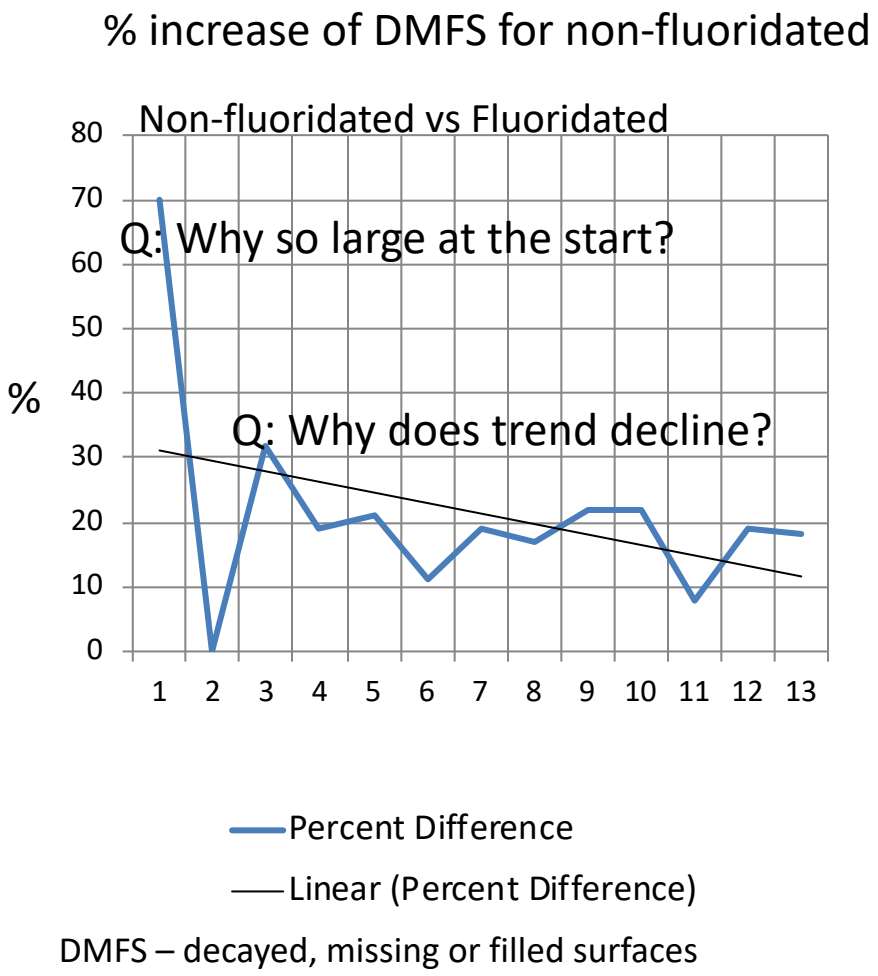
* All means adjusted to age and gender distribution of total U.S. population ages 5-17.

Plots of the original data showing the benefit of fluoridation:

Recent Trends in Dental Caries in U.S. Children and the Effect of Water Fluoridation by J.A. Brunelle and J.P. Carlos

Journal of Dental Research February 1990 (Volume 69, Special Issue, Pages 723-727)





The flaw in the study: Tooth eruption delay

3028 Systemic Fluoride: Delayed Tooth Eruption and DMFT vs Age Profiles

H. LIMEBACK, University of Toronto, Canada

Recent concerns about the risks vs benefits of water fluoridation have lead to renewed examination of its effectiveness as a public health measure. Furthermore, chronic ingestion of fluoride may have long-term systemic side effects. **Several researchers have reported a delay in tooth eruption in children growing up in fluoridated areas. This delay has been reported to be anywhere from 0.7 years (Virtanen *et al*, 1994) to 2 years (Campagna *et al*, 1995).** In the recent meta-analysis by McDonagh *et al*, it was noted that 'no (fluoridation) study used an analysis that would control for…the number of erupted teeth". **Objectives:** An attempt was made to determine how much influence various delays in tooth eruption would have on the DMFT vs Age profiles in fluoridated (F) vs non-fluoridated (non-F) areas. **Methods: Modern (1980's) data from the NIDR study (Brunelle and Carlos, 1990),** from the UK (Diesendorf, 1986) and older (1950's) data from the original Grand Rapids trial (Arnold *et al*, 1962) was used for this analysis. The data from the F areas was adjusted by 1 - 2 years. The adjusted DMFT vs Age data was then re-plotted and the profiles compared. **Results:** In all cases, a delay in tooth eruption reduced the difference between F and non-F communities. **The profiles were indistinguishable when a 1-year delay was used for the modern data** and a 2-year delay was used for the older data. **CONCLUSION**: **The small benefit that remains today from water fluoridation can, in part, be explained by fluoride ingestion retarding tooth eruption, resulting in a delay in dental caries.** The effect of the delay in tooth eruption from systemic fluoride is likely less evident in more recent fluoridation studies because of increasing ingestion of other sources of fluoride such as fluoridated dentifrices.

Taking into account the tooth eruption delay, the purported benefit disappears.

Adjustment accounting for delay in tooth Eruption due to fluoride

J.A. Brunelle and J.P. Carlos 1990 Study

MEAN DMFS OF U.S. CHILDREN WITH PERMANENT TEETH BY AGE AND WATER FLUORIDATION EXPOSURE

	Life-long Water Fluoridation Exposure	No Water Fluoridation Exposure	
Age	Mean DMFS*	Mean DMFS*	Percent Difference
5	0.03	0.1	70
6	0.14	0.14	0
7	0.36	0.53	32
8	0.64	0.79	19
9	1.05	1.33	21
10	1.64	1.85	11
11	2.12	2.63	19
12	2.46	2.97	17
13	3.43	4.41	22
14	4.05	5.18	22
15	5.53	6.03	8
16	6.02	7.41	19
17	7.01	8.59	18
All Ages	2.79	3.39	18

Original Data – age based

MEAN DMFS OF U.S. CHILDREN WITH PERMANENT TEETH BY AGE AND WATER FLUORIDATION EXPOSURE

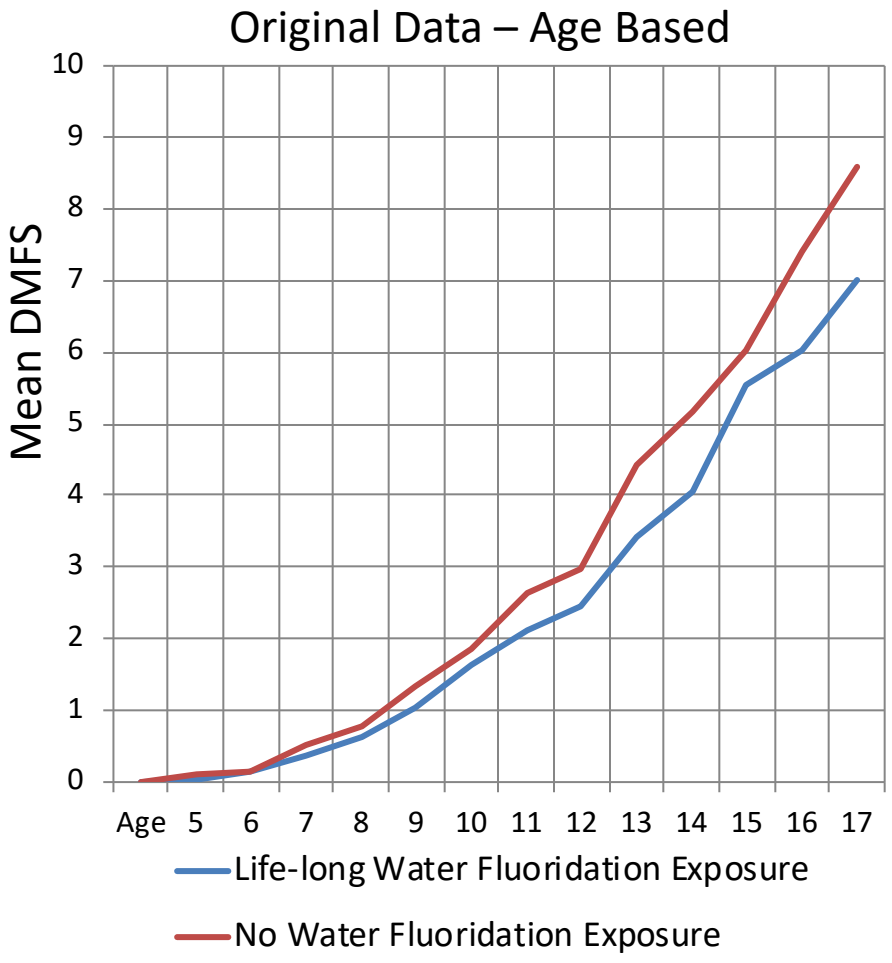
Life-long Water Fluoridation Exposure		No Water Fluoridation Exposure		
Age	Mean DMFS*	Age	Mean DMFS*	Percent Difference
6	0.14	5	0.1	-40%
7	0.36	6	0.14	-157%
8	0.64	7	0.53	-21%
9	1.05	8	0.79	-33%
10	1.64	9	1.33	-23%
11	2.12	10	1.85	-15%
12	2.46	11	2.63	6%
13	3.43	12	2.97	-15%
14	4.05	13	4.41	8%
15	5.53	14	5.18	-7%
16	6.02	15	6.03	0%
17	7.01	16	7.41	5%
All Ages	2.87		2.78	-3%

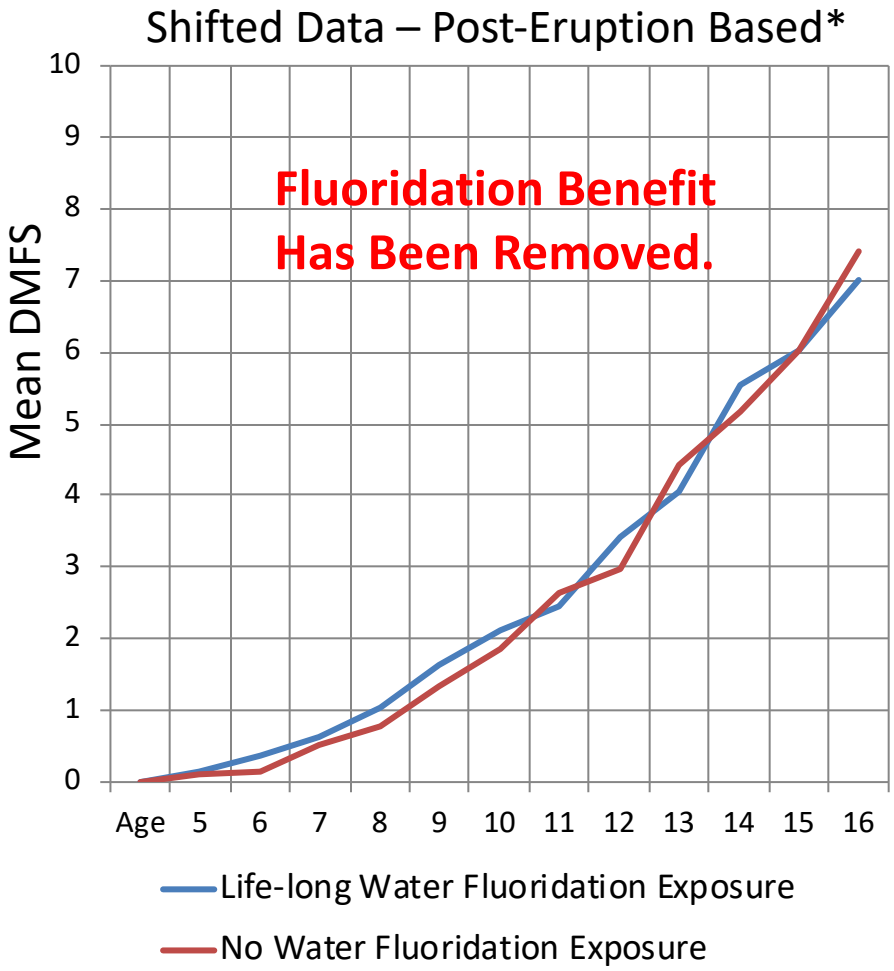
Shifted Data – time since tooth eruption
Age 6 fluoridated aligns with age 5 non-fluoridated, etc.

Recent Trends in Dental Caries in U.S. Children and the Effect of Water Fluoridation

by J.A. Brunelle and J.P. Carlos

Journal of Dental Research February 1990 (Volume 69, Special Issue, Pages 723-727)





*Fluoridated data was shifted back by one year; e.g. age 6 Fluoridated aligns with age 5 unfluoridated, etc.

Excerpts from the Scientific Literature: Delayed Eruption of Teeth

Drs R. Feltman and G. Kosel (1961) over a period of fourteen years fed fluoride tablets to children "through their eighth year of life" and reported that there was: "... a delay in the eruption of the teeth in some cases by as much as a year from the accepted eruption dates."

Although the number of erupted teeth at each age was not stated in any of the four main trials, in the **Newburgh** one it was possible to calculate from the published data that the number of erupted teeth was less than expected. The data published from the Evanston study suggested that there had been a progressive decline in the number of erupted first permanent molar teeth in six-year-old children in **Evanston** between the commencement of the study in 1946 and 1951. Unfortunately, this trend could not be studied because, after that time, the authors ceased publishing the data they obtained for the first permanent molars.

The Royal College of Physicians stated in 1976 that in the U.K. studies by the Department of Health, in the age group 8 to 11 years: "...it appears that fluoridation merely **postpones** caries by about 0.8 cavities a year."

In their paper entitled "The failure of fluoridation in the United Kingdom", when discussing the final report of that U.K. Health Department study, Professor A. Schatz and Dr J.J. Martin stated in 1972:
"It is thus clear that fluoridation does not prevent or reduce tooth decay. Instead, it merely postpones the appearance of caries by about 1.2 years Fluoridated children develop the same amount of tooth decay as their non fluoridated counterparts The only difference is that caries starts developing approximately 1.2 years later in the fluoridated group."
This delay, at least partly, could be due to the teeth of children in fluoridated areas erupting (breaking through the gums) at a slightly older age, and therefore being exposed to decay-producing factors for a shorter period.

Excerpts from the Scientific Literature: Delayed Eruption of Teeth

The suggestion has been made repeatedly that **fluoride inhibits thyroid** function, which in turn delays the eruption of teeth (e.g. Baume and Becks, **1954**) In **1979**, Drs L. Krook and G.A. Maylin described a mechanism which could have produced the considerable delay in the eruption of the teeth, of between 1.5 and 3.0 years, which occurred in cattle which were crippled with fluorosis (fluoride damage to bone) due to having been exposed to atmospheric fluoride pollution. They found that exposure to fluoride had produced a great decrease in the number of certain cells in bone (resorbing osteocytes) which play a major role in the resorption of the roots of the deciduous (first) teeth and of bone, both of which processes are necessary before permanent teeth can erupt normally. They stated:

"The delay in the eruption of the permanent teeth has also been reported in children in fluoridated communities." "The cause of the delay in eruption was shown in the present material. Fluoride arrests resorption of deciduous tooth roots and of the supporting bone. By inducing one disease [fluorosis], delays the manifestations of another [dental caries]."

Krook L, Maylin GA, Lillie JH, Wallace RS, Dental fluorosis in cattle, *Cornell-Vet*, 1983 Oct., 73:4, 340-362
Five expressions of dental fluorosis are described in cattle exposed to industrial fluoride pollution: 1. Hypercementosis with tooth ankylosis, cementum necrosis and cyst formation; 2. **Delayed eruption of permanent incisor teeth**; 3 Necrosis of alveolar bone with recession of bone and gingiva; 4. Oblique eruption of permanent teeth, hypoplasia of teeth with diastemata; and 5. Rapid progression of dental lesions. The five entities are not recognized in the "standard for the classification of dental fluorosis" by the National Academy of Sciences. Since this classification is too limited and superficial, adherence to this standard has left severe cases of fluoride intoxication in cattle undetected in field surveys [emphasis added].
editor's note: delayed tooth eruption with higher fluoride intake means less cavities are recorded because teeth have not been exposed to cariogenic challenge for as long. Is this the "benefit" fluoridation proponents saw in the early "trials"?

Reasons To Not Fluoridate Alamo Heights Water

91% Of Water Systems In SA Metro Area Are Non-Fluoridated

San Antonio, Converse and Universal City are the only cities in Bexar county that have chosen to artificially fluoridate their water. In the 7 surrounding counties only Floresville and New Braunfels are artificially fluoridated.

In the San Antonio Metro area, 91% of water systems, excluding those naturally fluoridated and military bases, are non-fluoridated. However, 84% of the population has fluoridated water due to the size of San Antonio.

It is clear that smaller communities are not supportive of fluoridation.

Fluoridation Status of Cities, Counties and Military Bases
San Antonio Metropolitan Area

Artificially Fluoridated Water Systems	County	Date
San Antonio Water System	Bexar	2002
Bexar Met Water System	Bexar	2002
Converse	Bexar	1999
Universal City	Bexar	1990
Military Bases (3)	Bexar	1955-58
New Braunfels	Comal	1983
Floresville	Wilson	1982
Green Valley Utility	Guadalupe	1995

Non-Fluoridated Water Systems	
Alamo Heights	Bexar
Castle Hills	Bexar
Kirby	Bexar
Leon Valley	Bexar
Fair Oaks Ranch	Bexar
Windcrest	Bexar
Shavano Park	Bexar
Selma	Bexar
Canyon Lake Sh.	Comal
Garden Ridge	Comal

Non-Fluoridated Water Systems	
Schertz	Guadalupe
Seguin	Guadalupe
Marion	Guadalupe
Bandera Co.	Bandera
Lake Medina Sh.	Bandera
Hondo	Medina
Benton	Medina
Devine	Medina
E. Medina Co.	Medina
Castroville	Medina
Natalia	Medina
La Coste	Medina
Poth	Wilson
Stockdale	Wilson
SS Water Supply	Wilson
Oak Hills	Wilson
Pleasanton	Atascosa
Jourdanton	Atascosa
Poteet	Atascosa
Charlotte	Atascosa

Source: CDC “My Water’s Fluoride” Data Base of all water systems – 1/2008

Fluoridation Status of Cities, Counties and Military Bases San Antonio Metropolitan Area

Consecutive Fluoridated*

Water Systems	**County**	**Date**
Military Bases (3)	Bexar	1958-62
Cibolo	Guadalupe	

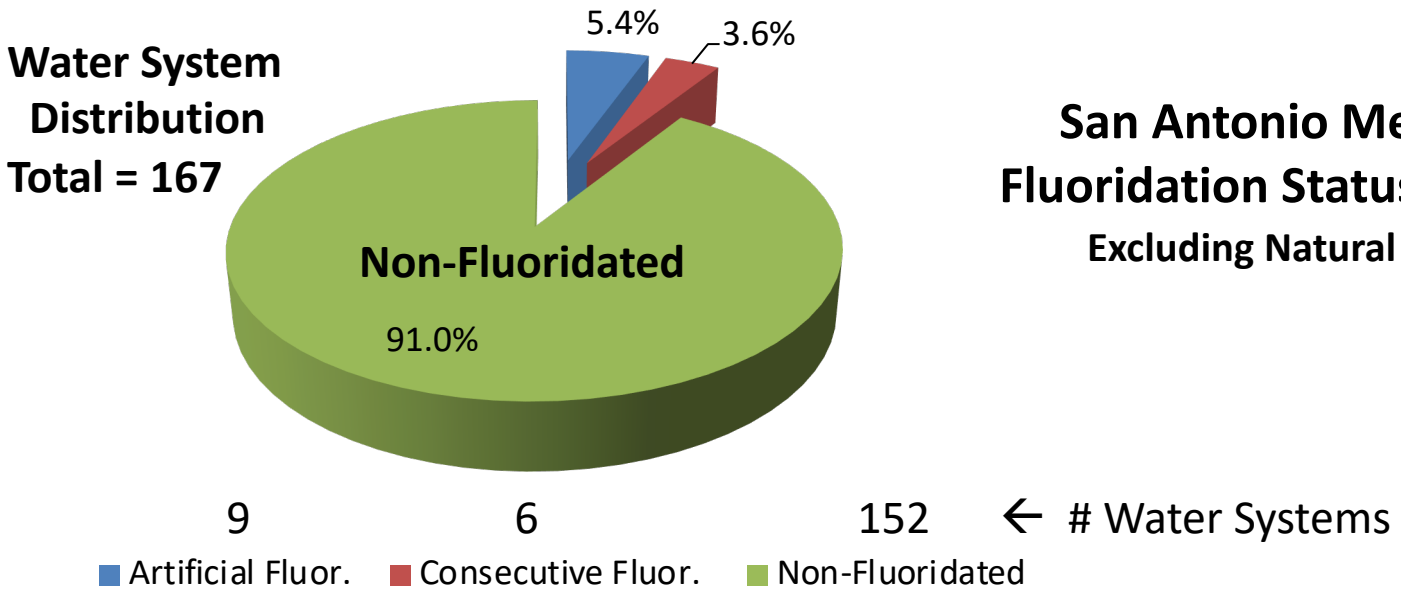
Naturally Fluoridated

Water Systems	**County**
Military Base (1)	Bexar
Bulverde	Comal
Boerne	Kendall
Bandera	Bandera
Lytle	Atascosa

*Consecutive Water System: A public water system that buys water from another public water system. For purposes of water fluoridation record keeping, the consecutive water system should purchase at least 80% of its water from a fluoridated water system. CDC MMWR Report 1995

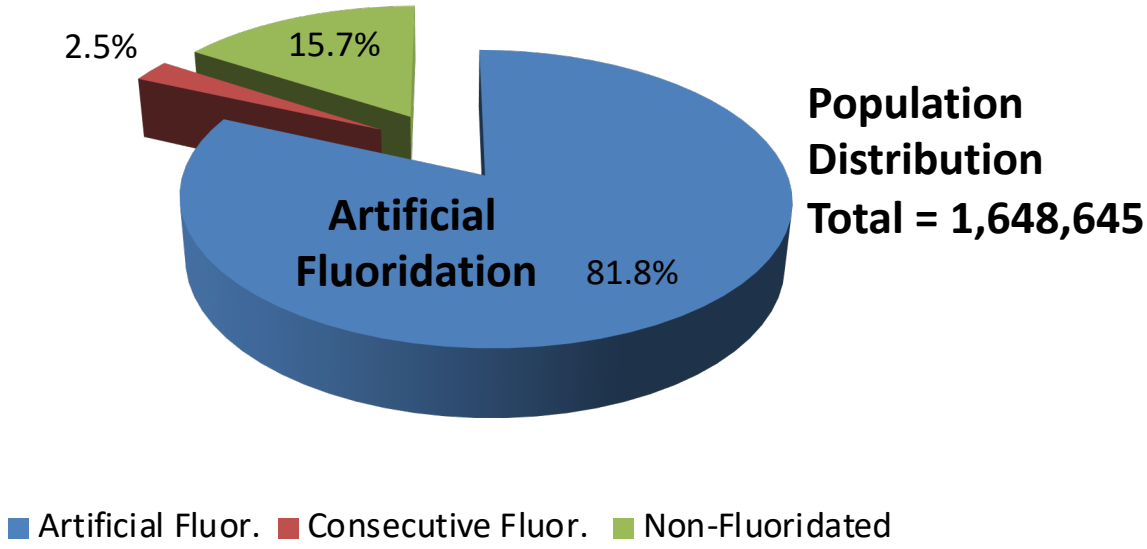
San Antonio Metropolitan Area Fluoridation Status of Water Systems

Excluding Natural Fluor. & Military



91% of water systems are non-fluoridated.

84.3 of population has artificial fluoridation.



Reasons To Not Fluoridate Alamo Heights Water
Safety Challenges To Operate And Maintain Fluoridation

The installation, operation and maintenance of a water fluoridation system is a complex process requiring trained and dedicated staff. Fluoride must be administered at each water source. For Alamo Heights this means 6 wells at three locations: City Hall (4), the high school (1) and TMI (1). Through a process of monitoring and surveillance, daily measurements are taken and reported to minimize the risk of overfeed. In the event of an overfeed, "the operating procedures should address the following:

1. Shutting down the equipment
2. Notifying appropriate state personnel
3. Flushing out the water lines containing the high (>10mg/L) fluoride concentrate
4. Notifying the public to prevent consumption of drinking water with high fluoride concentration. "

Source: Engineering and Administrative Recommendations for Water Fluoridation
CDC – MMWR Report pgs 6,7

Reasons To Not Fluoridate Alamo Heights Water

Safety Challenges To Operate And Maintain Fluoridation

Fluoride is a very hazardous substance and must be handled carefully. Therefore, It is critical that proper safety procedures be followed at all times. To emphasize this point, The CDC MMWR Report states that " The water supply industry has a high incidence of unintentional injuries compared with other industries in the United States; therefore, safety procedures should be followed." p. 12

The Texas Fluoridation Project Operator Manual also states "The accident rate among water utility personnel is one of the highest of any industry." p.27

Also from the operator manual (pgs 27,28):

"Safety equipment

The recommended safety equipment for handling fluorides depends on both the type of fluoride chemical and the process used. Anytime work is to be performed near pumps or acid storage, rubber gloves, goggles, and a face shield are the absolute minimum. If acid transfers are to be made, a PVC raincoat should also be worn. Always rinse gloves before storing them to prevent acid exposure.

All safety equipment must be readily available and must be stored outside the fluoride-feed area. An eyewash station, safety shower, or wash-down hose with a vacuum breaker on the water source should be readily accessible near the fluoride area. Safety showers and eyewash facilities must be accessible within 10 seconds, free of obstructions, and must be within a travel distance no greater Than 50 feet from the hazard."

Reasons To Not Fluoridate Alamo Heights Water

Safety Challenges To Operate And Maintain Fluoridation

"Full safety gear should be worn when transferring bulk shipments of acid from tanker trucks to a bulk storage tank. Fluorosilicic acid is transferred from the tank truck to the storage tank using air pressure provided by the chemical supplier."
"Dust masks, respirators, exhaust fans, and dust collectors should be used in dry-fluoride work and storage area. Sacks of dry fluoride should be handled carefully. The sacks should not be dropped, should be opened evenly at the top rather than tearing down the side, and the contents should be poured gently into hoppers, to minimize dust. Good ventilation is necessary when handling any fluoride. Masks should be worn when working around fluorides, even if no dust is visible."

"The greatest chance for overexposure to fluoride chemicals comes from the inhalation of dust generated when feeder hoppers or saturators are being filled."

"It is important to recognize symptoms of fluoride overexposure. In acute poisoning, the first symptoms to appear are vomiting, stomach cramps, and diarrhea. If large amounts have been ingested, what is vomited may be white or blue, depending on the color of the chemical ingested. The patient usually becomes weak, has difficulty in speaking, is thirsty, and has disturbed color vision. When the poisoning is by inhalation of dust or acid vapors, sharp biting pains occur in the nose, followed by nosebleed or nasal discharge."