

Water Fluoridation in the 21st Century: Doing Justly in Public Health

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- **Community water fluoridation is “one of ten great public health achievements of the 20th century.”**
 - Centers for Disease Control and Prevention (1999)
- **Fluoridation is “the single most important commitment that a community can make to the oral health of its citizens.”**
 - Former Surgeon General Dr. C. Everett Koop, cited by the American Dental Association (2005)
- **The ADA supports community water fluoridation as the single most effective public health measure to prevent tooth decay.**
 - American Dental Association (2006)
- **The Fluoridation Merit Award is presented to the Division of Oral Health. . . for its work at a national level in support of states and state oral health programs to promote water fluoridation.**
 - American Dental Association (2006)
- **It is a powerful strategy to reduce disparities in tooth decay among different populations.**
 - American Dental Association (2006)

- **In 2006, 69 percent of the U.S. population was served by community water fluoridation, an increase from 62 percent in 1992. The target is 75 percent.**
 - Centers for Disease Control and Prevention (2008)
- **Despite the proven benefits of water fluoridation, both for adults as well as children, formidable barriers continue to impede more widespread adoption of this public health practice, including lack of sufficient personnel at the State level, costs, maintenance, public misperceptions about safety, and political opposition.**
 - Public Health Service (2008)

- **Sodium fluoride is “a well known insecticide and ingredient of many roach powders”**
 - *Chemistry in Medicine* (1928)
- **If it is a fact that some individuals are against fluoridation, you have just got to knock their objections down. The question of toxicity is on the same order. Lay off it altogether. Just pass it over, “We know there is absolutely no effect other than reducing tooth decay,” you say, and go on.**
 - Dr. Frank A. Bull, Address to the Fourth Annual Conference of State Dental Directors with the Public Health Service and The Children’s Bureau (1951)
- **The “fluoridation of public water supplies is a hazardous procedure, people are bound to get hurt, it remains to find out how many and when.”**
 - Benjamin C. Nesen, Director of Laboratories, Department of Water Supply, Gas & Electric, City of New York (1956)

- **To my surprise, [the dental statistics] showed that fewer fillings had been required in the nonfluoridated part of my district than in the fluoridated part. . . . In fact, teeth were slightly better in the nonfluoridated areas.**
 - Dr. John Colquhoun, Principal Dental Officer for Auckland, New Zealand (1997)
- **The implication for the general public of these [risk assessment] calculations is clear. Recent, peer-reviewed toxicity data [for fluoride], when applied to EPA's standard method for controlling risks from toxic chemicals, require an immediate halt to the use of the nation's drinking water reservoirs as disposal sites for the toxic waste of the phosphate fertilizer industry.**
 - Dr. J. William Hirzy, Senior Vice President, NTEU Chapter 280 (1999)
- **The ethical validity of fluoridation policy does not stand up to scrutiny relative to the Nuremberg Code and other codes of medical ethics.**
 - Douglas W. Cross and Dr. Robert J. Carton (2003)

- **The evidence has convinced me that the benefits of water fluoridation no longer outweigh the risks. The money saved from halting water fluoridation programs can be more wisely spent on concentrated public health efforts to reduce dental decay in the populations that are still at risk and this will, at the same time, lower the incidence of the harmful side effects that a large segment of the general population is currently experiencing because of this outdated public health measure.**
 - Dr. Hardy Limeback, Head of Preventive Dentistry, University of Toronto (2000)
- **One could argue that [fluoride] is the most widely used medicine in history.**
 - Joel Tickner and Melissa Coffin, University of Massachusetts Lowell (2006)

We call upon Members of Congress to sponsor a new Congressional Hearing on Fluoridation so that those in government agencies who continue to support the procedure, particularly the Oral Health Division of the CDC, be compelled to provide the scientific basis for their ongoing promotion of fluoridation.

We call upon all medical and dental professionals, members of water departments, local officials, public health organizations, environmental groups and the media to examine for themselves the new documentation that fluoridated water is ineffective and poses serious health risks. It is no longer acceptable to simply rely on endorsements from agencies that continue to ignore the large body of scientific evidence on this matter.

- Professionals' statement to end fluoridation (1778 signers as of 23 July 2008)**

- **The American Medical Association is not prepared to state that “no harm will be done to any person by water fluoridation.”**
 - Joseph E. Flanagan, Jr., American Medical Association (1965)
- **Fluoride is much better than not having it, but we cannot prove it's safe.**
 - Dr. Steven Levy, University of Iowa (2006)

- **For the past 50 years, CWF has been considered the most cost-effective measure for the control of caries at the community level. However, it is now accepted that systemic fluoride plays a limited role in caries prevention. Several epidemiologic studies conducted in fluoridated and nonfluoridated communities clearly indicated that CWF may be unnecessary for caries prevention, particularly in the industrialized countries where the caries level has become low. Moreover, the evidence of an increased prevalence of fluorosis, particularly in fluoridated areas, needs to be considered.**
 - Pizzo et al., University of Palermo (2007)
- **It is not CDC's responsibility to determine what levels of fluoride in water are safe.**
 - Centers for Disease Control and Prevention (2007)

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.

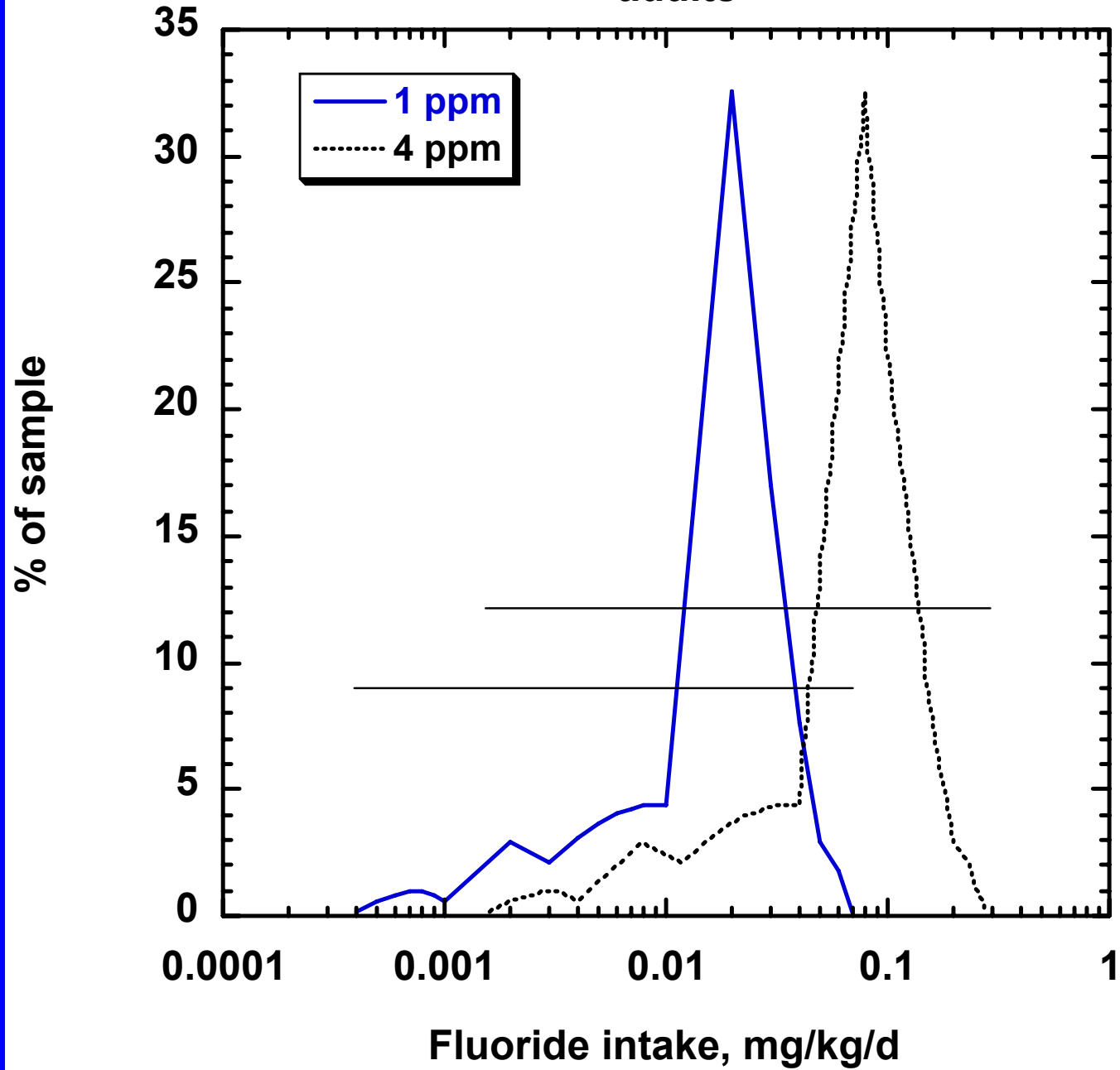
- National Research Council (2006)**

EPA's response

- **EPA named Dow AgroSciences as a winner of the 2007 Best-of-the-Best Stratospheric Ozone Protection Award**
 - **For commitment and innovation in developing sulfuryl fluoride as an alternative to methyl bromide**
- **To date, no change to the drinking water standard**

- **The National Research Council's finding is "consistent with CDC's assessment that water is safe and healthy at the levels used for water fluoridation (0.7-1.2 mg/L)."**
 - Centers for Disease Control and Prevention (2006)
- **The [NRC] report in no way examines or calls into question the safety of community water fluoridation, which is the process of adding fluoride to public water supplies to reach an optimal level of 0.7-1.2 ppm in order to protect people against tooth decay.**
 - American Dental Association (2006)

Fluoride intake from water adults



- **[Infant formula] can be mixed with water that is fluoride free or contains low levels of fluoride to reduce the risk of fluorosis.**
 - American Dental Association (2006)
- **Enamel fluorosis is not a disease but rather affects the way that teeth look.**
 - American Dental Association (2006)

Dental Fluorosis



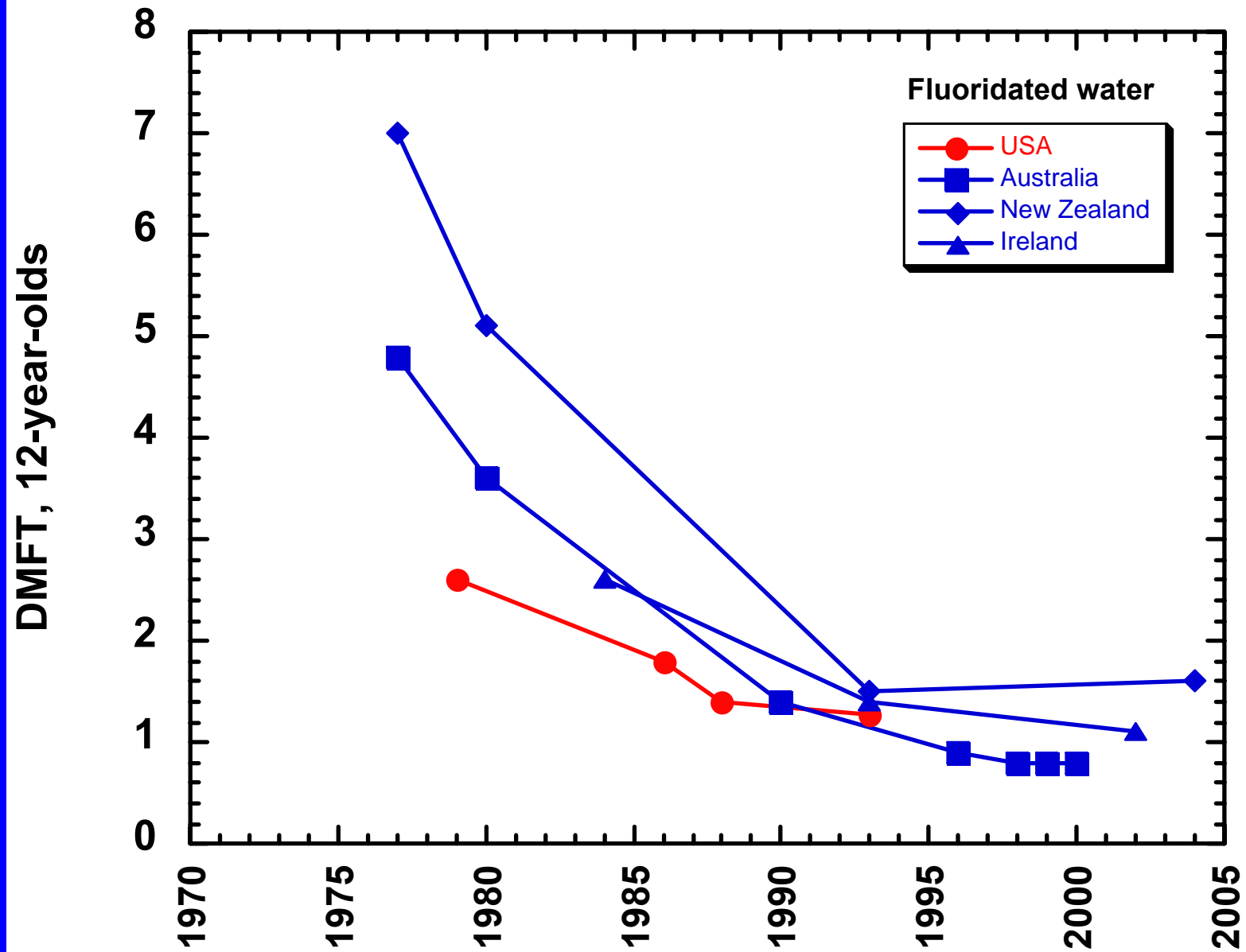
Two fundamental questions

- **Is community water fluoridation beneficial?**
- **Is community water fluoridation safe?**

Is water fluoridation beneficial?

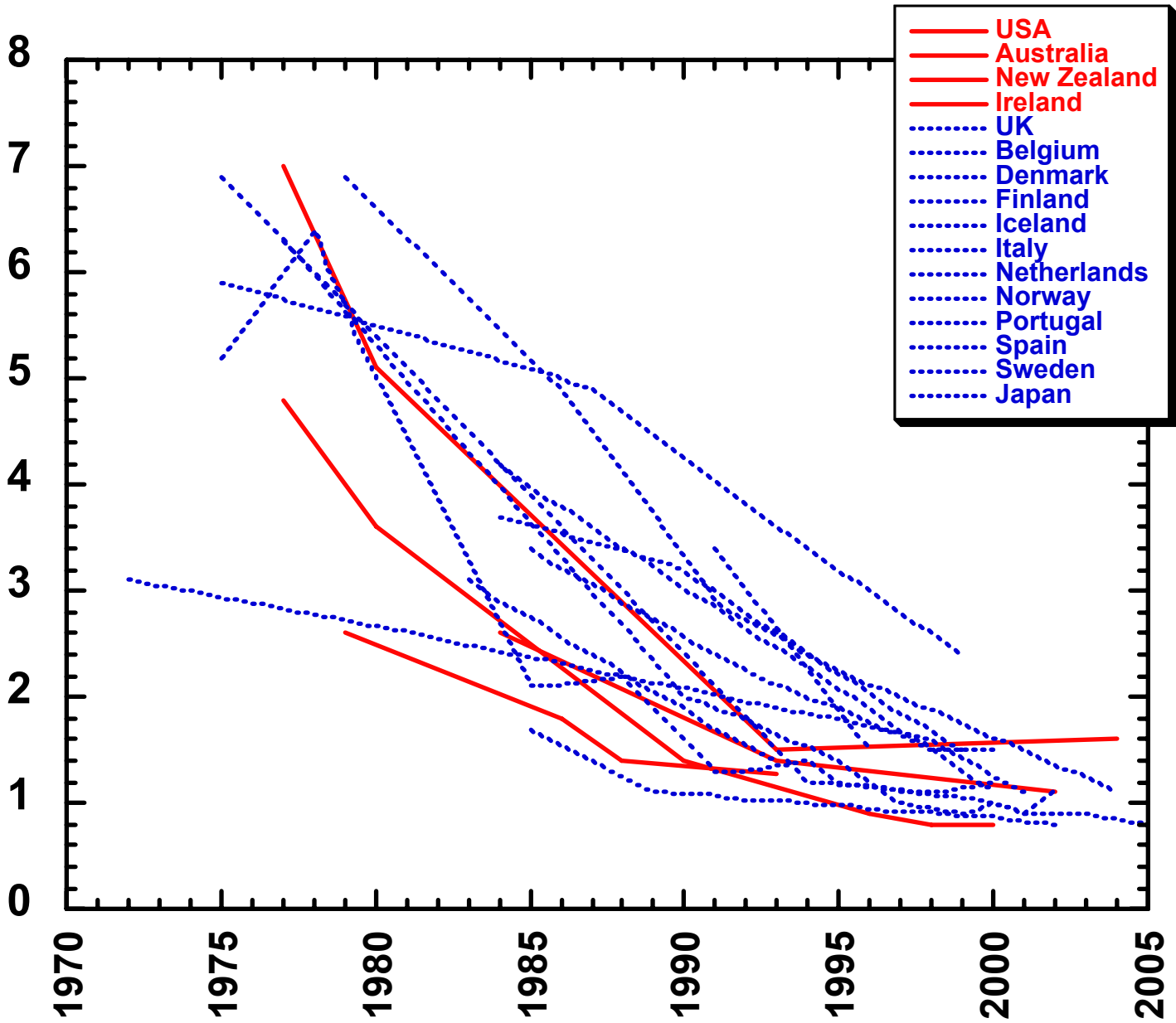
Given the level of interest surrounding the issue of public water fluoridation, it is surprising to find that little high quality research has been undertaken.

- McDonagh et al. (2000), the “York” report



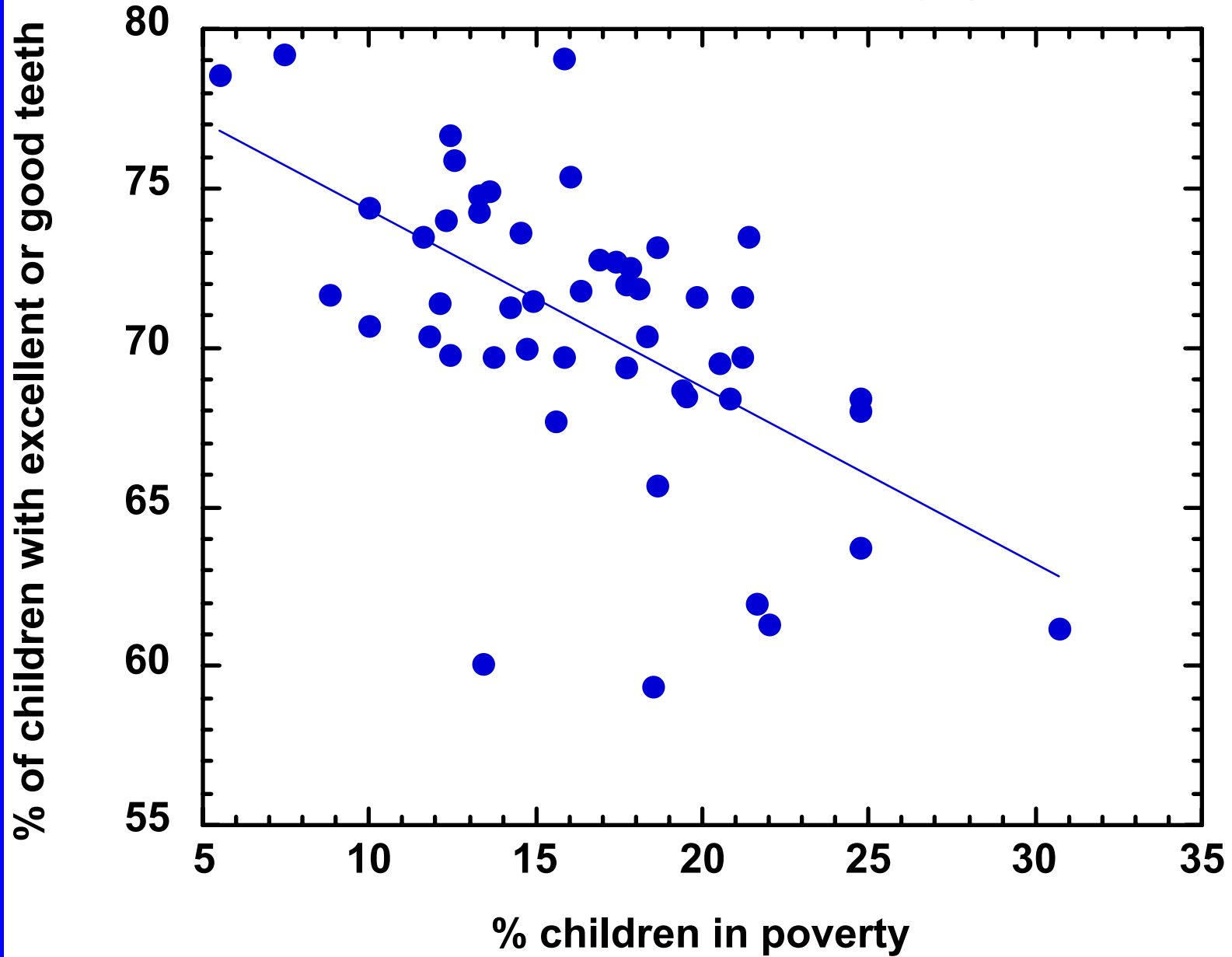
Data from World Health Organization

DMFT, 12-year-olds

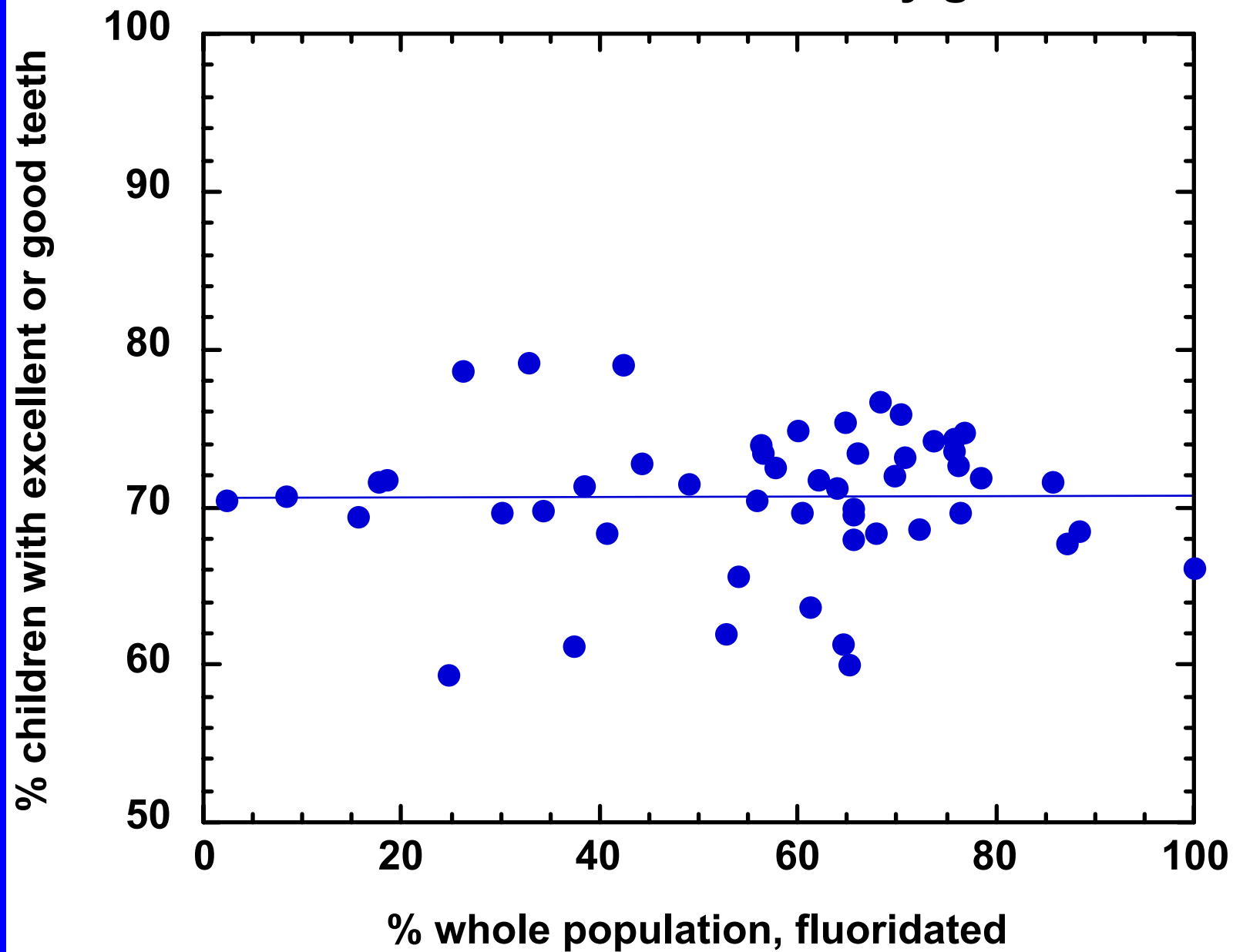


- **Water fluoridation aims to reduce social inequalities in dental health, but few relevant studies exist. The quality of research was even lower than that assessing overall effects of fluoridation.**
 - Cheng et al. (2007)
- **Evidence relating to reducing inequalities in dental health was both scanty and unreliable.**
 - Wilson and Sheldon (2006)

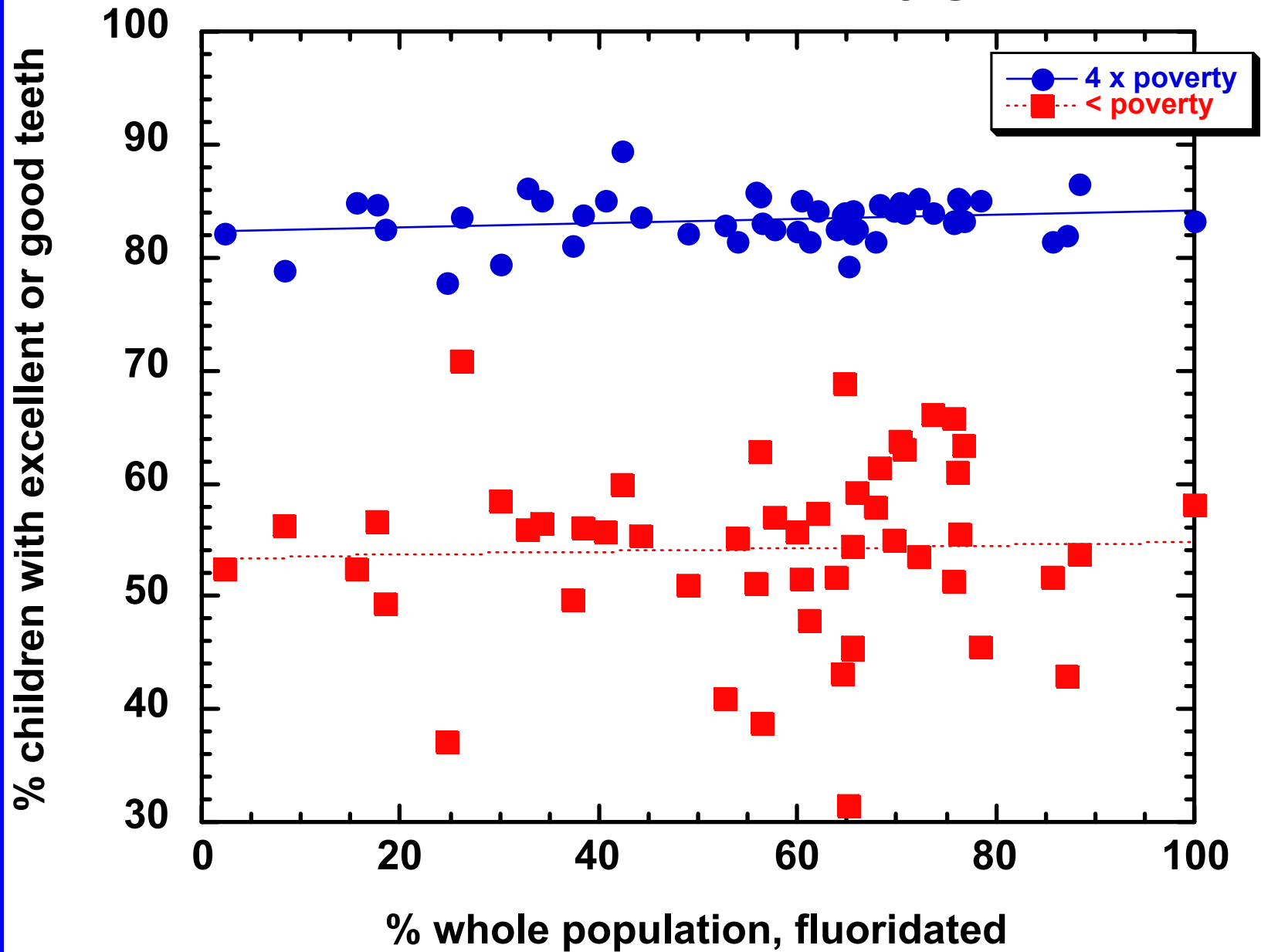
Children with excellent or very good teeth

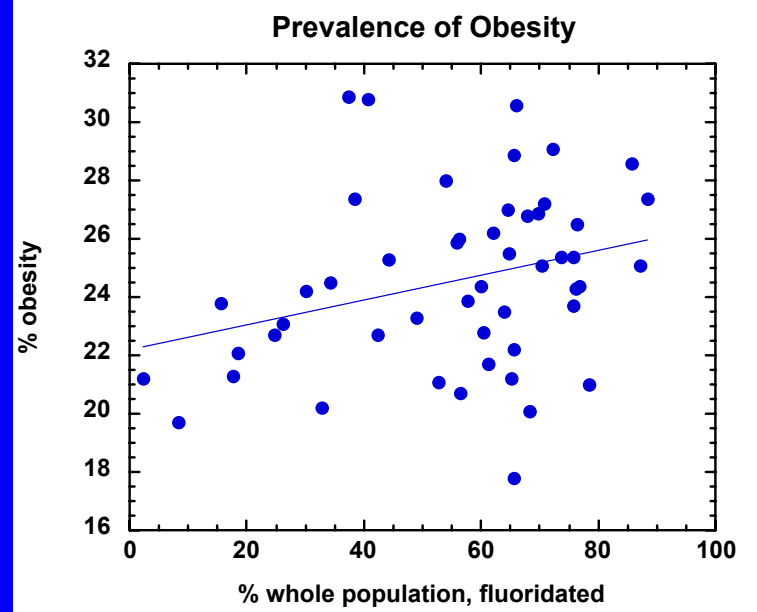
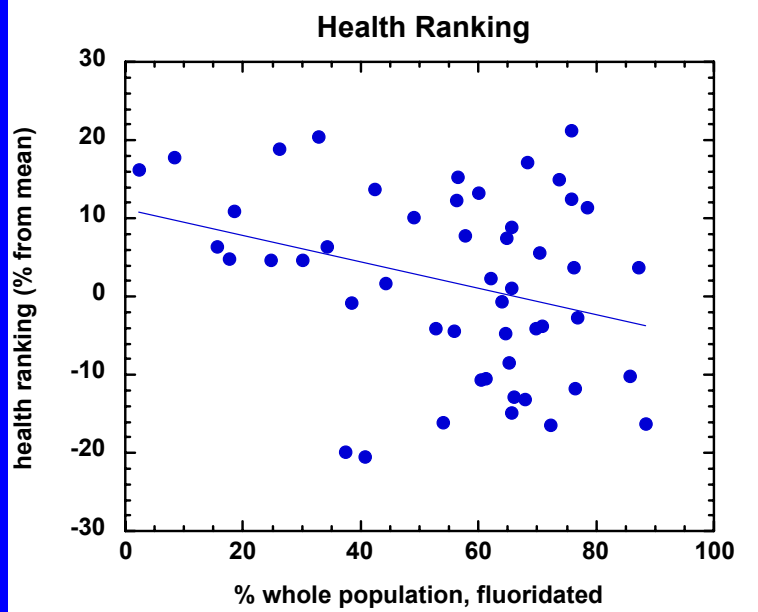
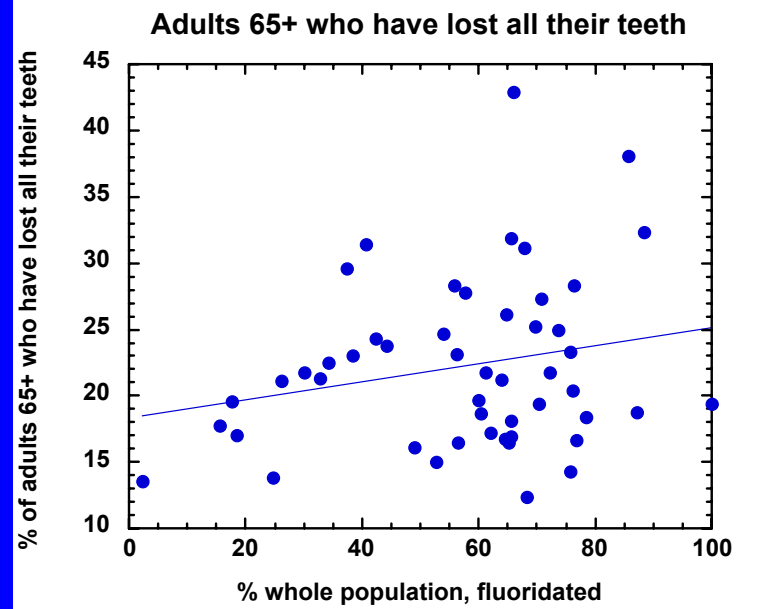
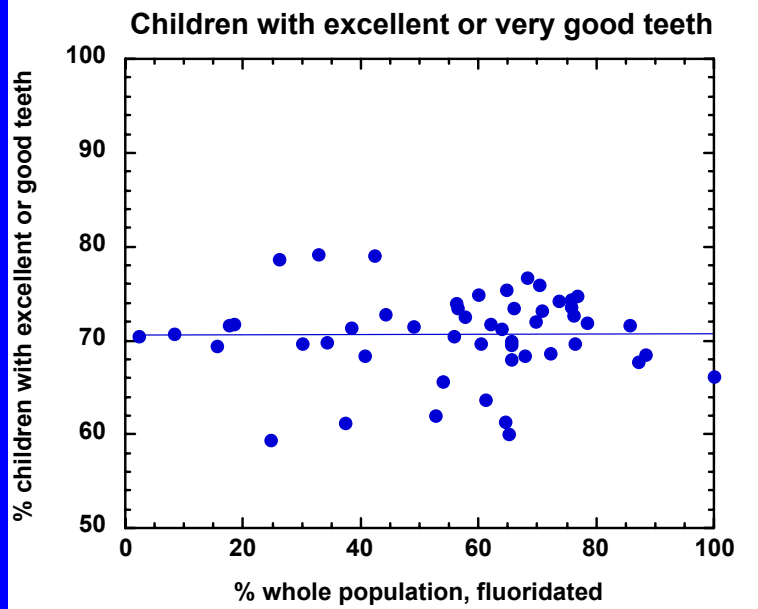


Children with excellent or very good teeth



Children with excellent or very good teeth





Is water fluoridation safe?

- **Kingston-Newburgh study (New York)**
- **Bartlett-Cameron study (Texas)**

- **In those areas of endemic fluorosis which have been studied there have been no observed defects other than mottled enamel. . . . It is true there have not been studies made of any defects other than mottled enamel.**
 - **Dr. David B. Ast (1944)**
- **Dr. Levine: Would you agree with that, that as a start the [Kingston-Newburgh] project as contemplated is a perfectly safe procedure from a public health point of view?**
- **Dr. Dean: I don't think so.**

**The absence of good studies showing
adverse health effects**

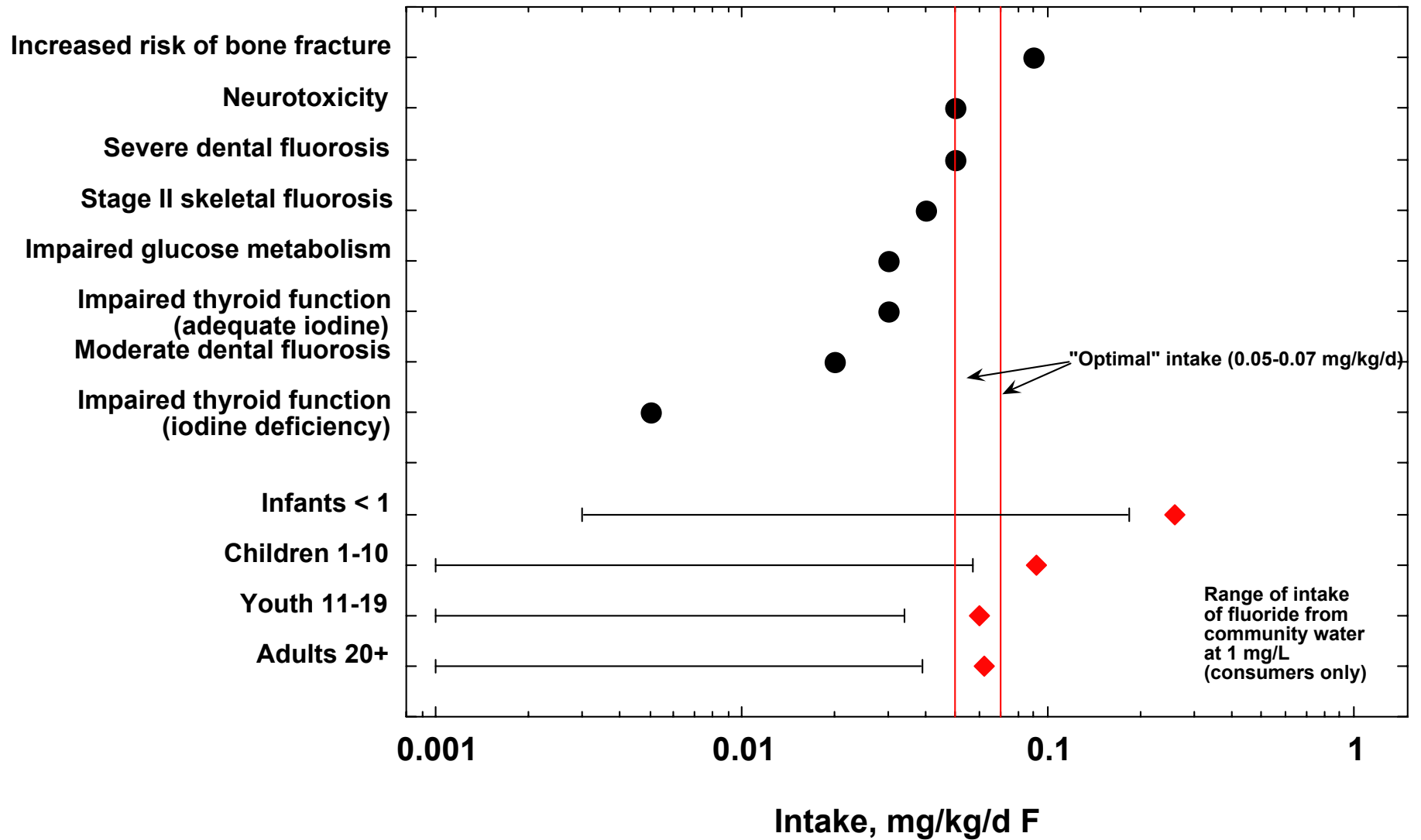
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**Good studies showing the absence of
health effects**

“Known or reasonably anticipated” adverse effects of fluoride exposure

- **Dental fluorosis**
- **Skeletal fluorosis**
- **Increased risk of bone fracture**
- **Neurotoxicity, decreased IQ**
- **Endocrine effects**
- **GI, hepatic, renal effects**
- **Carcinogenicity**

Estimated "No-effect" levels in humans



- **Fluoride exposure ranges necessary for many adverse effects of fluoride are reached by people in the U.S.**
 - Primary source of exposure is fluoridated drinking water
- **Additional risk factors**
 - 4.5% of the adult US population has chronic kidney disease
 - Iodine deficiency and calcium deficiency are increasing in the U.S.
- **Potential impact of fluoride exposure**
 - 1/3 or more of US children have dental fluorosis
 - Approximately 1/3 of the adult population of the US has arthritis or chronic joint symptoms
 - 4-5% of the US population are thought to be affected by disorders of thyroid function
 - 6% of the US population has diabetes mellitus

In the face of uncertain evidence it is important to act in a manner that protects public health. A precautionary approach to fluoridation would consider all the available evidence on efficacy, safety, and alternatives.

- **Joel Tickner and Melissa Coffin, University of Massachusetts Lowell (2006)**

**References for presentation by K.M. Thiessen
(ASA/CSCA Annual Meeting, August 3, 2008)**

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Distribution of tap water intake (L/kg/d) is from EPA-822-R-00-001 (2004), and includes only consumers of community water (municipal tap water). Indicated ranges (horizontal lines) represent 90% of the reported distribution. Water intake was multiplied by 1 or 4 mg fluoride per liter.

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Photos courtesy of Hardy Limeback, University of Toronto.

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Slides 18-19

Data on DMFT for 12-year-olds, by country (sorted by global region) were obtained in early 2007 from the WHO website. Fluoridation status of countries is also provided.

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Slides 21-24

(1) Data on the percentage of children 1-17 years old whose parents say they have good or excellent teeth are from the Health Resources and Services Administration (HRSA 2005).

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(3) Data on the percentages of state populations served by public water supplies in 2000 are from the U.S. Geological Survey. [Available: <http://pubs.usgs.gov/circ/2004/circ1268/htdocs/table05.html> (accessed August 12, 2008)]

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The fluoridation status shown on the graphs (% whole population, fluoridated) combines the CDC and USGS data.

(4) Data on the percentage of adults aged 65+ who have lost all their natural teeth due to tooth decay or gum disease are from the Centers for Disease Control and Prevention (CDC 2008). Data are from the 2004 Behavioral Risk Factor Surveillance System.

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Slides 28-30

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(3) Estimated ranges of tap water intake (L/kg/d) by age group are from EPA-822-R-00-001 (2004), and include only consumers of community water (municipal tap water). Water intake was multiplied by 1 mg fluoride per liter.

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