

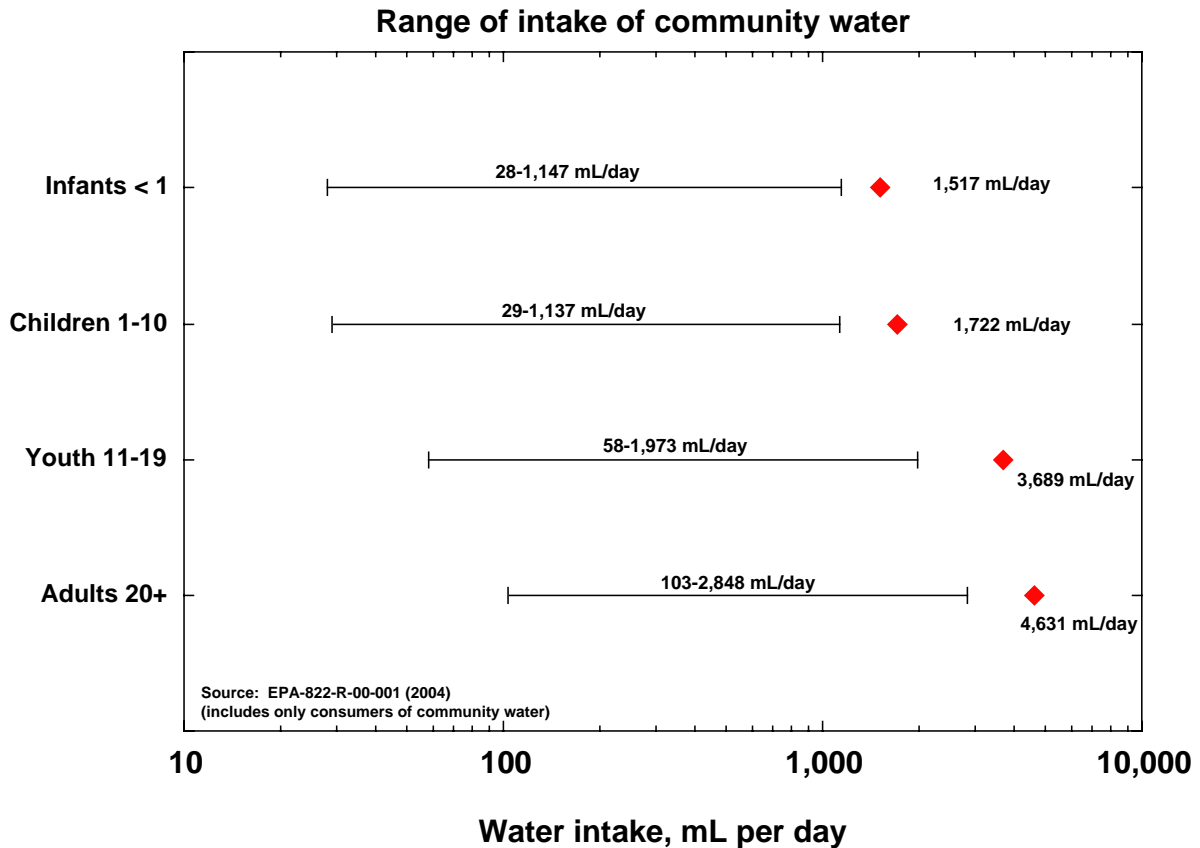
## **Adverse Health Effects from Fluoride in Drinking Water**

Comments to the Water Quality and Operations Committee  
Metropolitan Water District  
Los Angeles, California  
August 20, 2007

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Thank you for this opportunity to address the committee. I understand that your plans to fluoridate are already in place. I wish simply to inform you of some of the implications of those plans.

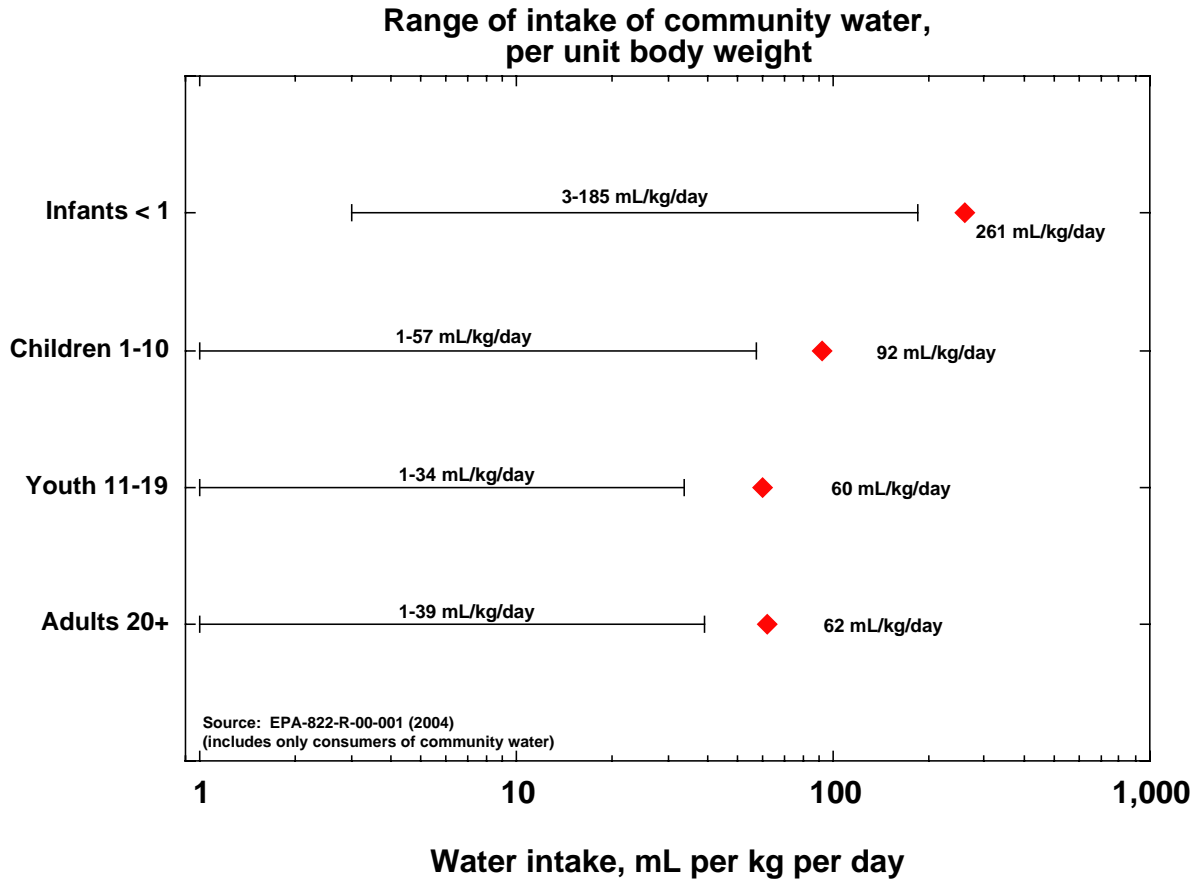
Slide 1



The first graph illustrates the expected range of consumption of community water (public tap water) for various age groups, in quantities of milliliters per day (mL per day). The ranges include only people who actually consume tap water. Note that some people consume substantially more tap water than the usual range (indicated by the diamonds). This information is from an EPA report published in 2004.

The total consumption of community water shown here is not to be confused with total fluid consumption or total water consumption. It does not include well water, bottled water, or commercial beverages. It does include water consumed directly and water used to prepare household or restaurant foods and beverages.

Slide 2

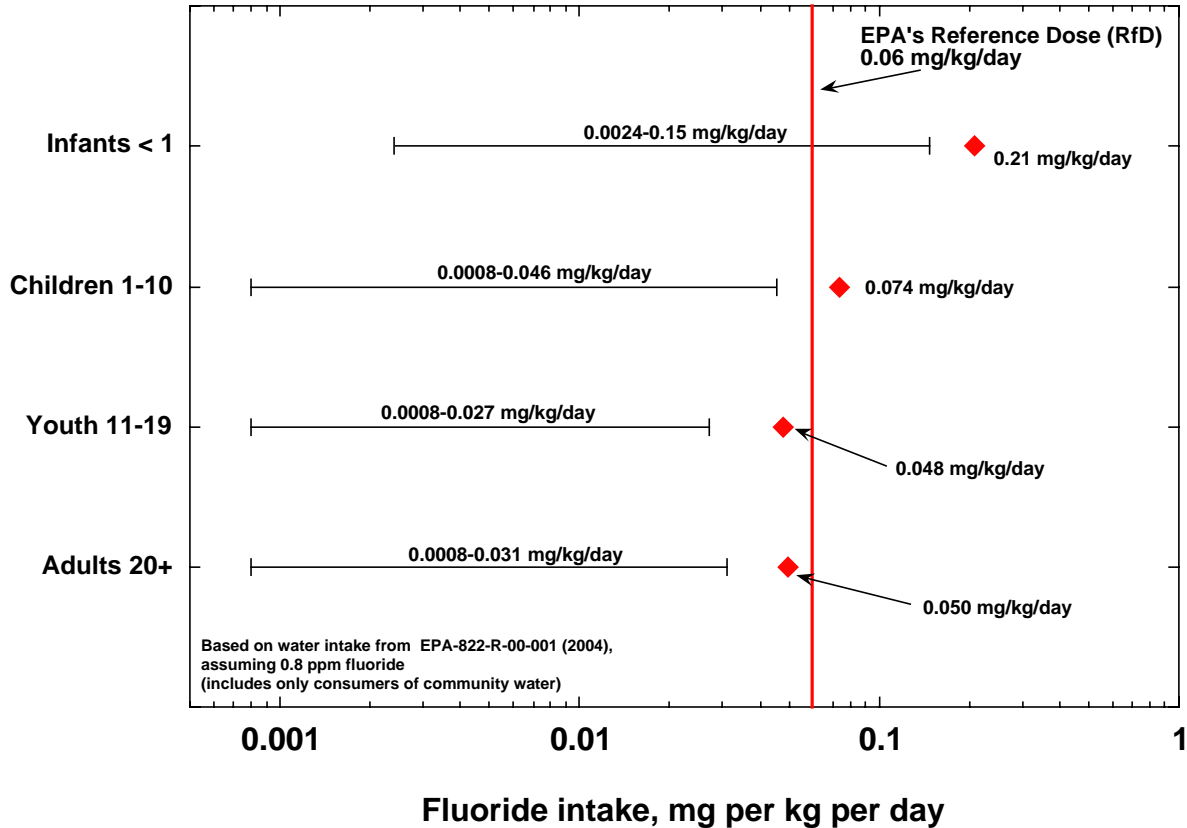


The second graph shows the same information as in the first slide, but in terms of water intake per unit body weight (milliliters of community water intake per kg of body weight, or mL per kg per day). Note that infants have the highest tap water consumption per unit body weight, with some infants reaching more than 250 mL per kg per day.

In general, the people with the highest tap water intakes include babies fed formula made with tap water, people with certain medical conditions (e.g., diabetes insipidus, diabetes mellitus) or taking certain medications (e.g., lithium), people in unairconditioned residences in hot climates, people who work outside in hot climates or do heavy physical labor, and athletes.

Slide 3

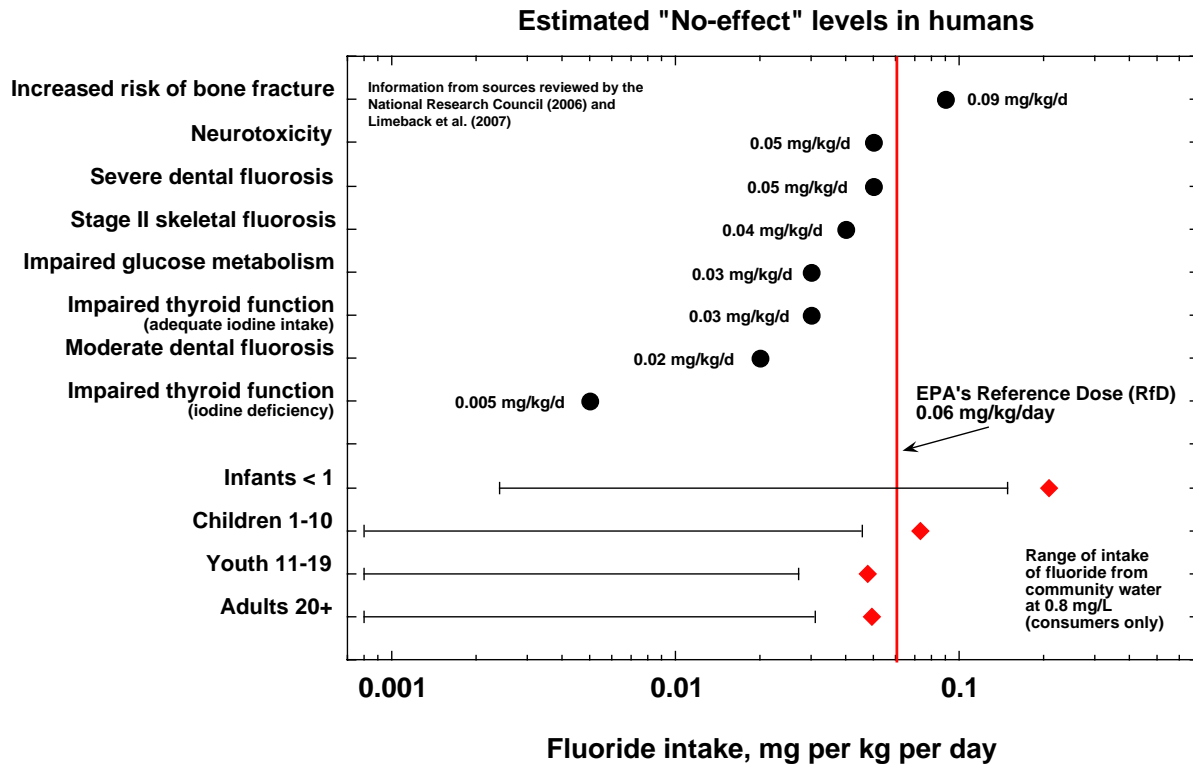
Range of fluoride intake from community water, assuming 0.8 ppm fluoride in the water



The third graph shows estimated fluoride intakes for each age group (mg of fluoride per kg of body weight per day), assuming the range of tap water intakes shown in Slide 2 and a fluoride concentration in the tap water of 0.8 ppm (0.8 mg fluoride per liter of water). Also shown is EPA’s reference dose, which is defined as “an estimate of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.” For fluoride, the reference dose is 0.06 mg per kg per day. As seen in the graph, many infants have a fluoride intake just from tap water that exceeds EPA’s reference dose for fluoride. Children (ages 1-10) with high water consumption also exceed EPA’s reference dose. Older children (youth) and adults with high water consumption are very close to EPA’s reference dose.

Note that this graph shows estimated fluoride intakes only from tap water. These estimates do not include fluoride intakes from other sources, such as commercial beverages (which are often made with fluoridated tap water), toothpaste, tea, or food. When these other sources of fluoride intake are included, total fluoride intakes for many members of all age groups exceed EPA’s reference dose.

Slide 4



The final graph shows the estimated fluoride intakes from tap water from Slide 3, plus estimates of the “no-effect” levels for various adverse health effects. These “no-effect” levels represent fluoride intakes at or below which most people are not expected to experience any harmful effects. Note that these estimates are based on average exposures of study populations; these estimates do not include any margin of safety, and they might not be protective for all individuals. Intakes above these levels cannot be considered safe.

Note also that most of these “no-effect” levels are lower than EPA’s reference dose for fluoride. In other words, EPA’s reference dose is not protective for most of these health endpoints.

Note also that most of these “no-effect” levels are exceeded by many members of the population, of all ages, just from fluoride at 0.8 ppm in community drinking water. When other fluoride sources are included, even more people are expected to exceed the “no-effect” levels. In order to be “safe” for all members of the population, fluoride intakes for all people must be kept below the lowest “no-effect” levels, when all sources of fluoride intake are included, and with an adequate margin of safety.

This list of adverse health effects does not include cancer. A carcinogenic (cancer-causing) effect of fluoride cannot be ruled out from the available data, and at the very least, a cancer-promoting effect is likely. For carcinogenic substances, the risk of cancer increases with the amount of exposure, such that even a very low exposure carries with it some cancer risk.

In conclusion, I would like to quote from the Director of Laboratories, Department of Water Supply, Gas and Electric, of the City of New York, from a presentation made in 1956 but still relevant today:

The continued promotion of water supply fluoridation in [the] face of mounting adverse evidence and criticism requires some evaluation. It seems that the proponents hit upon an idea years ago which appealed to them, and which they felt was sound. As their claims for safety were progressively discredited, rather than acknowledge this, they persisted in condoning such evidence. At the same time they were lending their prestige to such equivocation. Certainly the proponents of fluoridation are not intent upon poisoning or harming anyone, however, the dilemma of prestige is a very difficult matter to resolve.

The proponents have tried to demonstrate various factors of safety which are patently naïve. . . . It has been customary to consider a minimal factor of safety of not less than 10 for substances which may be admitted to water supplies. This would mean that ten times the amount of the proposed substance when present in the water supply would be definitely without harm to human or beast. It is obvious from the knowledge of fluoride toxicity that such factor of safety cannot be established when fluoride is added to the public water supply at the level recommended by the proponents of fluoridation. In view of the fact that the range of water consumption may vary over a ratio of 20 to 1 the insistence upon a factor of safety of 10 is exceedingly moderate.

It must be concluded that 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. I do not believe the water supply fraternity is interested in demonstrating this with wholesale experimentation on populations.

Thank you.

## References

NRC (National Research Council). 2006. Fluoride in Drinking Water: A Scientific Review of EPA's Standards. Washington, DC: The National Academies Press. [Available at <http://www.nap.edu/catalog/11571.html>]

Limeback, H., Thiessen, K.M., Isaacson, R.L., and Hirzy, W. 2007. The EPA MCLG for fluoride in drinking water: New recommendations. Presentation to the Society of Toxicology 2007 Annual Meeting. *Toxicological Sciences* 96(1):317.

Nesin, B.C. 1956. A water supply perspective of the fluoridation discussion. *J. Maine Water Util. Assoc.* 32:33-47.

U.S. Environmental Protection Agency. 1989. Fluorine (soluble fluoride) (CASRN 7782-41-4). Integrated Risk Information System. [Available at <http://www.epa.gov/iris/subst/0053.htm>]

U.S. Environmental Protection Agency. 2004. Estimated Per Capita Water Ingestion and Body Weight in the United States—An Update Based on Data Collected by the United States Department of Agriculture's 1994–1996 and 1998 Continuing Survey of Food Intakes by Individuals. Washington, DC: U.S. Environmental Protection Agency, Office of Water, Office of Science and Technology, EPA-822-R-00-001.