

Estimated Number of Washington State Children With Moderate to Severe Fluorosis

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Fluoride that is ingested accumulates in bones, including the teeth. Dental fluorosis results when children ingest too much fluoride, which changes the crystalline structure of teeth. Mild forms result in white spots on the teeth, which can produce embarrassment and emotional stress. Severe forms result in black or brown spots, often with pitting, chips, fractures, and decay. Severe forms are a serious medical and dental problem. Below are photographs of mild through severe fluorosis.



Mild



Moderate



Severe

A study by Beltran released in 2007

http://iadr.confex.com/iadr/2007orleans/techprogram/abstract_92598.htm showed that, between 1999 and 2004, about 41% of adolescents aged 12 to 15 and 36% aged 16 to 19 had dental fluorosis. The numbers of those who had moderate to severe fluorosis was 3.56% and 3.78%, respectively.

Fluorosis has been presented as primarily a "cosmetic" problem. However, moderate to severe forms are much more than just cosmetic and even if less than 4%, represent a large number of individuals. To illustrate this fact, I will estimate the number of children between 12 and 19 who would have had moderate to severe fluorosis (dark brown spots, pitting, brittle teeth) in Washington State.

An estimate of the number of children between 12 and 19 derives from the November 2010 Forecast of the State Population put out by the Washington State Office of Financial Management.

<http://www.ofm.wa.gov/pop/stfc/stfc2010/stfc2010.pdf> Although the Washington State data cover a different age range (5 to 17), we can nevertheless use these data to estimate the number that would have been between 12 and 19. The Washington statistics indicate that there were 1,120,795 children between the ages of 5 and 17 in Washington State in 2004, the final year of Beltran's study.

The Beltran study examined ages 12 to 19, which is an 8-year spread.

The Washington State statistics are for ages 5 to 17, which is 13 yrs—a longer time period than in the Beltran study.

$8/13 = 0.6154$ which is a rough estimate of the **proportion** of the 1,120,795 Washington State children between 5 & 17 that would have been between 12 to 19.

Therefore, $0.6154 \times 1120795 = 689,737$ which is a rough estimate of the **number** of children in Washington that would have been between 12 & 19.

Moderate to severe fluorosis was reported by Beltran to be 3.56% for 12-15, and 3.78% for 16-19.

Averaging these $(3.56+3.78)/2 = 3.67\%$ with moderate to severe fluorosis.

Thus, the estimated number of Washington State children 12-19 with moderate to severe fluorosis in 2004 would be $689737 \times .0367 = 25,313$. This is only a rough estimate, but it indicates that many thousands of Washington State Children would have moderate to severe fluorosis.

The estimated number of Washington State Children between 12 and 19 with severe fluorosis would be 3,449. This is based upon the above estimate of 689,737 children that would be in this age range and upon the EPA conclusion that the 0.07 mg/kg/day recommended fluoridation dose would produce 0.5% severe fluorosis (see EPA document # 820-R-10-019, *Fluoride: Dose-Response Analysis for Non-Cancer Effects*, p 103, December 2010).

http://water.epa.gov/action/advisories/drinking/upload/Fluoride_dose_response.pdf

The new recommended fluoride dose of .07 mg/kg/day produces an unacceptably large number of cases of moderate and severe fluorosis. If this were some other disease, it would be considered an epidemic. It is totally unreasonable to consider fluorosis a "cosmetic" problem! Moreover, there is no reason to suspect that fluoride affects only the teeth—other bones are also affected which can result in hip fractures and other problems.

Drinking water is not the only source of fluoride. Fluoride is also found in many foods and beverages, as can be seen in this USDA link. <http://www.nal.usda.gov/fnic/foodcomp/Data/Fluoride/fluoride.pdf> All of these sources, plus toothpaste, pesticides, and others contribute to the total fluoride dose that we get.