



# Water Fluoridation

## Dental Health Benefits

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# Who, What, Where, Why, How

- Fluoride is found in some natural water
- Fluoridation is the adjustment of community water systems
- Used for optimum oral health benefits
- One of ten great public health achievements of the 20th century





# Who?

- **Dr. Frederick S. McKay initiated a study in 1908 of “Colorado Brown Stain” in Colorado Springs**
- **Important conclusions...**



- **Affected teeth more resistant to dental decay**
- **Life-long residents had stained teeth, more recent residents did not**
- **, High fluoride content of water identified in 1931**



# Who? (continued)

**In 1930s, Dr. H. Trendley Dean conducted the "21 Cities Study"**



- **Important conclusions:**

- Optimum levels of fluoride for enhancing oral health (natural breakpoint at 1 mg/L)
- 1.0 mg/L provided best combination of reduction in tooth decay (caries) and low risk of fluorosis
- Established community fluorosis index (increased incidence at 2 mg/L)



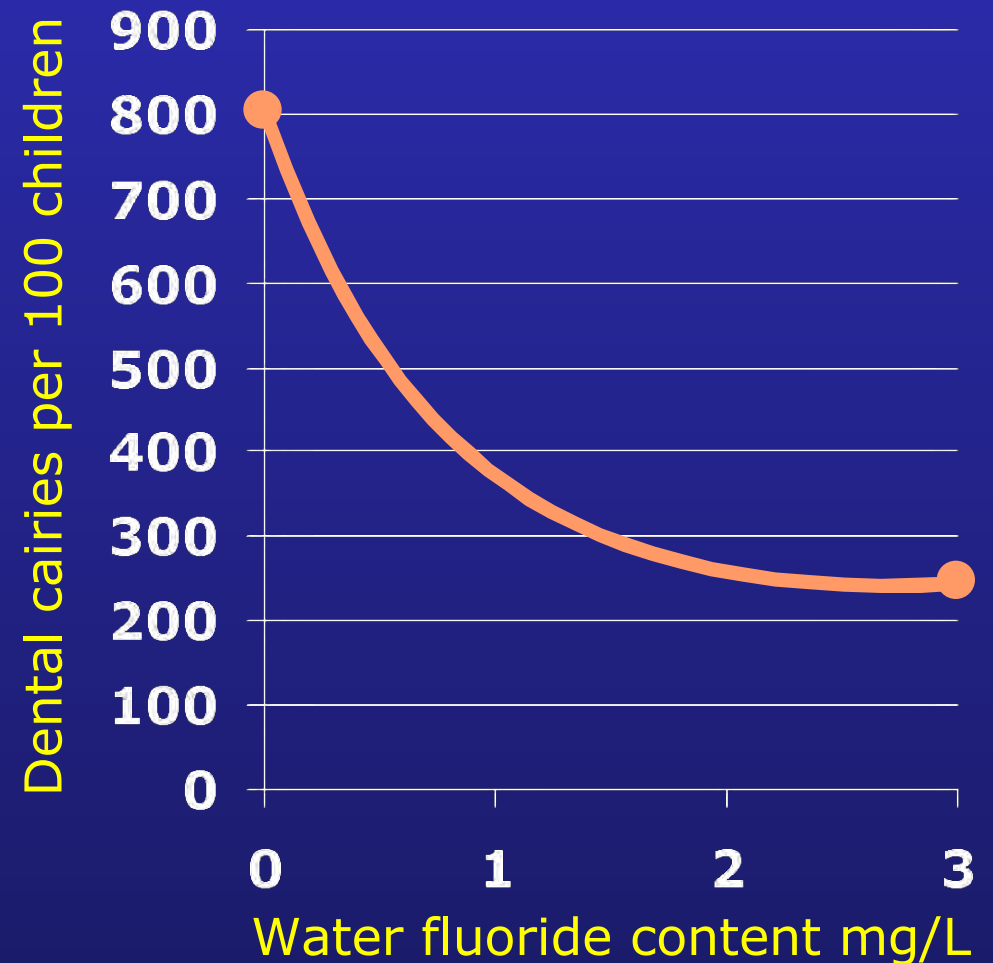
# What?

**1962 Adjustment of fluoride in water to an optimum range of 0.7-1.2 mg/L**

**2015 USPHS now recommends an Optimal Fluoride concentration of .7mg/L**

**Decreased benefits if Below optimal level.**

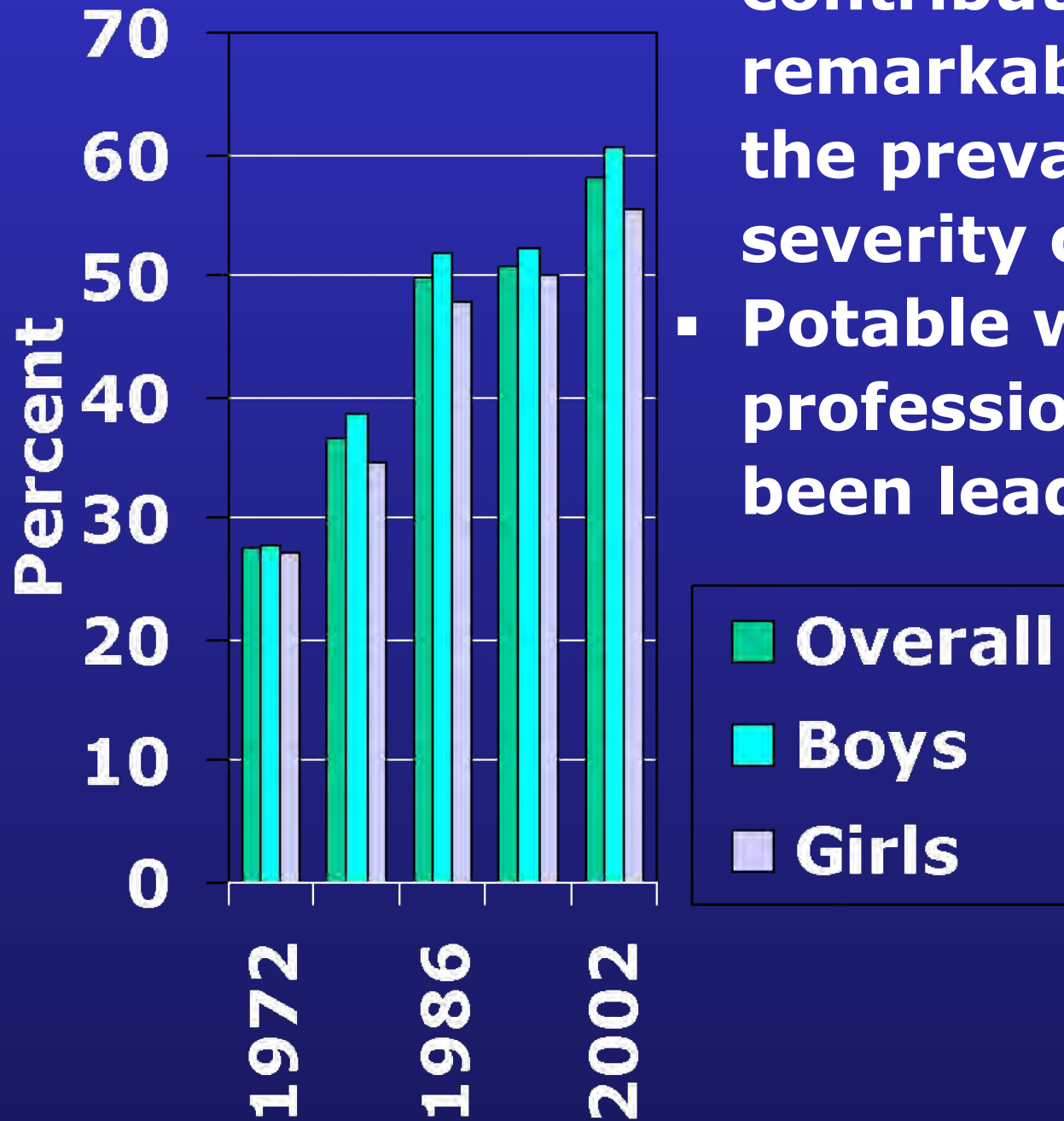
**No additional benefit and more severe fluorosis above 2 mg**





# What?

Portion of children who have no tooth decay



- Fluoridation has contributed to a remarkable decline in the prevalence and severity of tooth decay
- Potable water industry professionals have been leaders

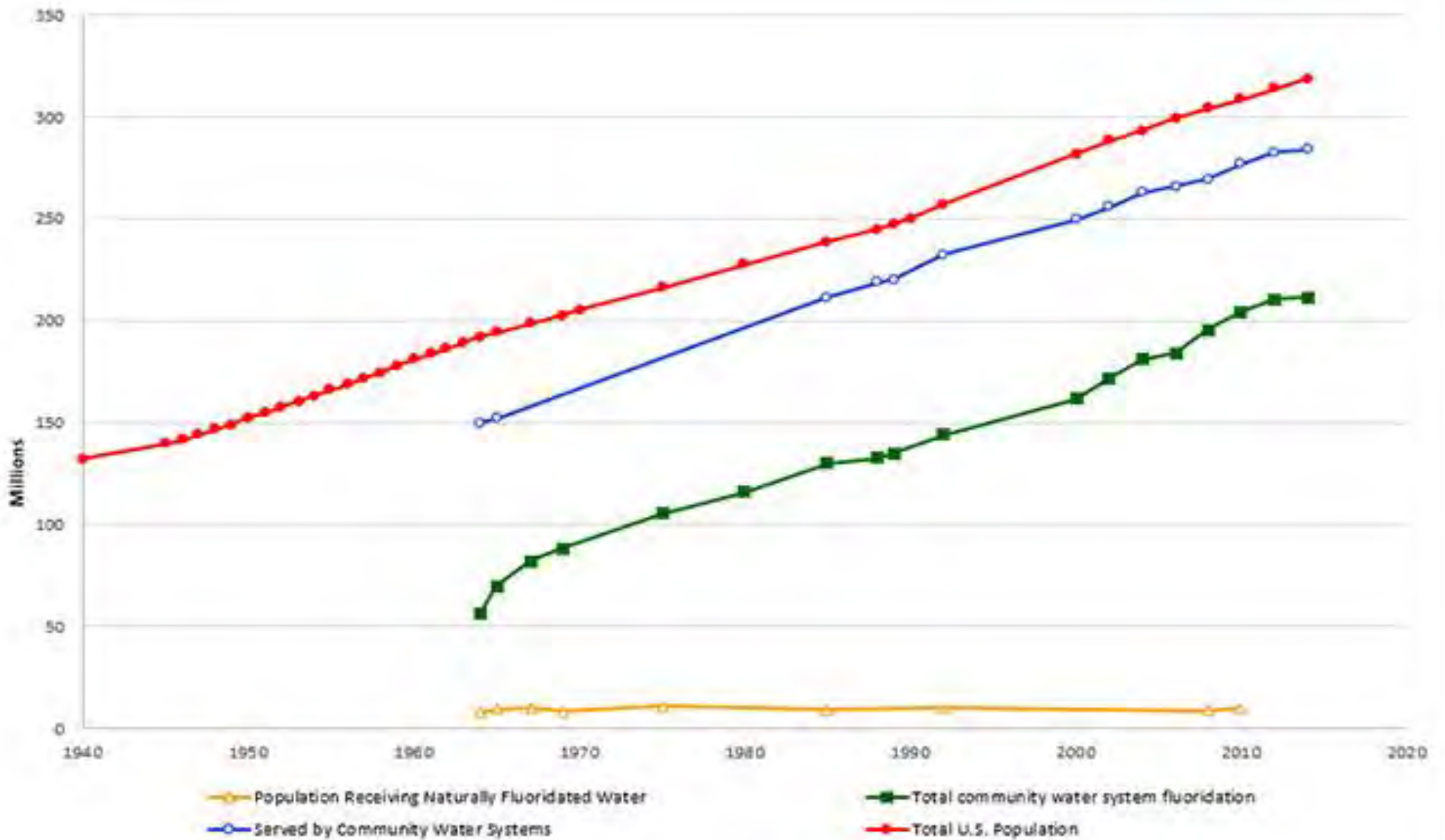
Overall  
Boys  
Girls





# Fluoridation Growth, by Population

United States, 1940–2014



Fluoridation Growth by Population, US 1940-2014

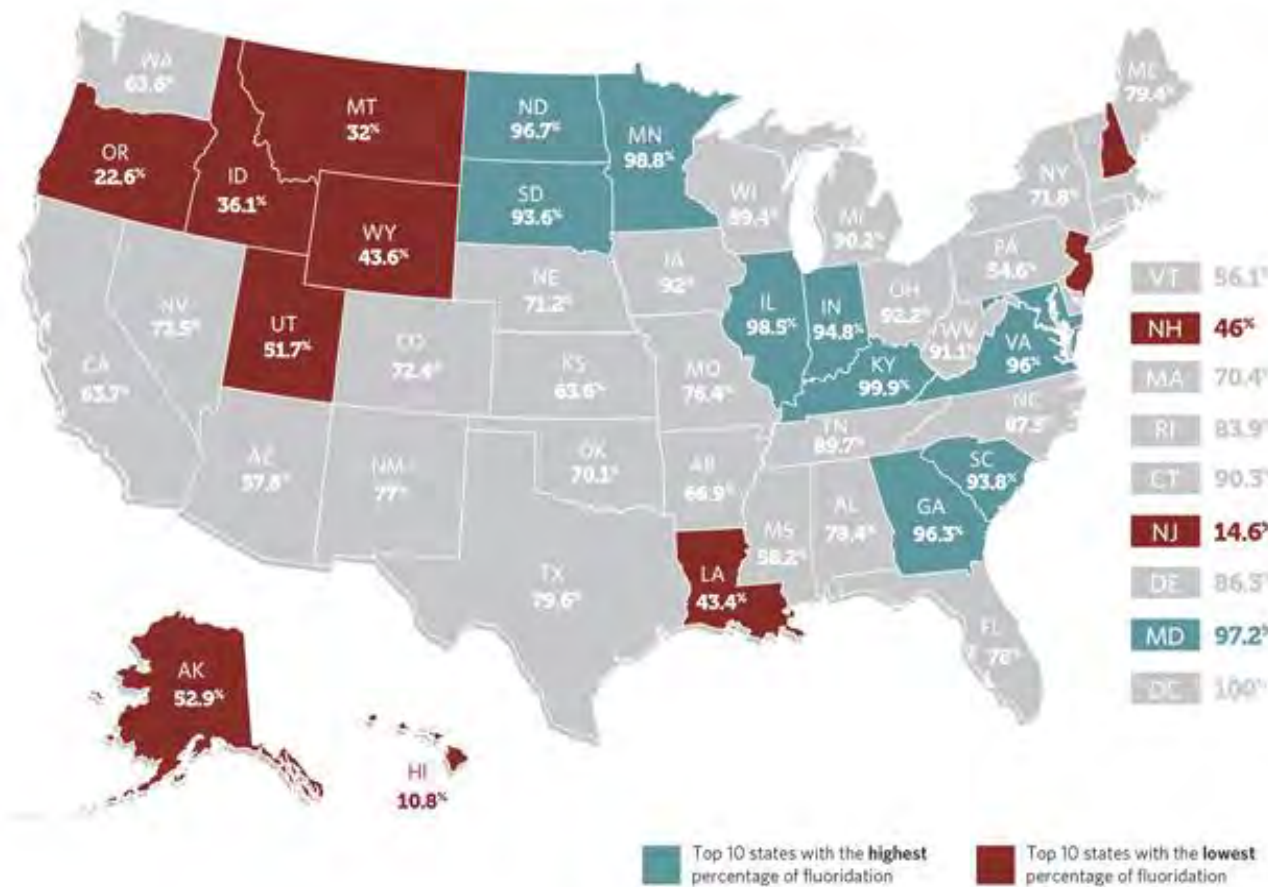
Source: CDC Water Fluoridation Reporting System. December 31, 2002.





# Community Water Fluoridation: The Top 10 and Bottom 10

The percentage of residents served by public water systems in each state who are receiving fluoridated water.<sup>1</sup>



**72** million Americans who are served by public water systems **lack** access to fluoridated drinking water

The CDC has recognized water fluoridation as one of "10 great public health achievements of the 20th century."<sup>2</sup>



1 Centers for Disease Control and Prevention, "2012 Water Fluoridation Statistic." Data covers only residents whose homes are connected to public water systems.  
 2 Centers for Disease Control and Prevention, "Ten Great Public Health Achievements-United States, 1900-1999," <http://www.cdc.gov/mmwr/preview/mmwrhtml/00056796.htm>.







# Nebraska Community Water

**In 2014 about 80% of our population had access to community water systems and 71.5% were drinking water with optimal fluoride levels. The national average was 74.6% and the CDC goal is 79.6%**

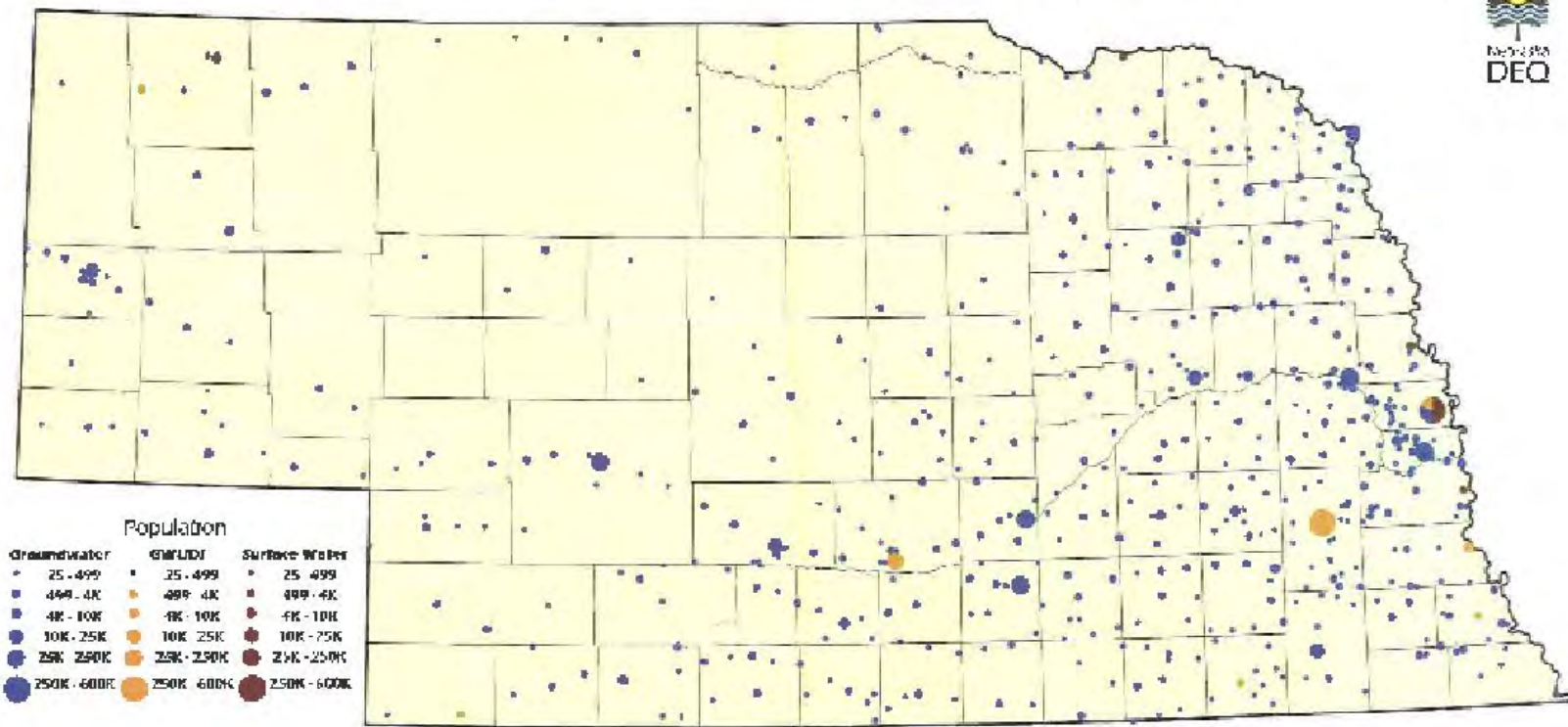
**Grand Island, Hastings and Beatrice are not currently fluoridating.**





# Nebraska Public Water Systems

Nebraska Public Water Systems - Source & Population





# Nebraska Public Water Systems

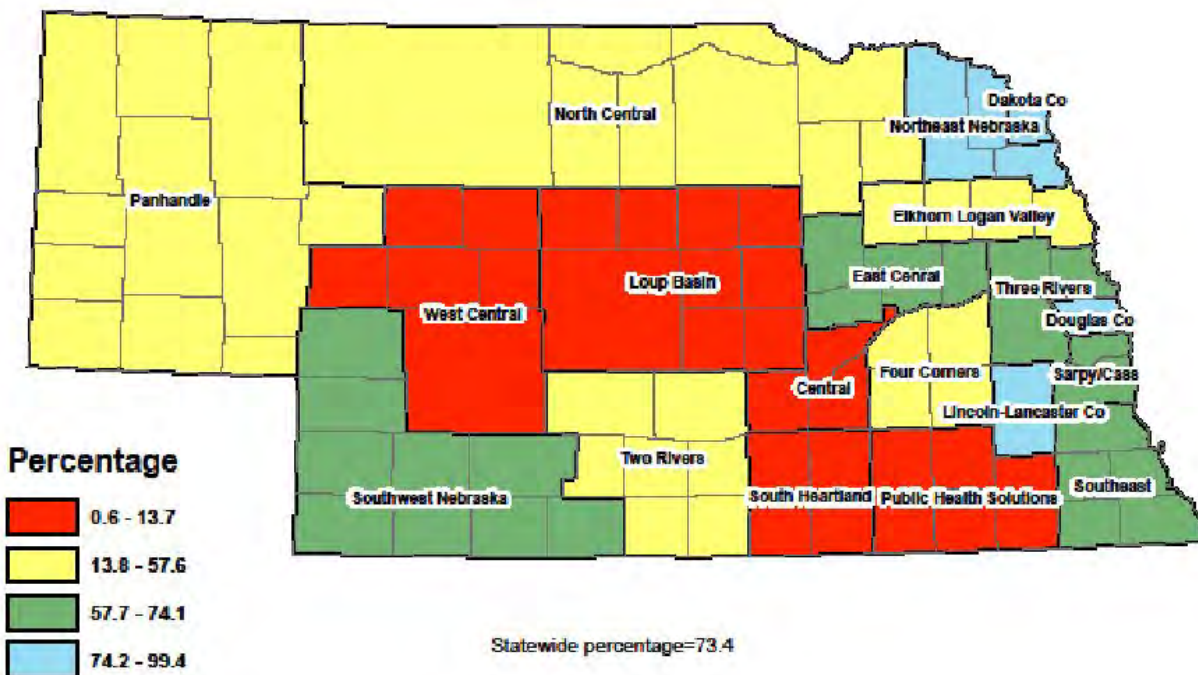
- About 600 community water systems
- About 130 have adequate fluoride
- About 60 add fluoride
- Others purchase fluoridated water
- Some are naturally fluoridated
- About 200 WOs fluoridate
- WO records Fluoride added daily
- Log sent to DHHS monthly
- Water sample sent monthly
- Water Administer will contact if any discrepancies





# Nebraska Optimal Fluoride

Percentage of Population Drinking Optimal Fluoridated Water in Nebraska, 2018  
Rates by Local Health Department Region



# Alternatives to Fluoridated Water

- Fluoridated water most common vehicle in US 211 million people
- Fluoridated salt second most common vehicle (estimates of 40-300 million people worldwide)
- Dietary fluoride supplements -- drops, tablets, or vitamins
- Fluoridated milk used in a few places







# Systemic and Topical Fluoride Proper Balance

- **Systemic Fluoride** strengthens the enamel in developing teeth....water or tablets....can reduce decay up to 40%
- **Topical Fluoride** strengthens the enamel in erupted teeth. Varnish, Mouth rinses, Toothpaste....can reduce decay up to 25%



# Systemic and Topical Fluoride



 NutritionFacts.org





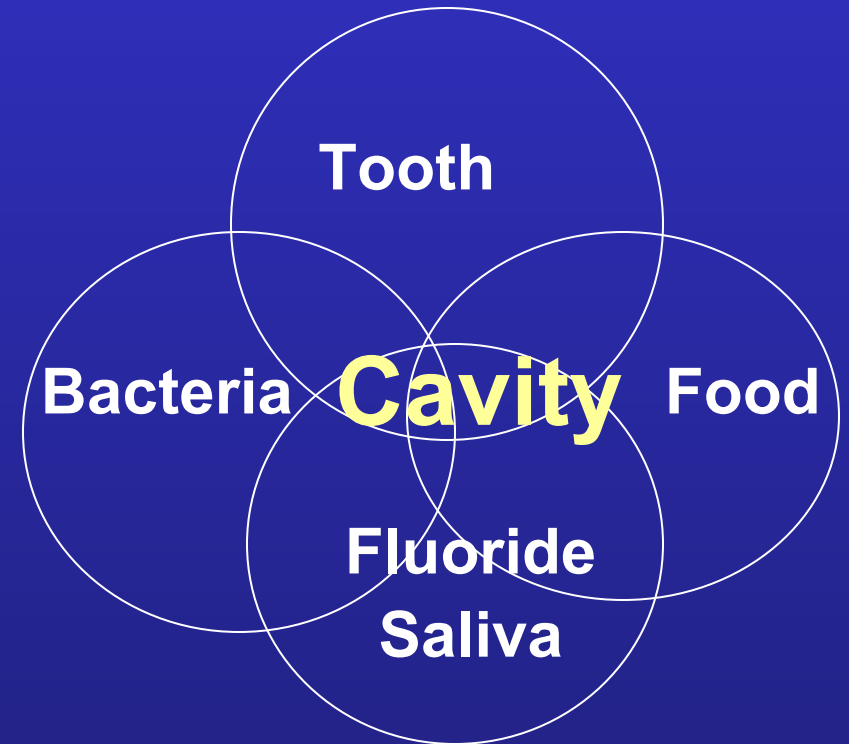
# Why?

- **Fluoridated communities have 20%-40% fewer caries (dental decay)**
- **Cost-effective results: every dollar spent on water fluoridation avoids \$38 in dental care**
- **Benefits all consumers across socio-economic status**
- **Benefits all age groups, from children to senior citizens**



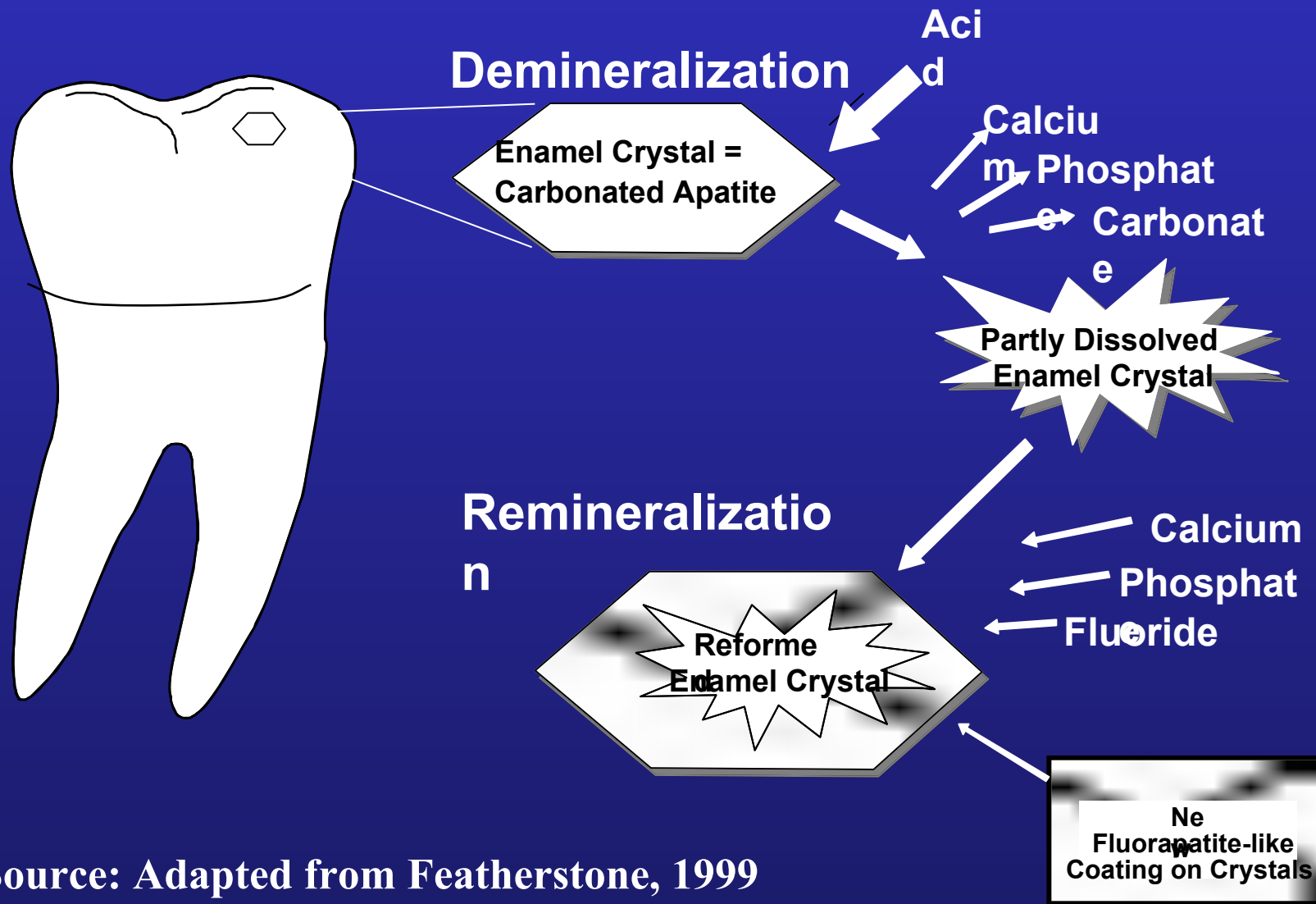
# Risk Factors for Caries

- **Improper Diet**
  - sugars and carbohydrates
- **Poor Oral hygiene**
- **High Bacteria Levels**
  - (especially mutans streptococci)





# How Fluoride Works



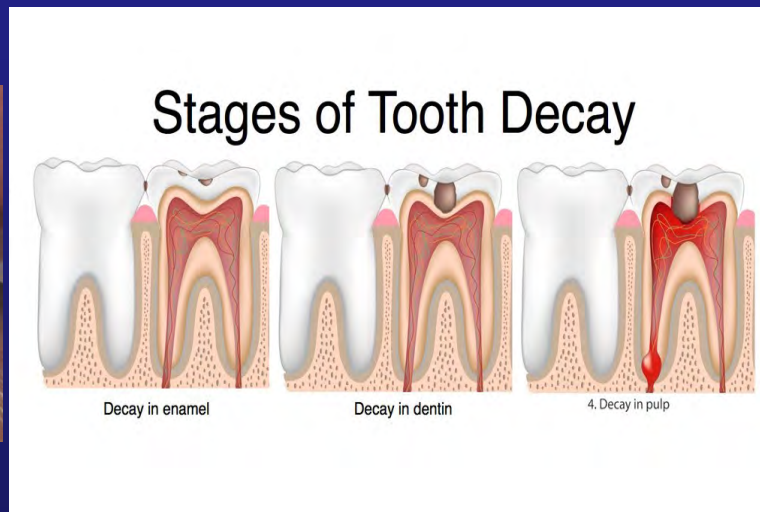
Source: Adapted from Featherstone, 1999





# Progression of Caries

- First sign of a cavity is a **decalcification of the enamel**
  - demineralization of apatite crystallites
    - A “chalky” appearance of the enamel
  - demineralization is reversible
    - **crystallites can regrow**



# Decay Progression



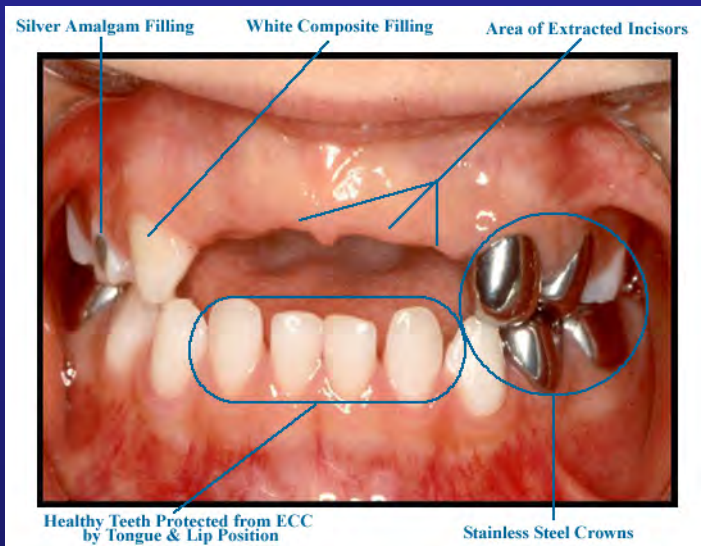
Abscess



Rampant Caries



Facial Cellulitis



Complete Rehab



Necrotic Tooth



Hospital OR Case



# Goal: Healthy Child Dentition







# Fluoride Public Health Issues

- Fluoridation has resulted in a remarkable decline in the prevalence and severity of tooth decay
- Despite this reduction, dental caries is still the most common preventable chronic disease in the U.S.
  - 1 of 4 elementary school children
  - 2 of 3 adolescents
  - 9 of 10 adults



# Fluoride Public Health Issues



- Tooth decay uneven across the general population

- Populations with increased risk:

- Rural Residents
- Low Income
- Minorities
- Special Needs

- Water fluoridation benefits all people young, old, rich, and poor







# Enamel Fluorosis

- Occurs when children with developing teeth consume excessive fluoride
- Potential for enamel fluorosis increases as water content exceeds 2 mg/L
- Excessively high natural fluoride levels, generally greater than 10 mg/L, may result in skeletal fluorosis
- Indigestion of high-fluoride toothpaste by children can cause fluorosis





# Dental Fluorosis with Staining





# Challenges

- **Opponents of community water fluoridation have made claims that optimally fluoridated water can cause an array of health problems including:**
  - Cancer
  - Increased bone fractures
  - Effects on the renal, gastrointestinal, and immune systems
  - Lower IQ in children
  - Down's syndrome
  - Allergies
  - AIDS
  - Alzheimer's disease
  - Reproductive problems





# Public Policy on Fluoridation

- ◆ **Recognized by the American Dental Association, U.S. Public Health Service, American Medical Association, World Health Organization, American Water Works Association, and virtually every scientific and professional organization in the health field**







# Credible Scientific Evidence

- **Expert Committees and Task Forces**
  - Independent reviews
    - University of York, UK (2000)
    - U.S. Surgeon General's Report (2000)
    - CDC Fluoride Recommendations (2001)
    - U. S. Guide to Community Preventive Services (2001)
  - National Research Council Review completed in 1993, Update currently in review





# Safe and Effective

- **Expert scientific panels, medical and professional organizations, and public health officials have concluded that water fluoridation is safe and effective**
- **Water fluoridation has been endorsed by the past five Surgeons Generals of the United States including the current one, Dr. Richard Carmona**





# Fluoridation Facts

- CDC web site at [www.CDC.gov/OralHealth](http://www.CDC.gov/OralHealth)
- American Dental Association “Fluoridation Facts” available link: [ADA Fluoridation Facts](#).
- Your State Water Fluoridation Program and State Dental Director





## **Nebraska State Recommendations:**

- **Take CDC Water Fluoridation Principles and Practice on-line Training Course**
- **Consider a state wide survey of all Water Systems to determine the equipment age and possible replacement costs.**
- **Ensure information in CDC Water Fluoridation Reporting System is current and accurate**
- **Increase public knowledge on the benefits of water fluoridation**







# Health Benefits

- Fluoride is a necessary naturally occurring nutrient for good oral health
- Not all communities have sufficient naturally occurring fluoride
- Fluoride is essential in the tooth enamel demineralization/reminerarization cycle
- Water fluoridation benefits people of all ages and all socioeconomic groups
- Water fluoridation is safe and effective
- Named by CDC as one of 10 great public health achievements of the 20<sup>th</sup> century
- Cost to fluoridate water for one person for entire lifetime is less than the cost of one dental filling





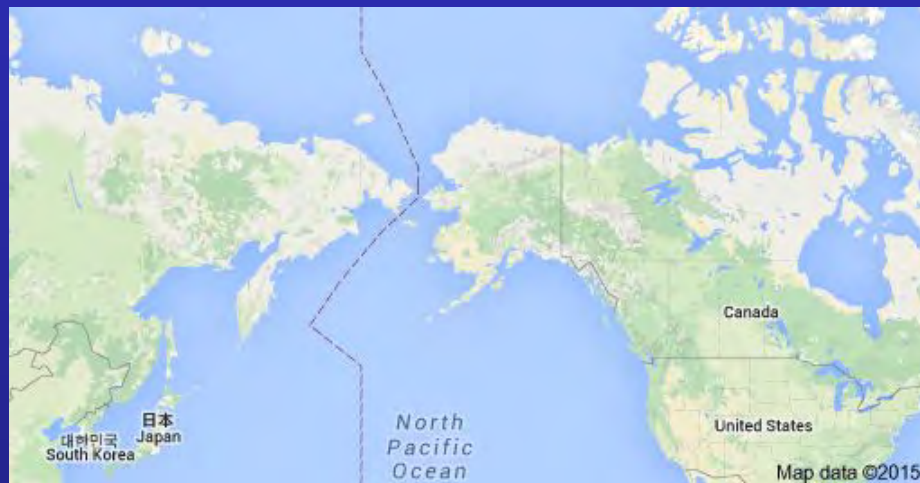
# Alaska







# 1980-2000 U.S. Public Health Service Indian Health Service Alaska







# Over 200 Remote dental field missions completed with portable equipment







# Village Pump House



Honey Buckets!





# Questions:

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