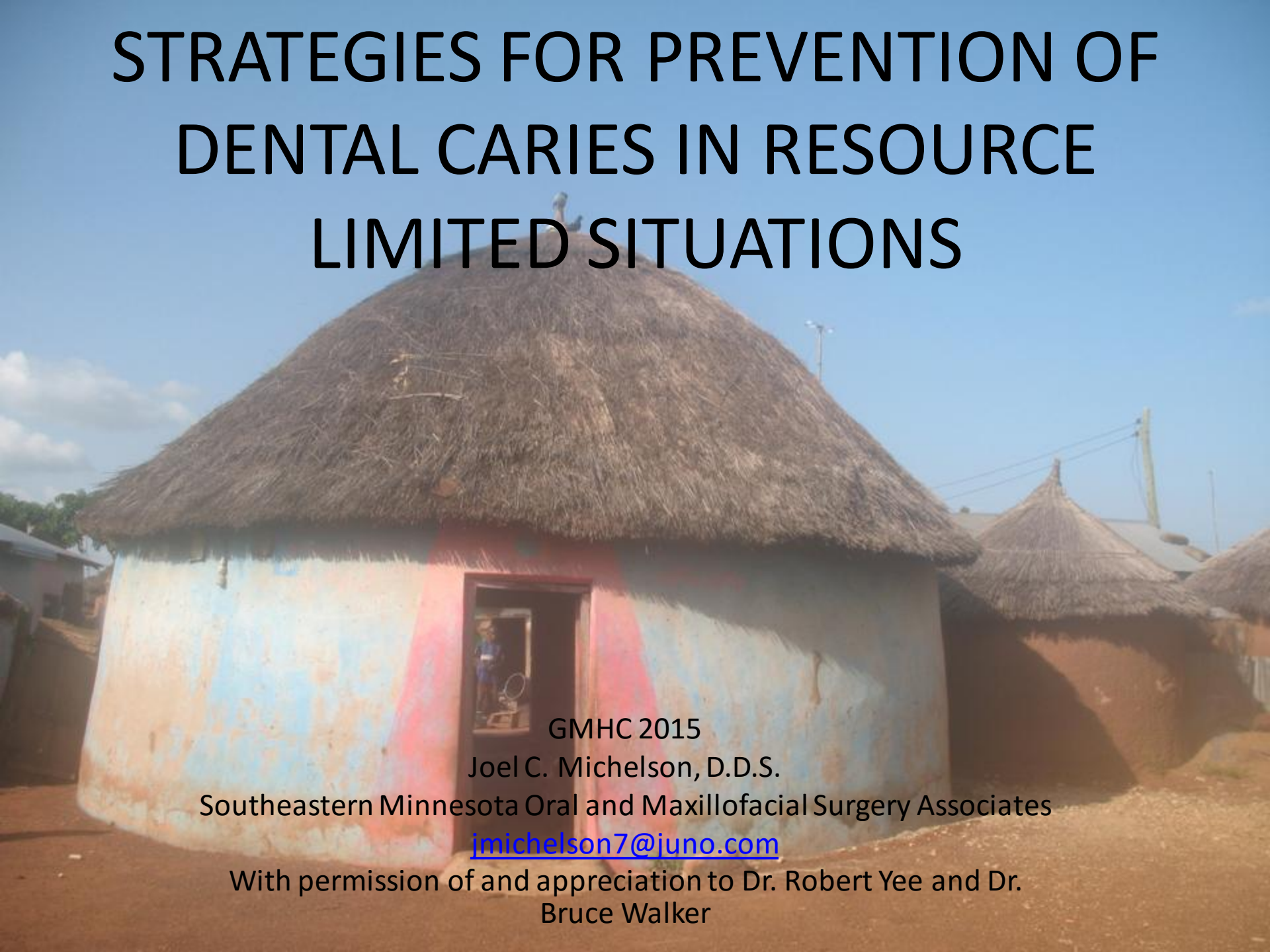
STRATEGIES FOR PREVENTION OF DENTAL CARIES IN RESOURCE LIMITED SITUATIONS

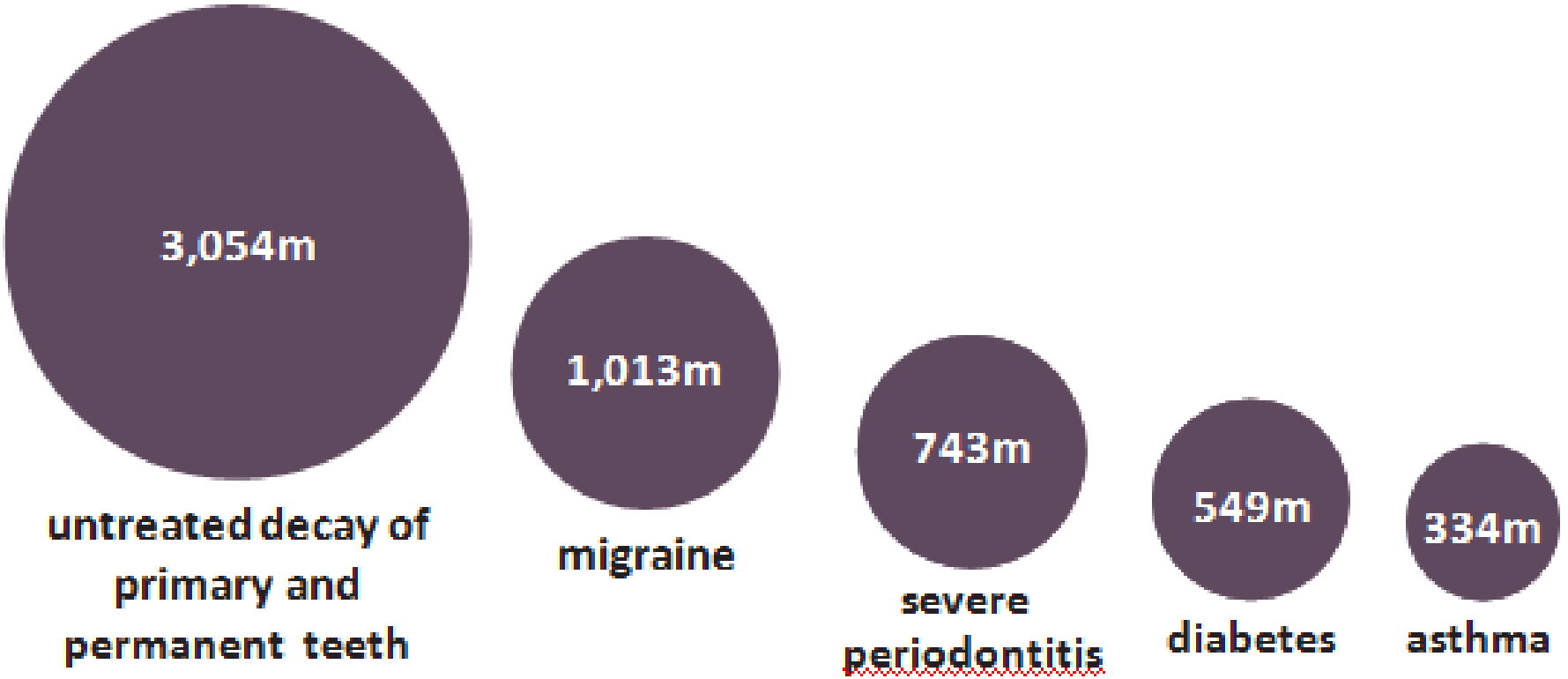


GMHC 2015
Joel C. Michelson, D.D.S.
Southeastern Minnesota Oral and Maxillofacial Surgery Associates
jmichelson7@juno.com
With permission of and appreciation to Dr. Robert Yee and Dr. Bruce Walker

ESTIMATED NUMBER OF PEOPLE AFFECTED BY COMMON DISEASES

- Tooth decay is the most prevalent of conditions, affecting almost half (44%) of the world population in 2010, followed by tension-type headache (21%), migraine (15%), severe periodontitis (11%), diabetes (8%) and asthma (5%).

From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation. Maps and graphics © Myriad Editions 2015

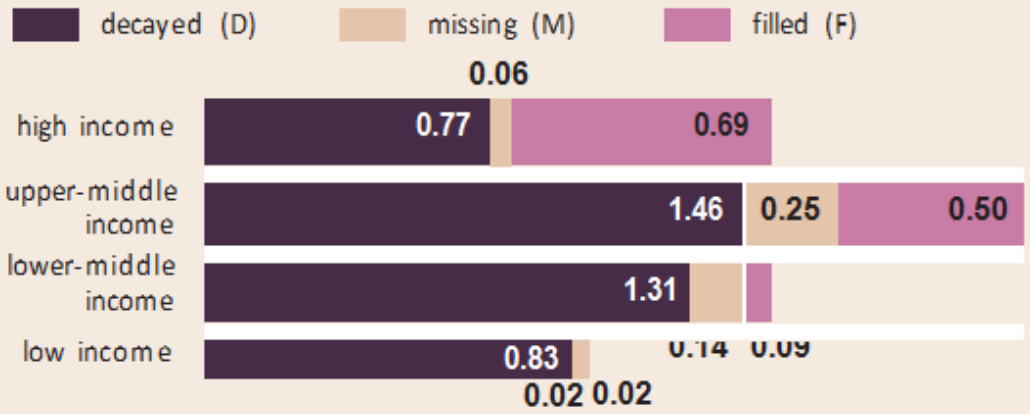

3,054m
untreated decay of primary and permanent teeth
1,013m
migraine
743m
severe periodontitis
549m
diabetes
334m
asthma

Global Scope of Oral Disease

- Most of the world's population will suffer from oral disease in their lifetime, ranging from caries, periodontal diseases and tooth decay to oral cancer.
- Only 60% of the world's population enjoys access to oral healthcare.
- 60%-90% of school children worldwide have dental caries.
- Toothache is the number one reason for absenteeism from schools in many countries.

GLOBAL DISTRIBUTION OF TOOTH DECAY

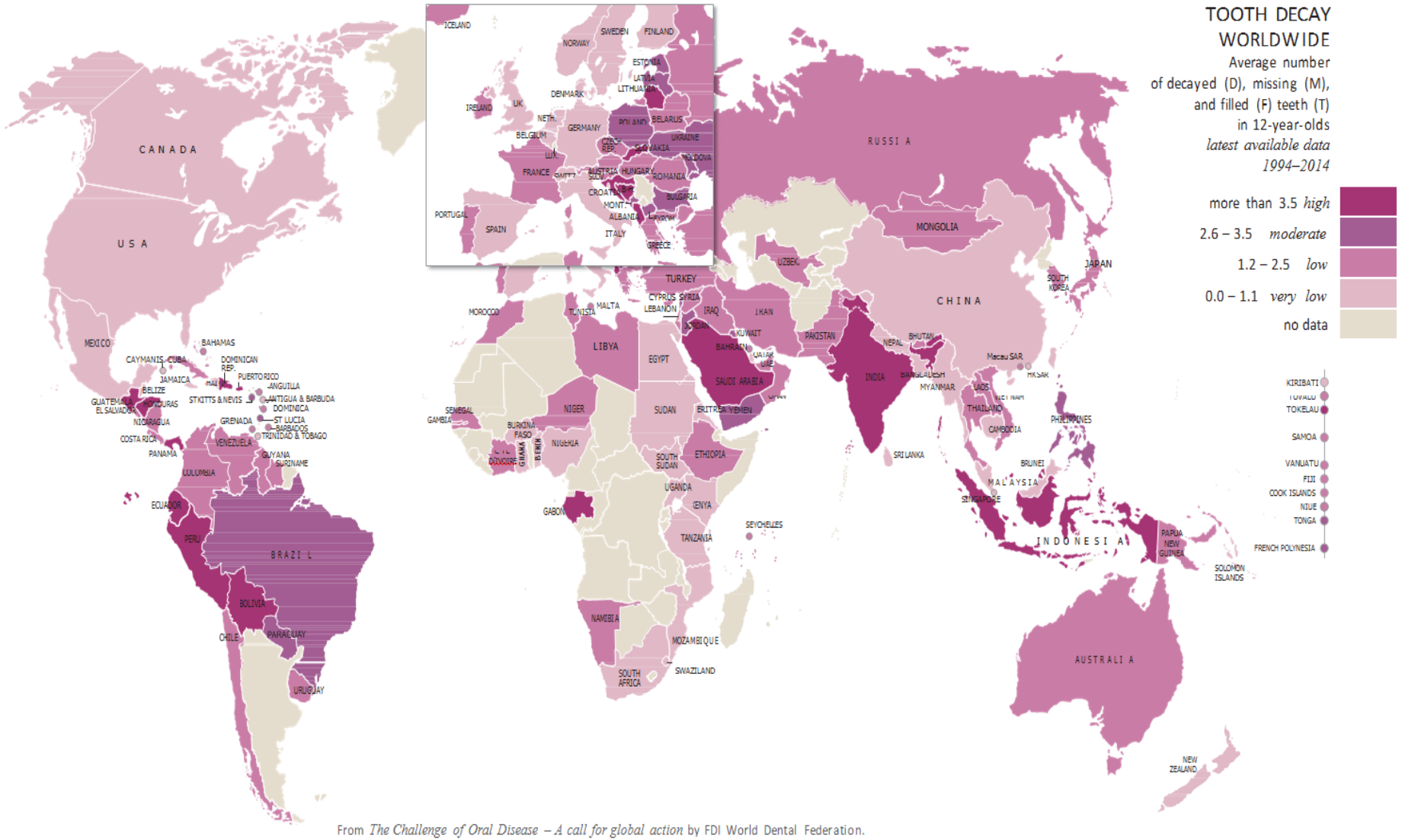
Average number of affected teeth for 12-year-olds
by country income group
2000 or latest available data



The DMFT Index

The DMFT index is generally used to report tooth decay in epidemiological studies. It records the number of decayed (D), missing (M) and filled (F) teeth (T). While DMFT is not the only measure and has limitations, the oral health status of populations is often summarized as a DMFT score (usually of 12-year-olds). A DMFT score of 1.0 means that 1 of the 32 adult teeth is either decayed, missing or filled. Scores for individuals are full numbers, for populations they can have decimal values.

From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.



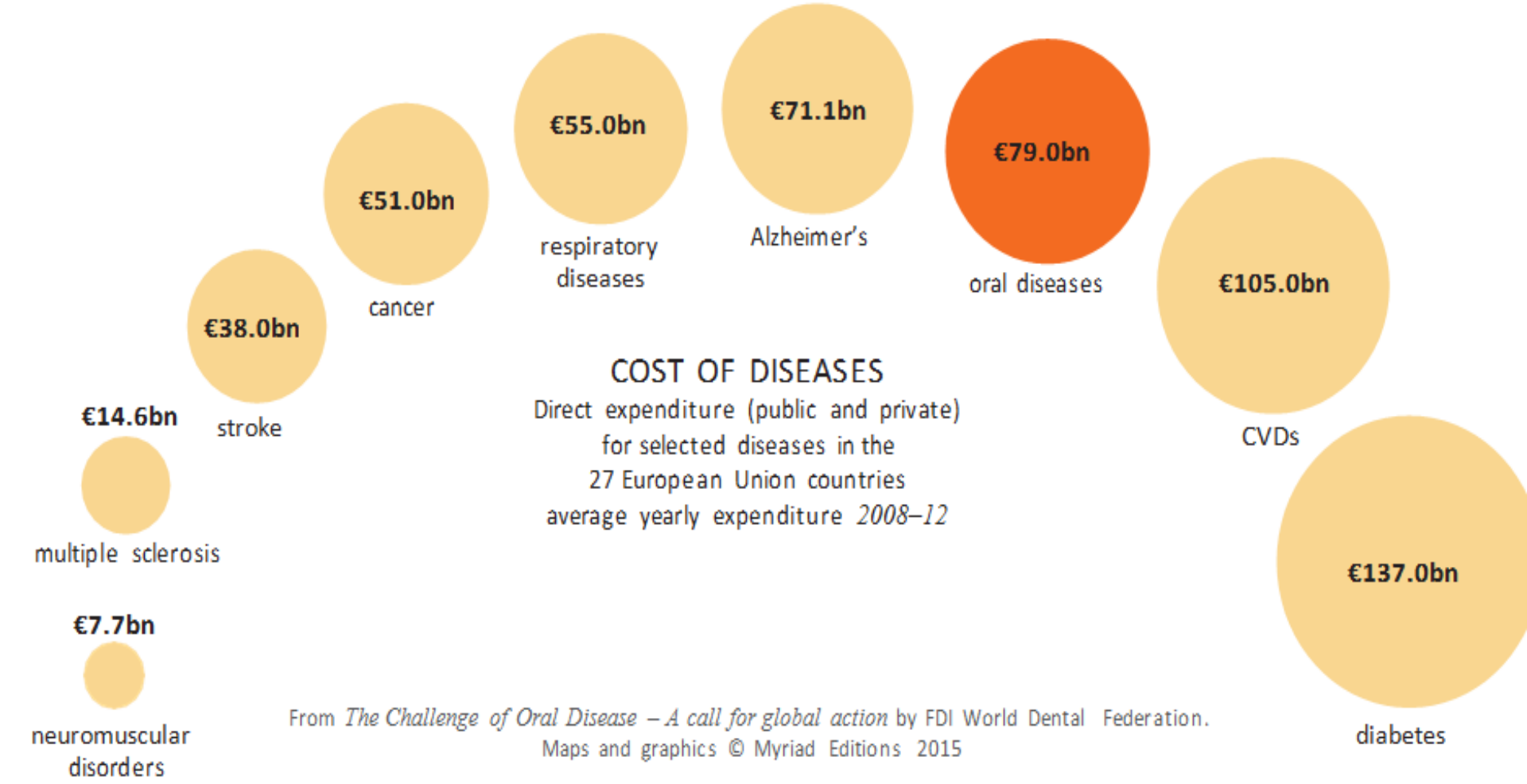
From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

Global Scope of Oral Disease

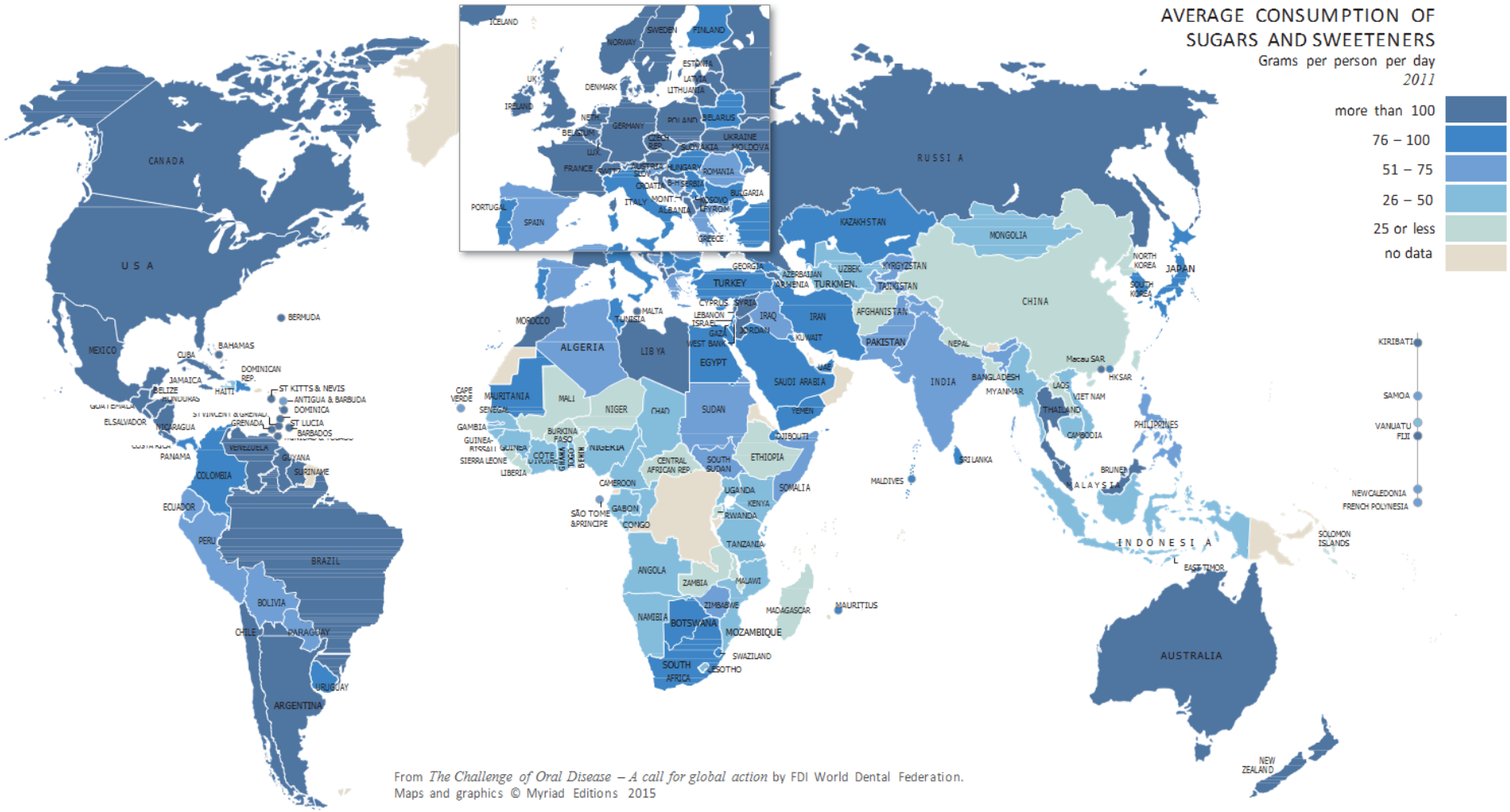
- Although the burden of oral diseases is decreasing in developed countries, gum complications are becoming more common, especially in older people. Major risk factors such as tobacco and alcohol use and a diet high in fat, salt and sugar contribute to a range of chronic diseases including oral disease

Global Scope of Oral Disease

- High consumption of sugar is the number one risk factor for tooth decay and diabetes. Almost 80% of diabetes deaths occur in low-middle income countries.



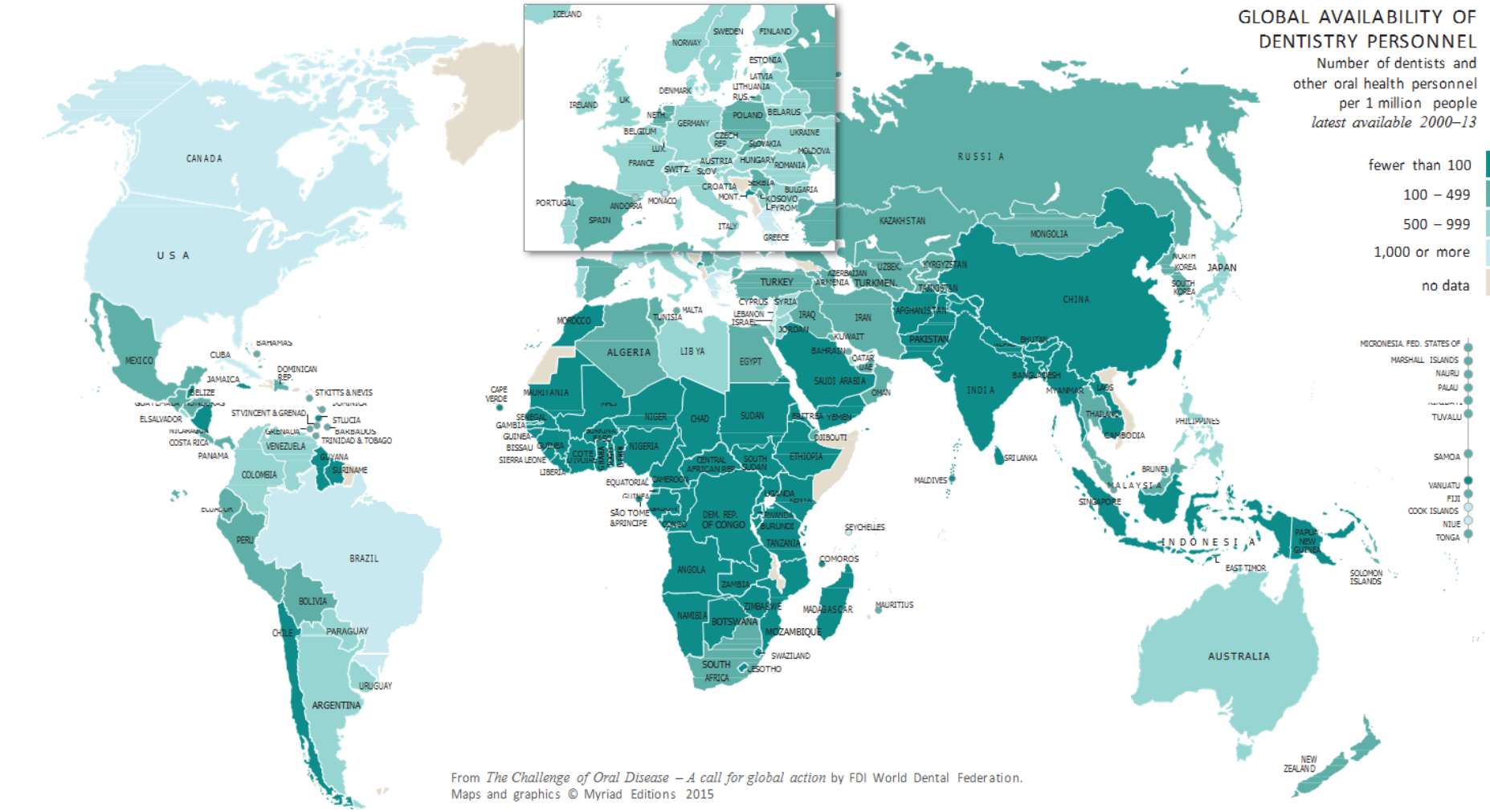
From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.



From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

Global Scope of Oral Disease

- There are over one million qualified dentists worldwide who, using modern dental treatments can restore almost all functions and aesthetics of a healthy dentition. However, they are not equally distributed around the world leaving many of the poorest and most needy regions with fewer than one dentist per 300,000 population.



From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

Global Scope of Oral Disease

- Given the extent of the problem, oral diseases are major public health concern. Their impact on individuals and communities, as a result of pain and suffering, impairment of function and reduced quality of life, is considerable. Moreover, traditional treatment of oral disease is extremely costly, the fourth most expensive disease to treat in most industrialized countries. In low-income countries, if treatment were available, the costs of treating childhood dental caries alone would exceed the total health care budget for children.

Global Scope of Oral Disease

- Dental caries is the most untreated disease in the world afflicting more than 2.4 billion people. People that do not have access to dental care are often suffering in pain for years.

- Dental disease is often be devastating to a person's quality of life and self perception.

- The primary dental treatment offered in most of these situations is tooth extraction.

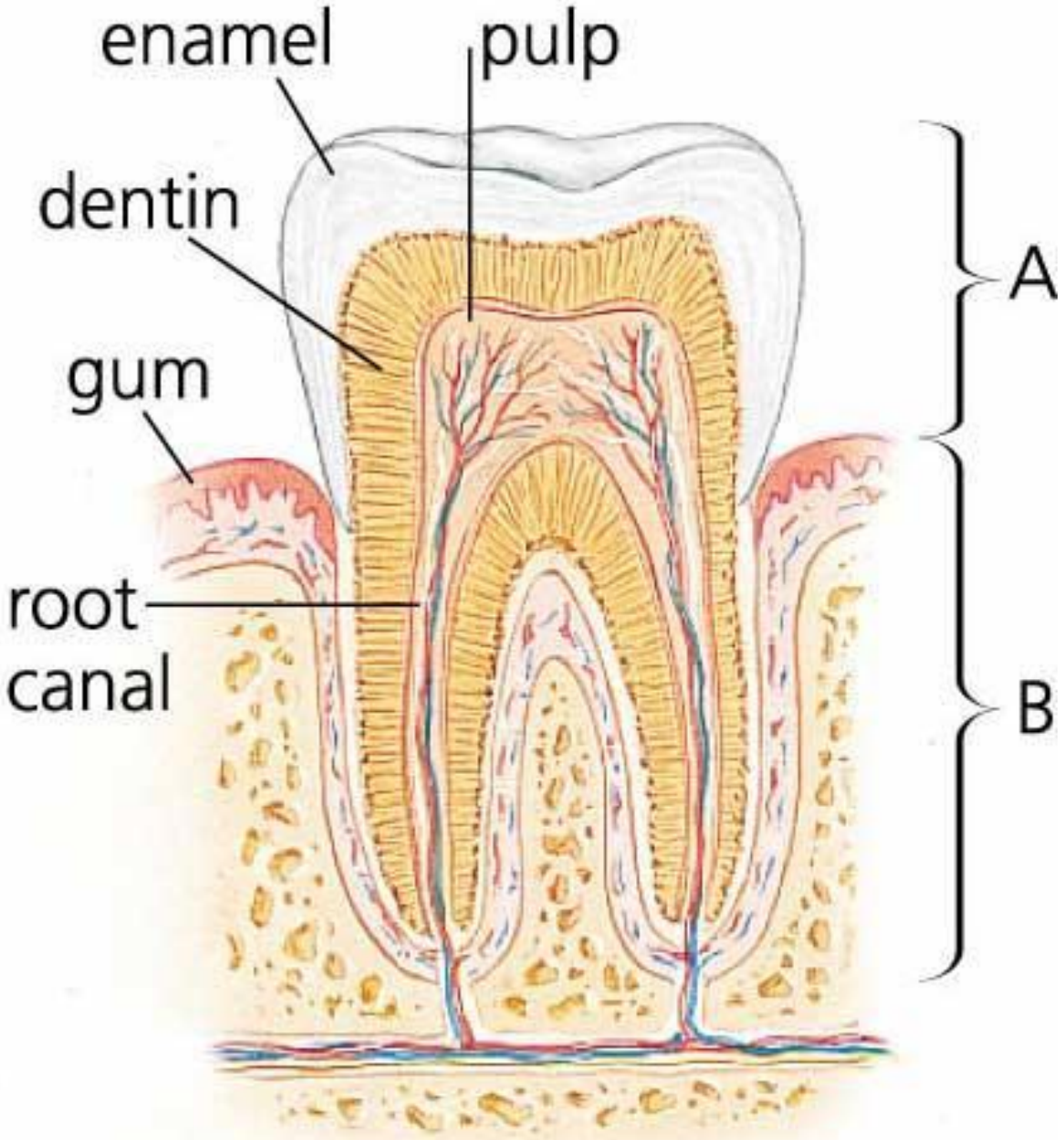
of Dentists/Population per Dentist

4,863	1,085	3	Finland
20,800	2,964	3	France
20	66,550	3	Gabon
20	85,450	3	Gambia
1,125	3,907	3	Georgia
52,202	1,582	3	Germany
100	234,780	3	Ghana
17,900	623	3	Greece
20	5,300	4	Grenada
2,046	6,527	4	Guatemala
60	156,167	4	Guinea
13	130,385	3	Guinea-Bissau
20	36,900	3	Guyana
60	159,967	3	Haiti
500	14,212	3	Honduras

DENTISTRY 101

TOOTH

- HARDEST PART OF THE HUMAN BODY
- COMPOSED OF THE MINERAL HYDROXYAPATITE
- HARD OUTER SURFACE OF THE TOOTH IS CALLED ENAMEL
- SOFTER CORE IN CALLED DENTIN


enamel
pulp
dentin
gum
root
canal
A
B

Permanent and Baby Teeth

Plaque and Decay

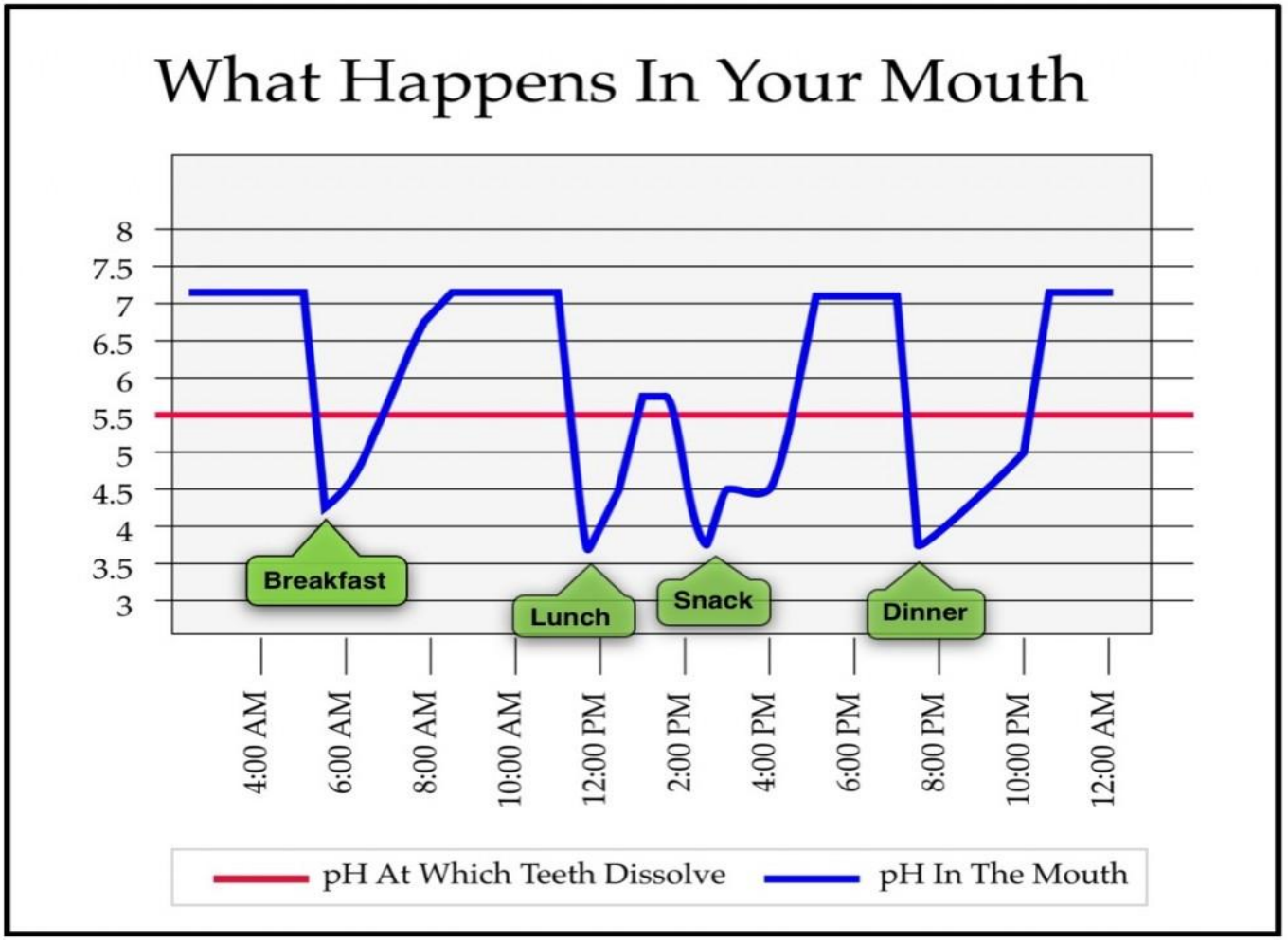
- **Plaque** is a soft, sticky, layer of bacteria and their products, growing on the teeth and gums.
- When plaque remains on the teeth, it combines with food and sugar to make acid. The acid can cause tooth decay and the bacterial toxins can cause gum disease.

Plaque = Biofilm

Streptococcus mutans
Lactobacillus

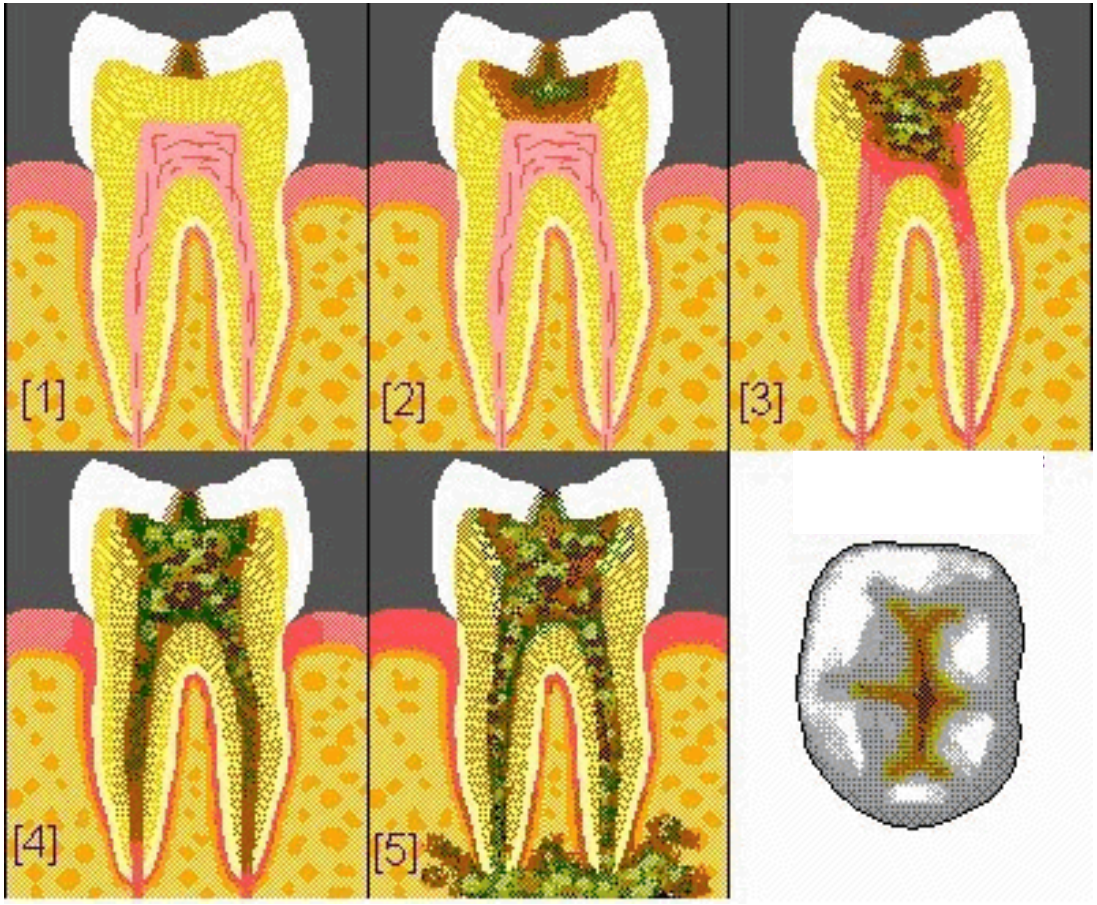
CIINICAL DECAY

Demineralization/Remineralization



http://helpyourmouth.com/wp-content/uploads/2012/10/Stephan-Curve1-1024x857.jpg

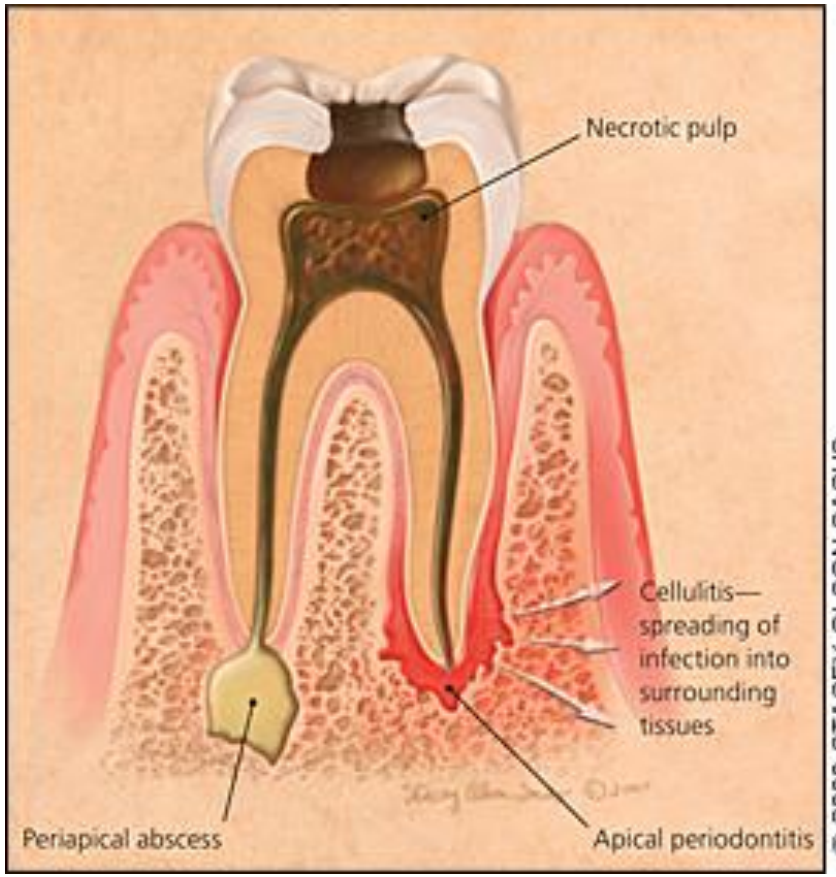
Stages of Decay



Pulpitis

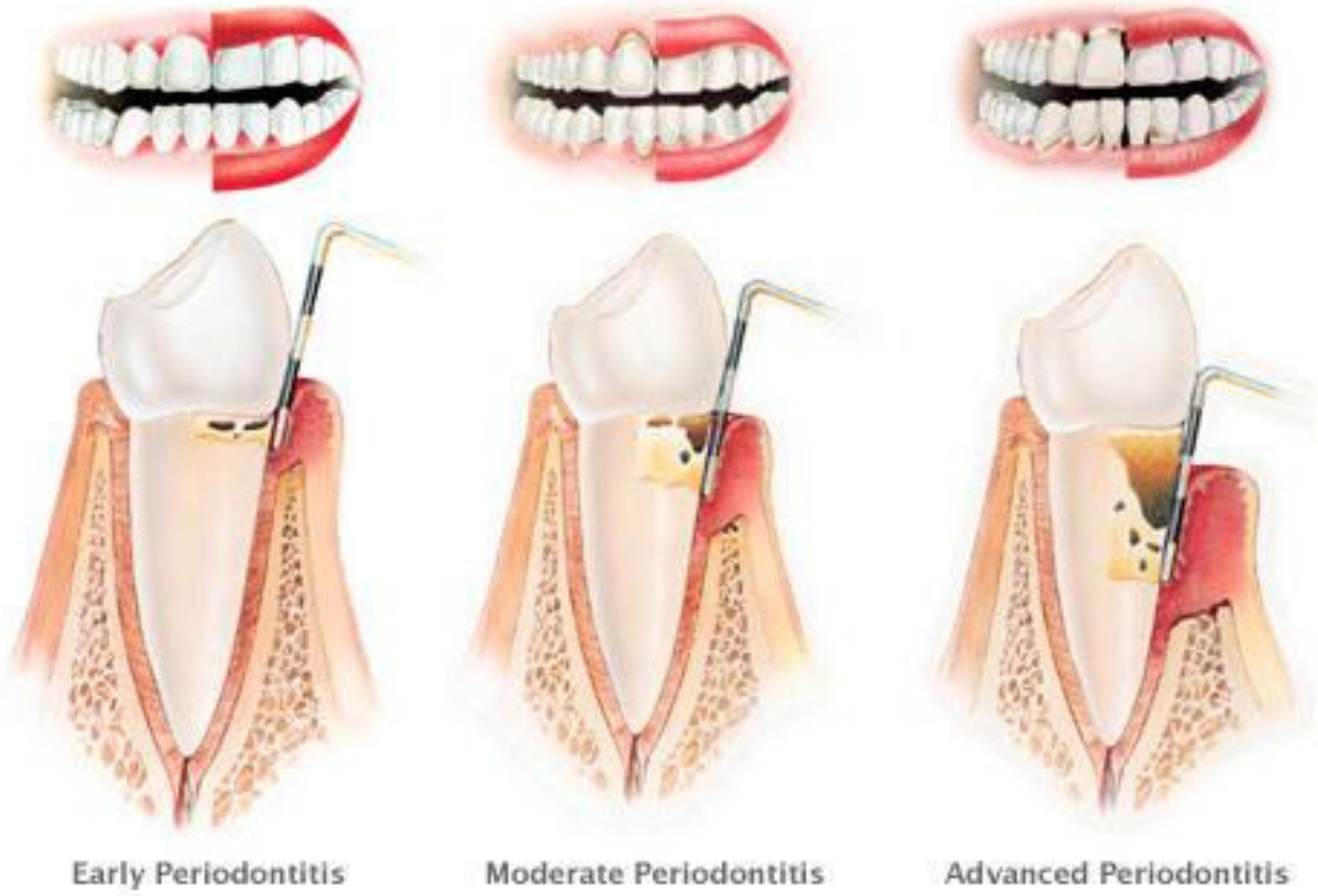
Definition:

- Inflammation of the inside
- of the tooth.
- 2 types of Pulpitis:
- -TREATABLE- needs a filling
- -UNTREATABLE- needs a root canal or extraction



mPOWER

PERIODONTITIS

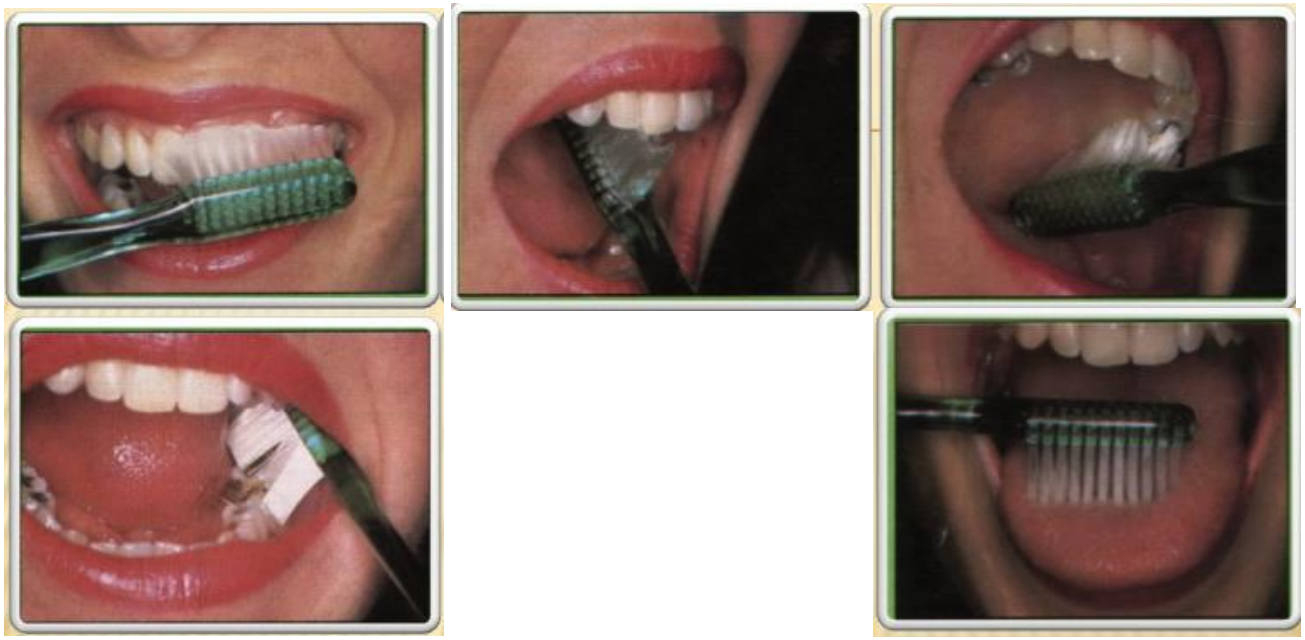


Plaque Control = Remove Biofilm

Removing Plaque

- How to brush your teeth:

1. Brush every surface of each tooth using fluoride toothpaste.
2. Brush twice a day for 3 minutes, with brush angled to the gum-line.
3. Brush or scrape the tongue.

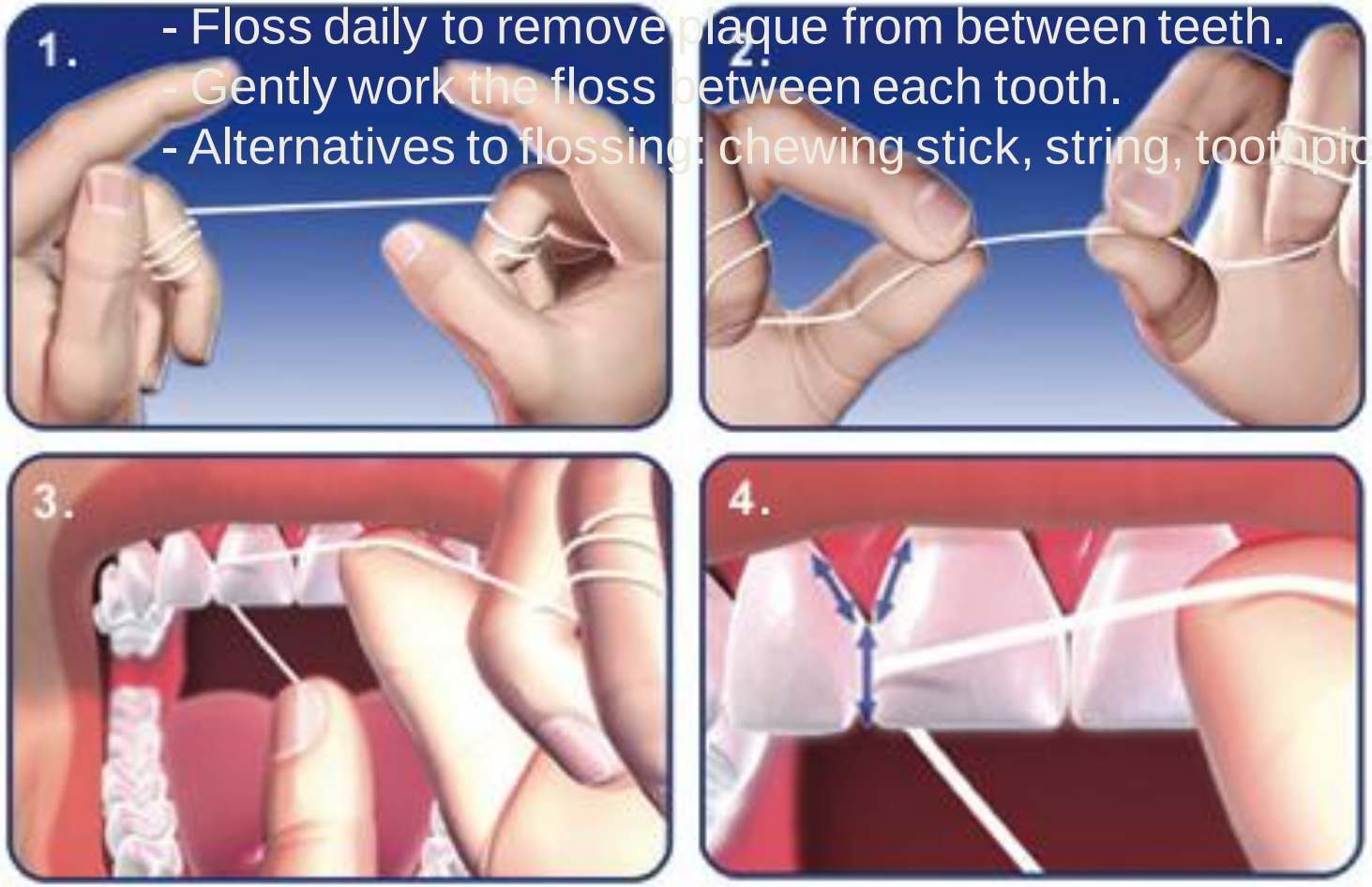


mPOWER

Removing Plaque

How to floss your teeth:

- Floss daily to remove plaque from between teeth.
- Gently work the floss between each tooth.
- Alternatives to flossing: chewing stick, string, toothpick



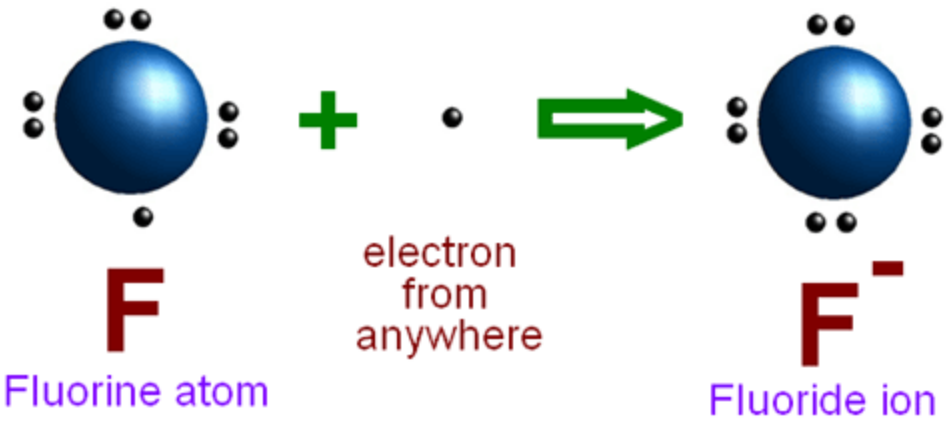
mPOWER

Prevention of Caries

- Remove Bacteria/Plaque
- Limit Sugars to Meals
- Strengthen Enamel
  - Fluoride
    - Topical
    - Systemic

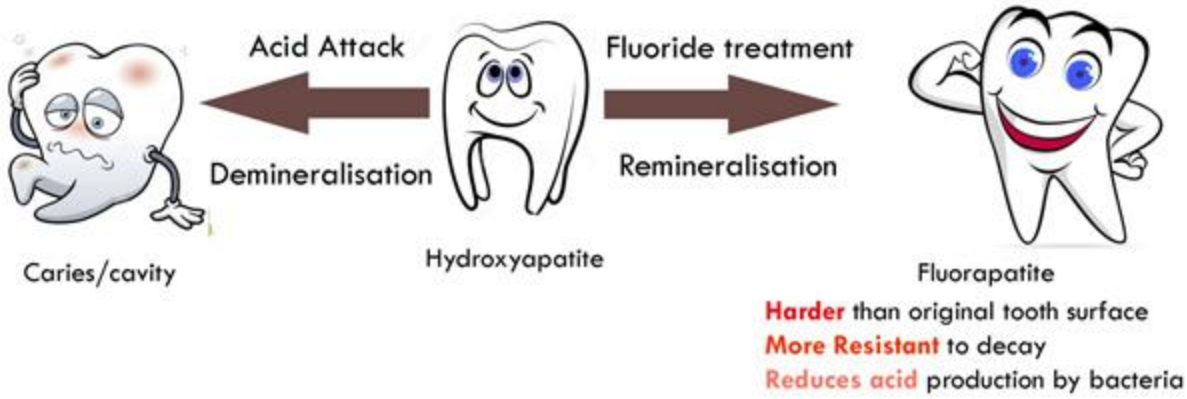
Fluoride

- Turns Hydroxyapatite to Fluorapatatite
- Enamel becomes more resistant to decalcification
- **Systemic** – water, tablets, salt
- **Topical** – rinses, toothpaste, gels/varnishes, water

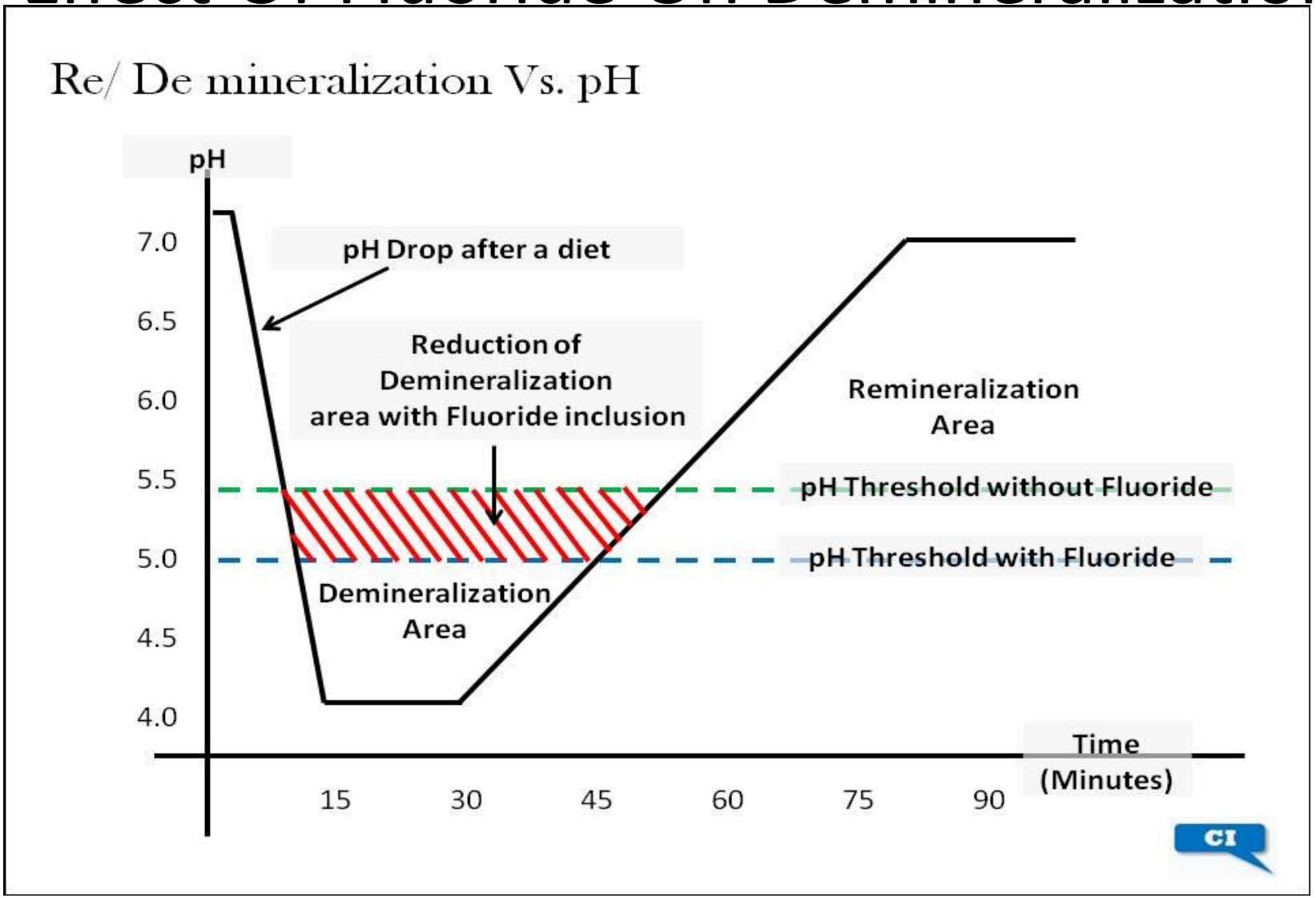


Fluoride Anticaries Benefits

- Slows tooth demineralization
- Promotes tooth remineralization
- Slows or stops tooth erosion
- Inhibits dental plaque bacteria reducing acid production



Effect Of Fluoride On Demineralization



http://cosmeticsinsight.com/wp-content/uploads/2015/03/Graph-of-Remineralization-and-Demineralization.jpg

FLUORIDE

- Only anticaries agent recognized by the FDA
- Publically available via community water, salt, toothpastes and oral rinses.
- Professionally available via varnishes, gels/mousse, sealants, prophy pastes and supplements

"QUOTES FOUND ON THE INTERNET ARE NOT ALWAYS ACCURATE."

- Abraham Lincoln

FLUORIDE

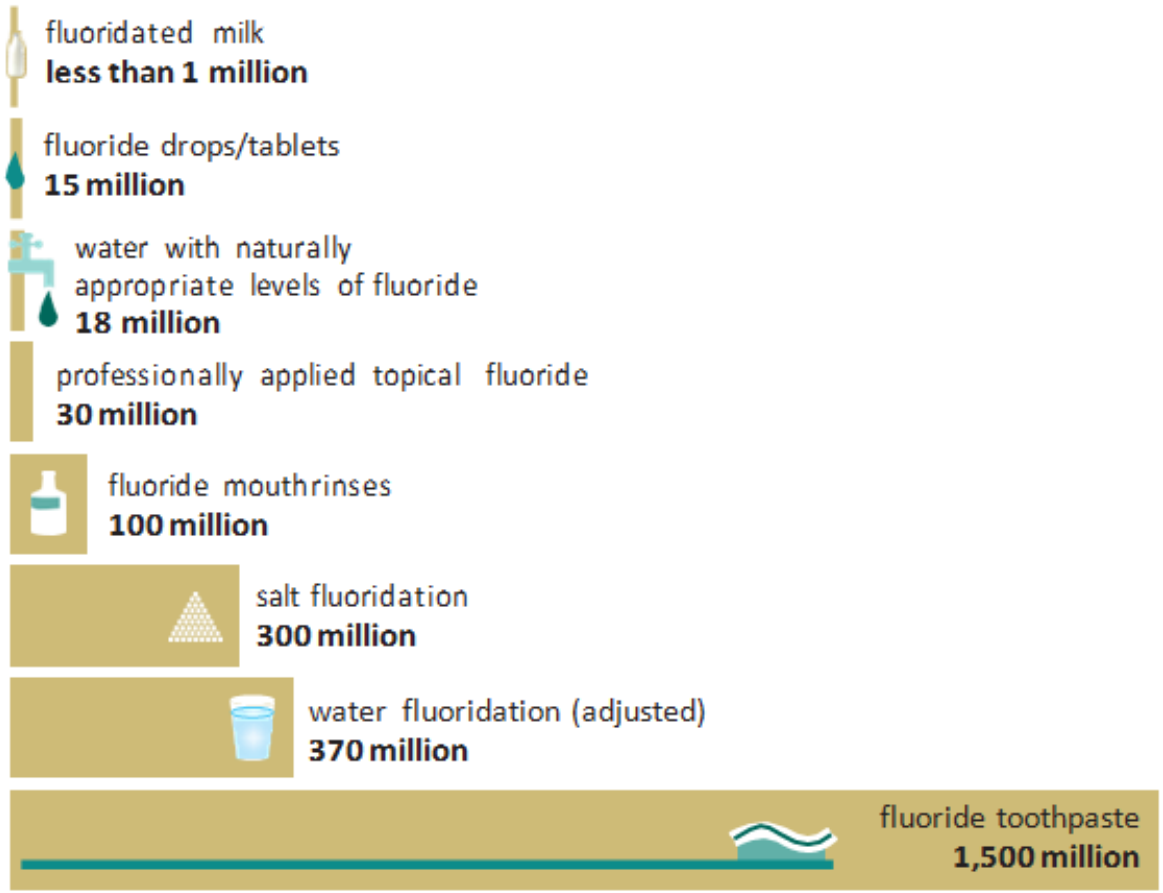
Nazi Germany used water fluoridation in concentration camps to sterilise the humans and force them into calm submission.

- Joseph Borkin, "The Crime and Punishment of I.G. Farben"

Fluorosis

GLOBAL FLUORIDE USE

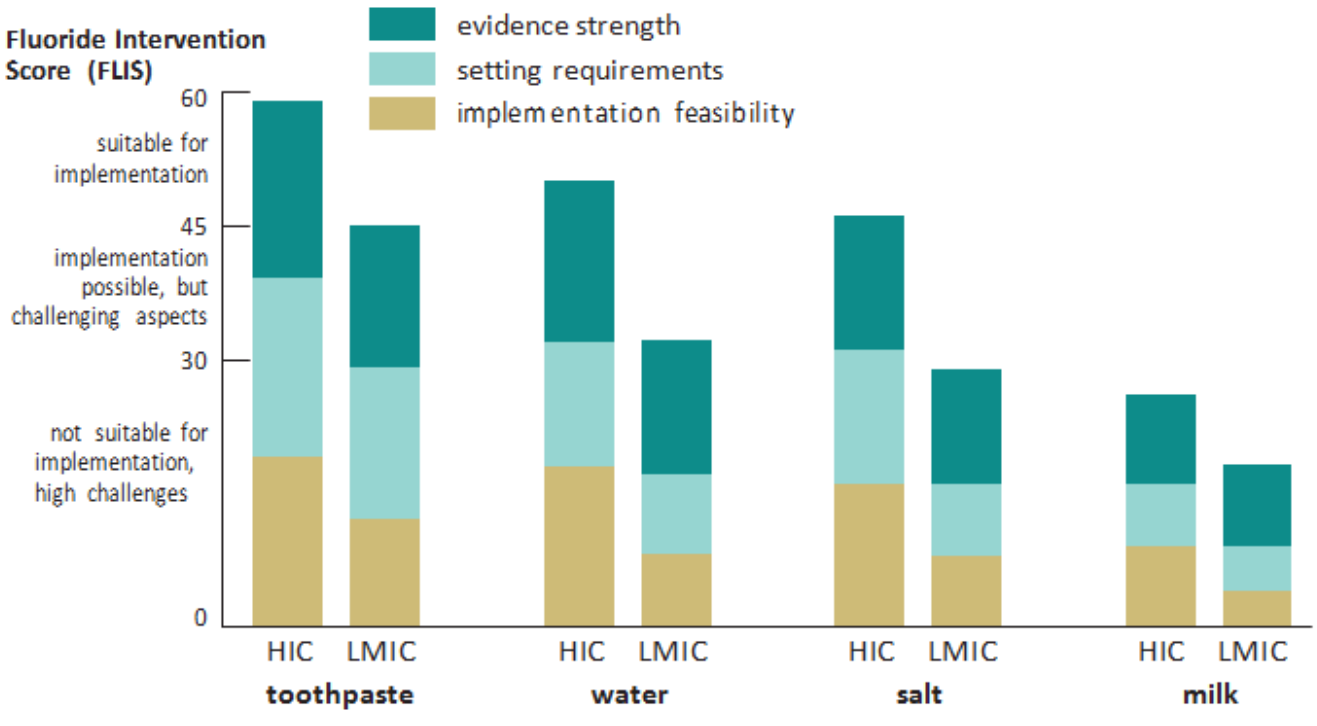
Estimated number of people worldwide using different sources of *fluoride 2001*
salt 2013
water 2012



From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

CHOOSING THE RIGHT FLUORIDE INTERVENTION

Estimated suitability of fluoride interventions in high-income (HIC) and low-/middle-income (LMIC) country settings using the Fluoride Intervention Score (FLIS)



Criteria for selecting a fluoride intervention:

1 Strength of scientific evidence:
- Effectiveness
- Efficiency
- Safety
- Compliance

2 Setting requirements:
- Feasibility
- Equity
- Legislation
- Fluoride mapping

3 Implementation feasibility:
- Quality assurance
- Sustainability
- Surveillance
- Communication

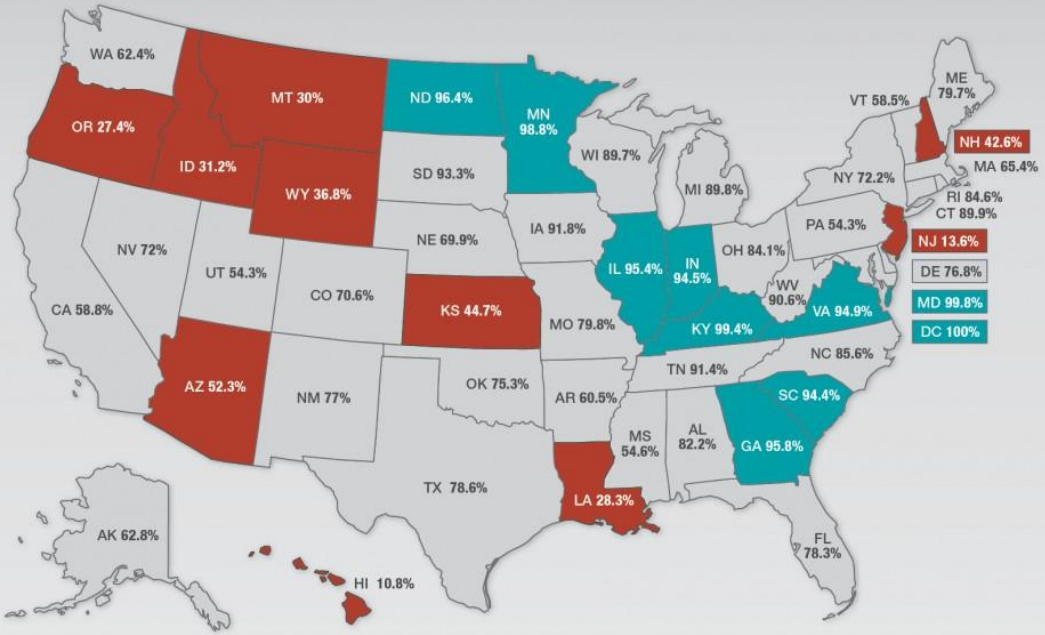
From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

DIRECT COST OF CARIES PREVENTION PROGRAMS

PROGRAM	ANNUAL COST PER PERSON
Sealants	$21.17
Fluoride Supplements	$2.53
Water Fluoridation	$0.54
Salt Fluoridation	$0.06

Water Fluoridation

Community water fluoridation:
The top 10 and bottom 10



Percentage of residents on public water systems who are receiving fluoridated water in each state[1]

- Top 10 states with highest percentage of fluoridation
- Bottom 10 states with lowest percentage of fluoridation

74 million

Americans who are on 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."[2]

1 Centers for Disease Control and Prevention, "2008 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

PEW

pewcenteronthestates.org/dental

Dental Care In the US At The Time of Water Fluoridation

- >75% of adults over 65 were edentulous
- First molar extractions in children were routine
- 3-4 new cavities per year were typical in school aged children
- 10% rejection of recruits during WWII for not having at least 6 opposing teeth, 40 % of those accepted needed immediate dental care

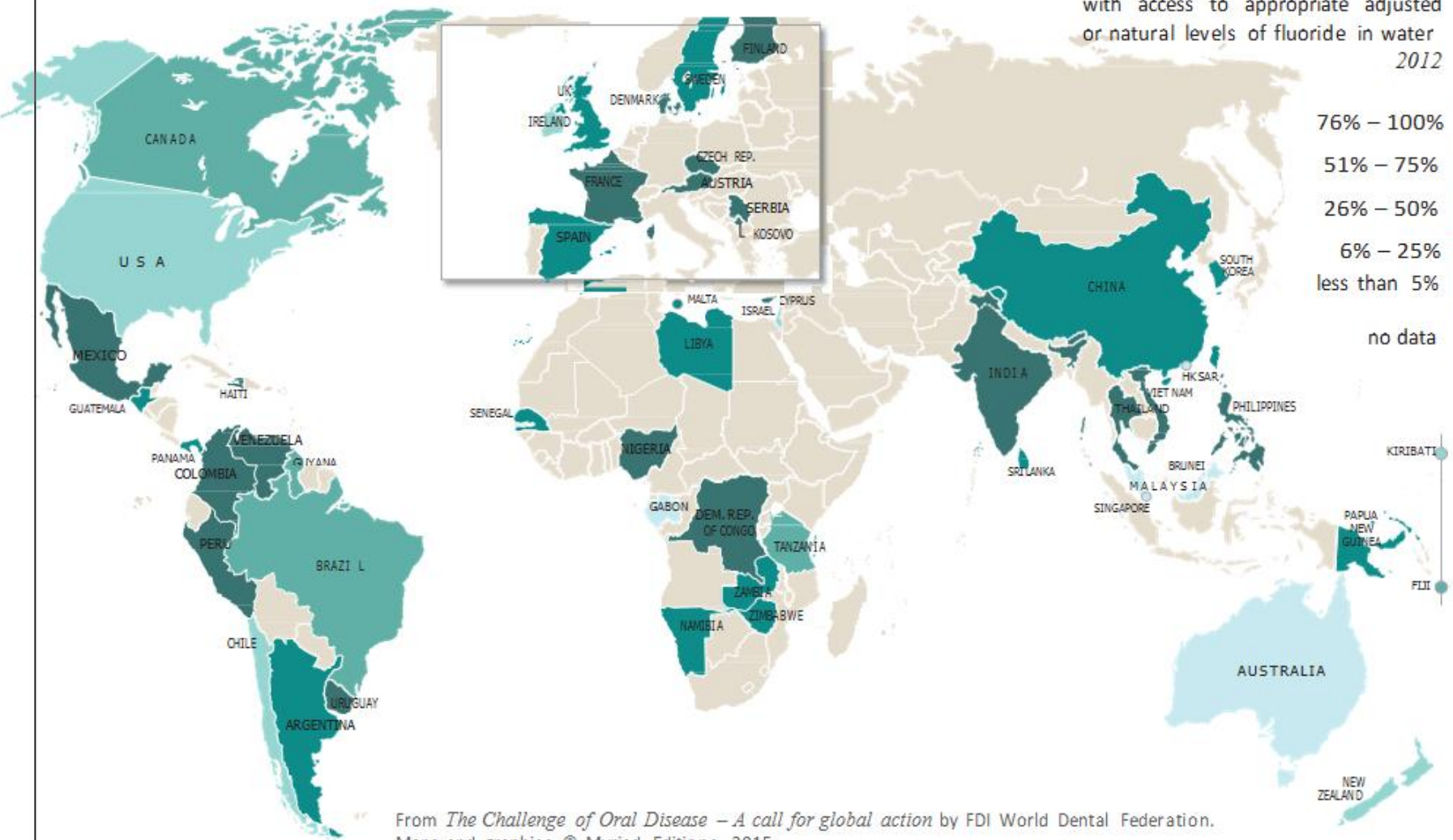
Water Fluoridation Benefits

- 70 years of experience (0.7 to 1.2 ppm)
- Reduces caries in children 18-40%
- Reduces caries 11-15% for high risk children
- Reduces adult caries by 31%

FLUORIDE IN WATER

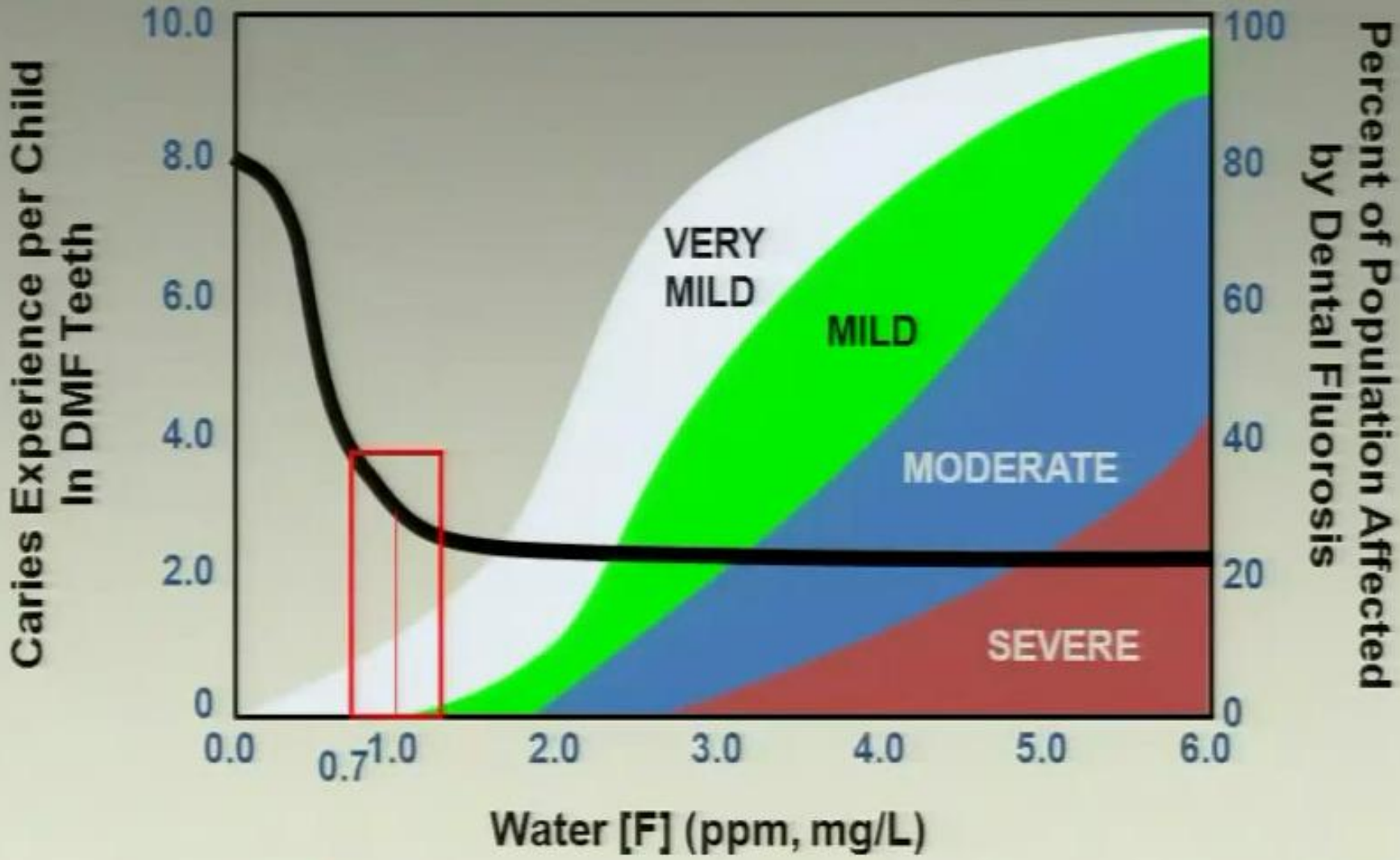
Percentage of population with access to appropriate adjusted or natural levels of fluoride in water

2012



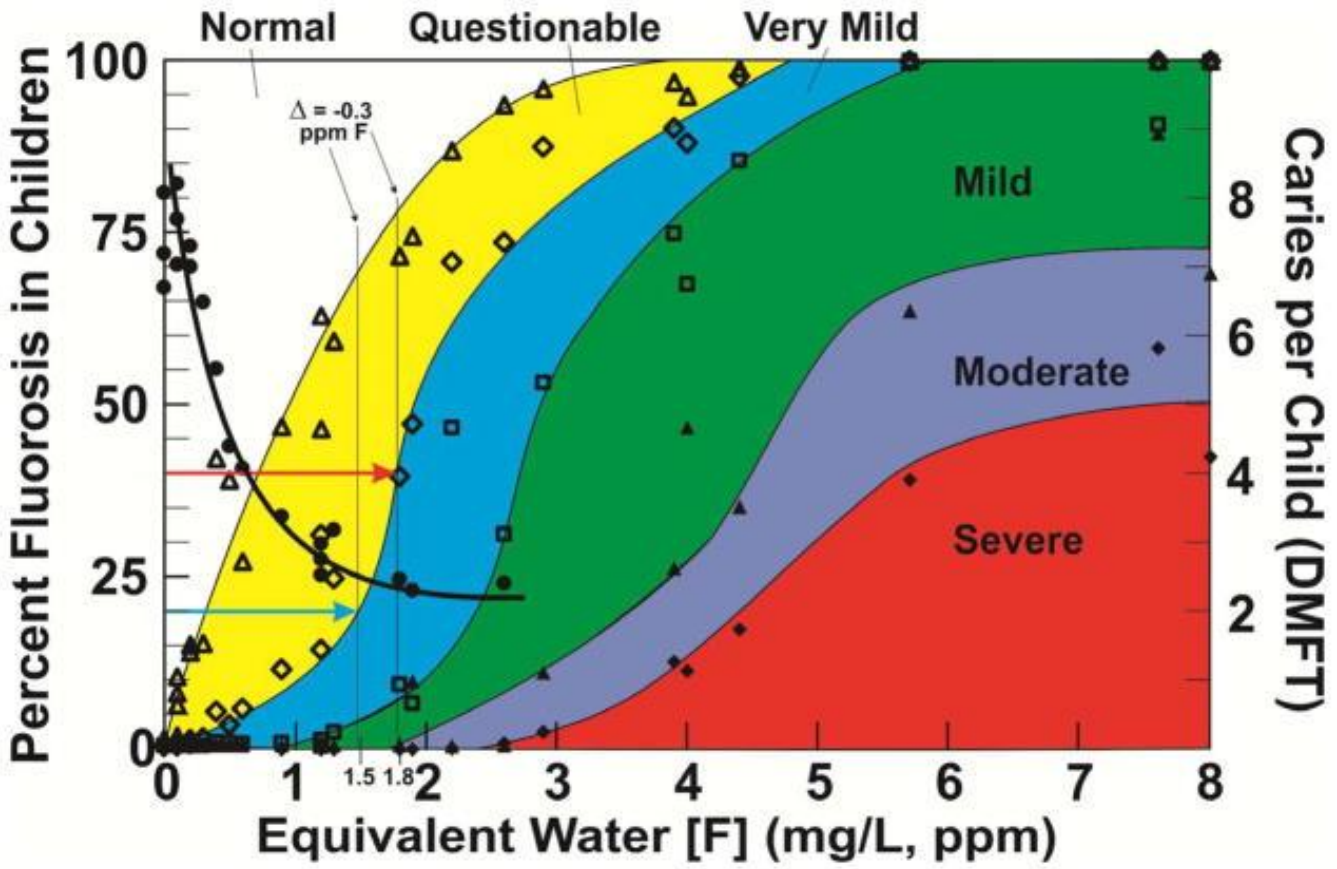
From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

HT Dean's Chart



Halo Effect

- With increased use of processed foods and beverages made with fluoridated water and use of fluoridated toothpaste the ingestion of fluoride increases and is distributed to areas that do not have community water fluoridation.



J Evid Based Dent Pract. 2014 Jun; 14 Suppl: 95–102.

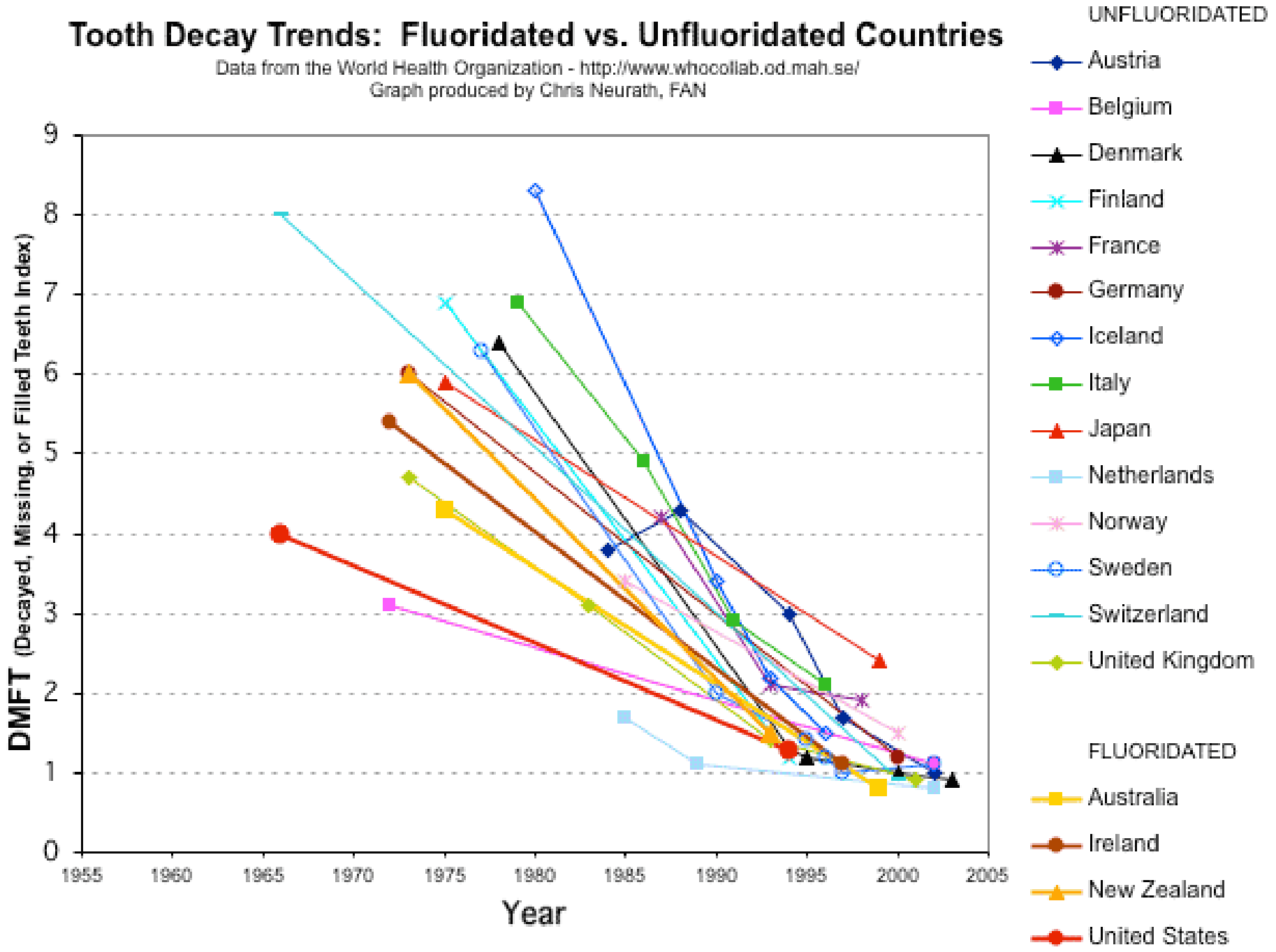
Water Fluoridation to Prevent Tooth Decay – 2015 Cochrane Review

- Found “that water fluoridation is effective at reducing levels of tooth decay among children. The introduction of water fluoridation resulted in children having 35% fewer decayed, missing and filled baby teeth and 26% fewer decayed, missing and filled permanent teeth. We also found that fluoridation led to a 15% increase in children with no decay in their baby teeth and a 14% increase in children with no decay in their permanent teeth. These results are based predominantly on old studies and may not be applicable today.”

Water fluoridation for the prevention of dental caries
Cochrane Database of Systematic Reviews
2015 Iheozor-Ejiofor Zipporah Glenny Anne-Marie et. al
US: http://onlinelibrary.wiley.com/doi/10.1002/14651858.CD010856.pub2/abstract

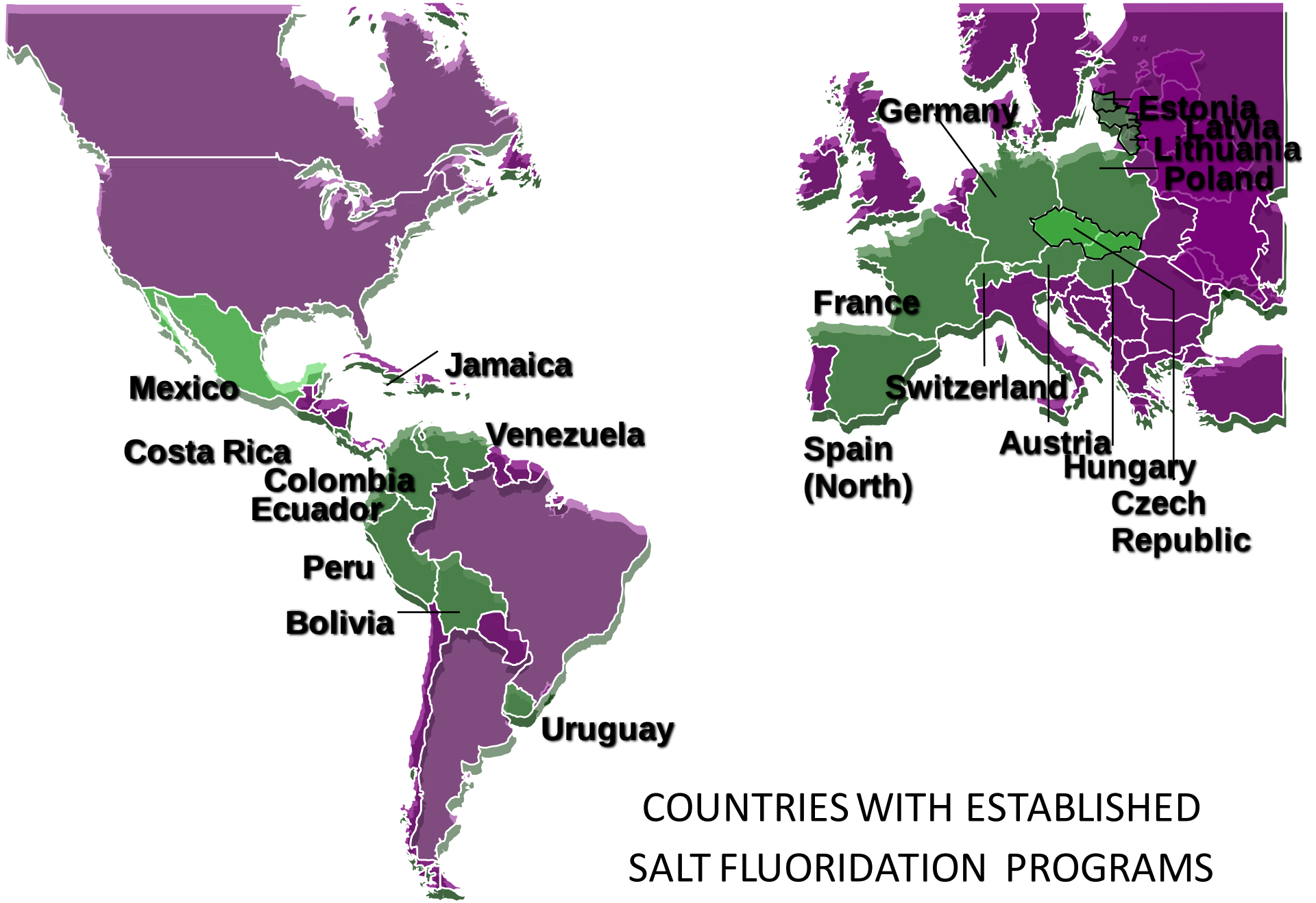
Water Fluoridation to Prevent Tooth Decay – Cochrane Review

- “Overall, the results of the studies reviewed suggest that, where the fluoride level in water is 0.7 ppm, there is a chance of around 12% of people having dental fluorosis that may cause concern about how their teeth look.”
- Found “insufficient information to determine whether fluoridation reduces differences in tooth decay levels between children from poorer and more affluent backgrounds.”


Tooth Decay Trends: Fluoridated vs. Unfluoridated Countries
Data from the World Health Organization - http://www.whocollab.od.mah.se/
Graph produced by Chris Neurath, FAN
DMFT (Decayed, Missing, or Filled Teeth Index)
0
1
2
3
4
5
6
7
8
9
1955
1960
1965
1970
1975
1980
1985
1990
1995
2000
2005
Year
UNFLUORIDATED
Austria
Belgium
Denmark
Finland
France
Germany
Iceland
Italy
Japan
Netherlands
Norway
Sweden
Switzerland
United Kingdom
FLUORIDATED
Australia
Ireland
New Zealand
United States

Salt Fluoridation

- Community fluoridation program alternative – Salt fluoridation is the controlled addition of a fluoride compound to salt so as to have a cariostatic effect.
- 250 ppm F added to salt usually in combination with iodine



COUNTRIES WITH ESTABLISHED SALT FLUORIDATION PROGRAMS

PAN AMERICAN HEALTH ORGANIZATION'S MULTI-YEAR PLAN FOR SALT FLUORIDATION IN THE AMERICAS

Source: PAHO 11/00

Established Programs Mexico, Belize, Costa Rica, Jamaica, Venezuela, Colombia, Ecuador, Peru, Bolivia, Uruguay

New Programs El Salvador, Honduras, Nicaragua, Paraguay, Guatemala

New Programs:

Laos, Cambodia, Vietnam

Safety

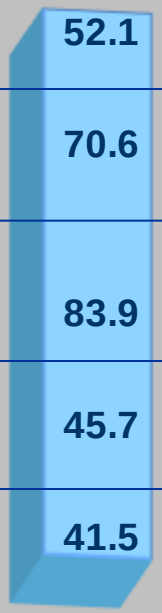
Fluorine is compatible with iodine

- **Does not potentiate iodine deficiency**
- **No effect on thyroglobulin content of thyroid gland**

In order for an adult (80 kg.) to suffer from acute toxicity, 1.6 kg. of salt fluoridated at 250 ppm of fluoride would have to be consumed in a short period of time.

DENTAL CARIES IN COUNTRIES WITH CONSOLIDATED NATIONAL SALT FLUORIDATION PROGRAMS

COUNTRY	BASELINE STUDIES		FOLLOW-UP STUDIES		CARIES
	YEAR	DMFT-12	YEAR	DMFT-12	REDUCTION (%)
Colombia	1980	4.8	1998	2.3	52.1
Costa Rica	1988	8.4	1999	2.5	70.6
Jamaica	1984	6.7	1995	1.1	83.9
Mexico	1987	4.6	1996	2.5	45.7
Uruguay	1992	4.1	1999	2.4	41.5



Source: PAHO. Jan. 2001

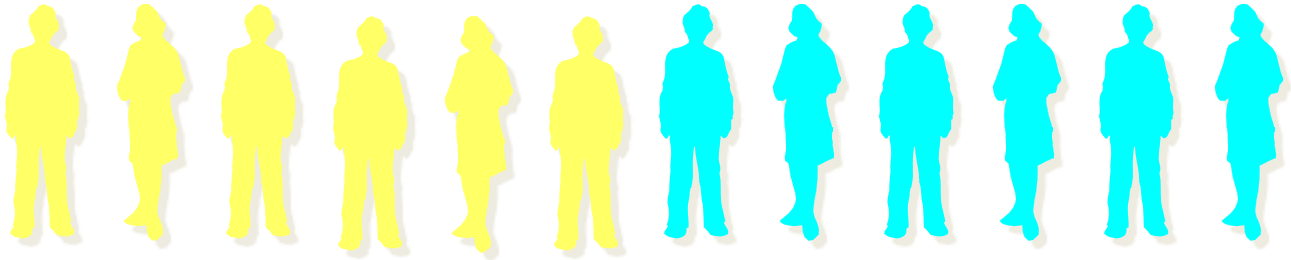
PUBLIC HEALTH EFFICACY

Depends on:

- **Availability of F salt**
    - **Distribution and marketing**
- **Affordability**
    - **Package size**
- **How F salt is consumed**
    - **Table salt**
    - **Institutional usage**
        - **e.g. restaurants, schools**
        - **e.g. baking**

PAHO Cost-Benefit Analysis

Bolivia



Assuming 50% of population covered by dental services @ US $10 per visit:

$136 savings

$1 Investment

In 6 years

The investment to implement the program (planning, execution, monitoring, evaluation, social marketing) has been estimated at

Bolivia

US $347,000

(25 salt fluoridation plants)

which corresponds to

US $.50

per person for the 6 years of the program

Salt Fluoridation Technology

There are two methods:

- **Dry method**
- **Wet method**

Salt Fluoridation Technology

Dry method:

- **Usually used for batch processes**
- **Usually used for small scale production (<10 ton/day)**
- **Sodium fluoride the additive of choice for dry method**
- **Iodide compound may be added at the same time**
  - **A premix is normally used (200 ppm F and 60 ppm Iodide)**
- **Best suited for salt size <30 mesh**

DRY

METHOD

DRY

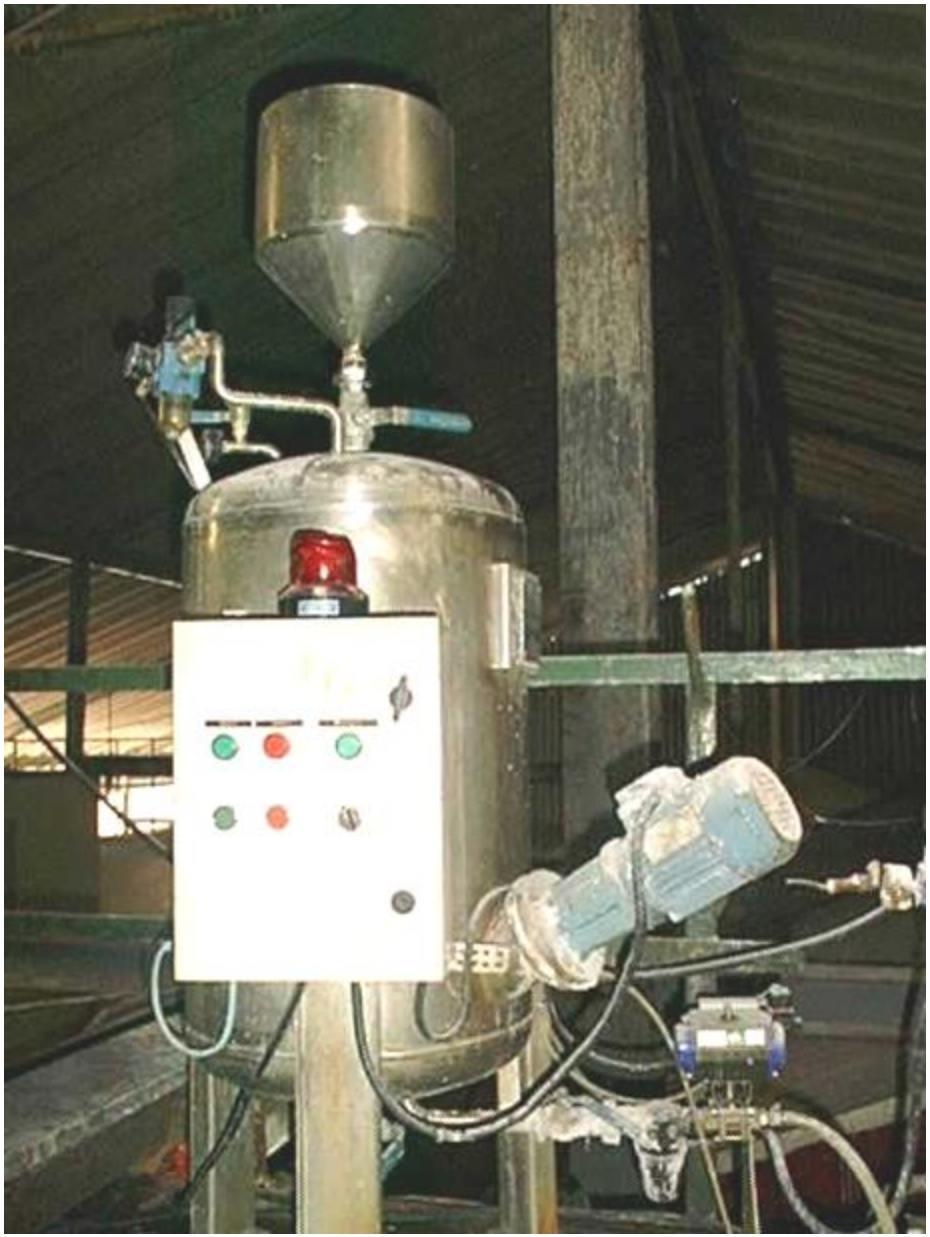
METHOD

SALT FLUORIDATION TECHNOLOGY

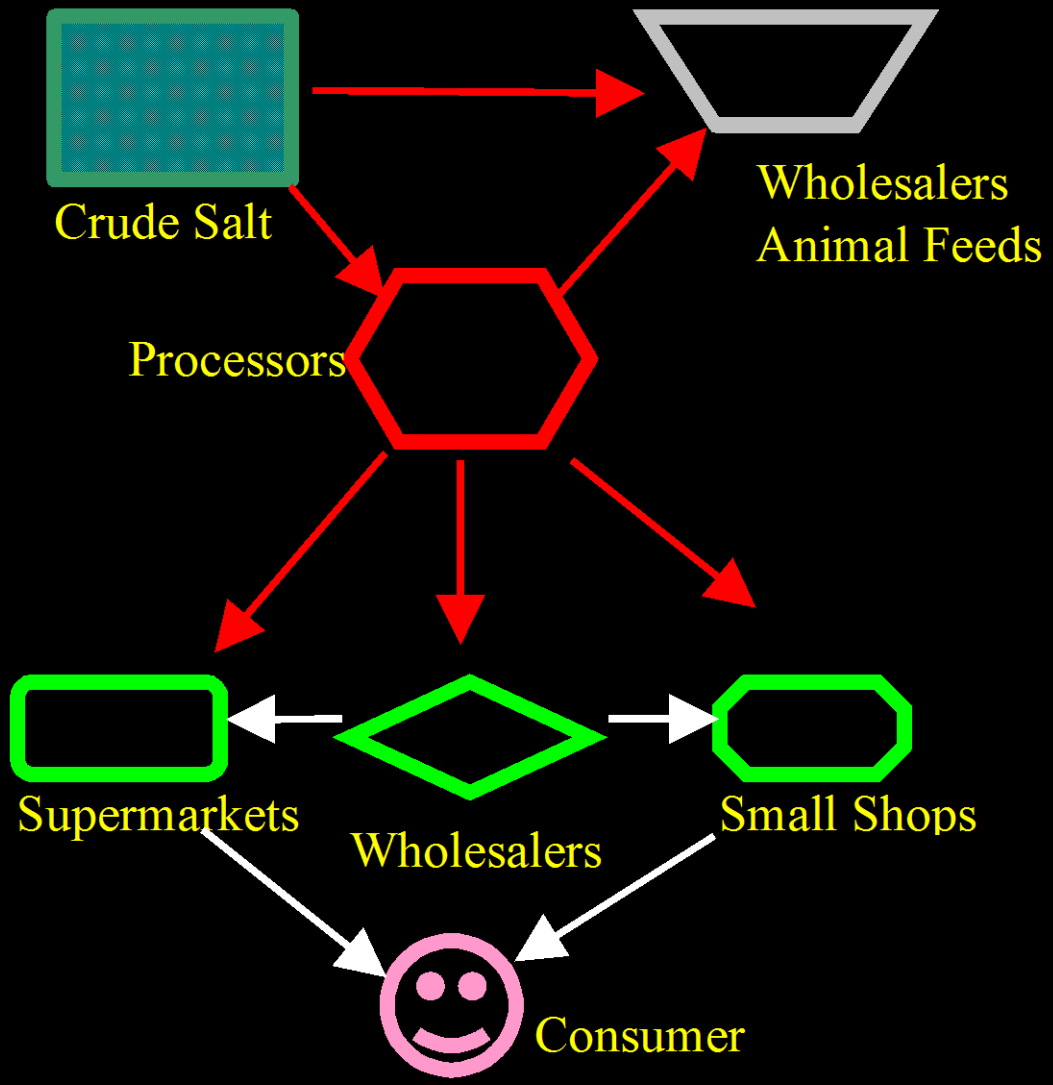
Wet method:

- **Usually used for continuous processes.**
- **Usually used in larger production facilities.**
- **Potassium fluoride the additive of choice for wet method.**
- **Iodide compound may be mixed in the same solution tank or added simultaneously.**
- **Best for coarse salt (>20 mesh).**

WET



METHOD


Crude Salt
Wholesalers
Animal Feeds
Processors
Supermarkets
Wholesalers
Small Shops
Consumer


SAL REFINADA
Sal
BAHIA
SAL COMESTIBLE FINA
CON YODO Y FLUOR
TAMAÑO INDUSTRIAL
PESO NETO: 25 KILOS
HECHO EN VENEZUELA


El
Salerito
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1 kilo
CALIDAD DE EXPORTACION
PISABOL

Cost of Fluorides

	Sodium Fluoride	*Potassium Fluoride*	*Potassium Fluoride Anhydrous*
Formula	NaF	$KF.2H_2O$	KF
Mol Wt	42.0	94.13	58.13
Solubility gm/100ml	4.1	100	55
Price U$/kg	2.5-5.0	2-10	1-8
gm reqr'd per ton Salt	581	778	1238
Cost added per ton Salt	2.76	7.63	9.91

Salt Fluoridation Program Components

1. Feasibility and country baseline studies
2. Training, quality assurance and control of salt fluoridation
3. Epidemiological surveillance and management of systemic and topical fluorides
4. Information, education and communication
5. Country legislation and legal enforcement of fluoride use and supplementation

Dental Fluorosis Survey

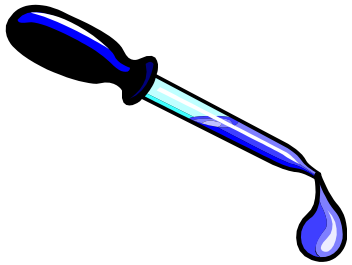
The objective of the fluorosis survey is to determine whether there is an acceptable cosmetic consequence of the fluoridation program.

Fluorosis is measured using Dean´s Index on the vestibular facial surfaces of the six anterior maxillary permanent teeth. These teeth are the most prominent cosmetically.

Study of baseline fluoride concentrations of water supplies for human consumption

This study is essential.

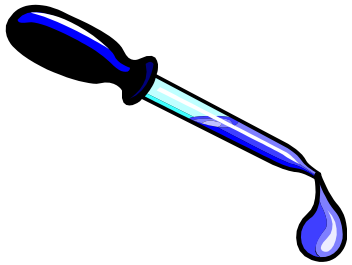
Continuous monitoring of main sources of water and preparation of a map showing location of water sources with 0.5 to 0.7 and greater PPM Fluoride.



Use of Other Fluorides

The use of professional fluoride applications is not recommended as a mechanism to decrease dental caries in children under 6 years old.

The use of fluoridated supplements is not recommended when fluoridated salt is available



Use of Other Fluorides

Continue with oral health promotional programs.

Continue with brushing exercises for periodontal health reasons.

Toothpaste should contain fluoride concentrations of 1000ppm.

The supervise use of fluoridated toothpaste in children under 6 years old - use only pea-sized amount.

Adjust Level of Fluoride in Salt

The recommended range is of 200-250 mg F per kg salt (PPM)

The current concentration should be adjusted based on the level of fluorosis observed, depending on the value of the modified Dean's Index, and the baseline of the fluoride concentration in water for human consumption.

Effective and Affordable Fluoride Toothpaste

"Oral Health through Fluoride for China and Southeast Asia"

"Fluoride toothpaste remains the most widespread and significant form of fluoride used globally and the most rigorously evaluated vehicle for fluoride use."

WHO, FDI, IADR, and the Chinese Stomalogical Association (CSA) Sept.18-19, 2007:

TOOTHPASTE FACTS

Main functions of toothpaste:

Tooth decay prevention: standard (1,000 – 1,500ppm) or high fluoride content (2,500 – 5,000ppm).

Plaque control: addition of antibacterial substances.

Reduction of tooth sensitivity.

Whitening or bleaching effect.

Freshening breath.

Best toothbrushing practice:

- Brush twice a day.
- Do not rinse after brushing.
- Use a pea-sized amount of toothpaste.
- For children up to the age of six, supervise their brushing.

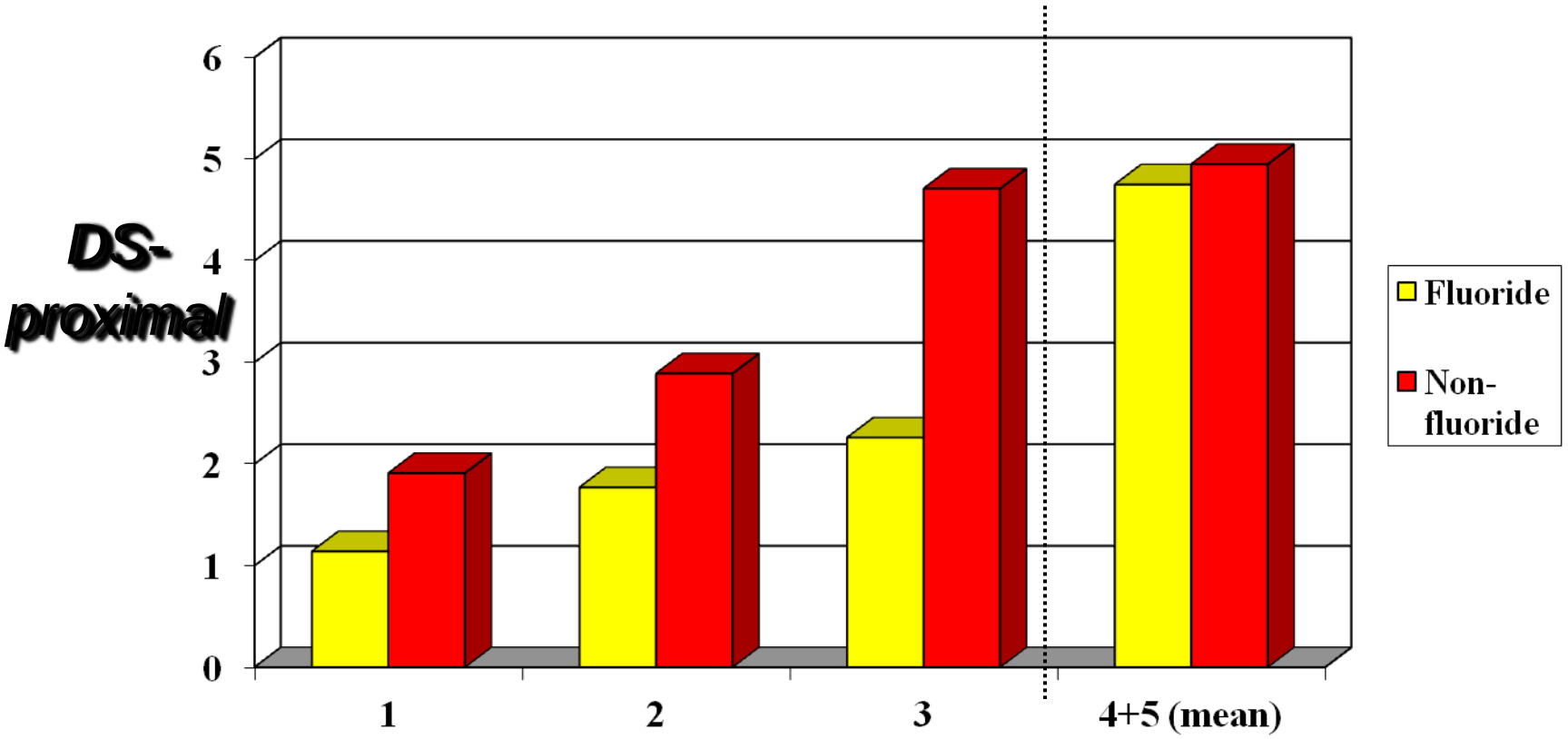
US$1 spent on promoting the use of fluoride toothpaste in Nepal = savings of **US$87–US$356** in treatment costs.

Size of the global toothpaste market in 2016: **US$14bn**

From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

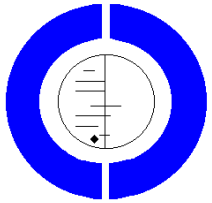
Non-Fluoride Dentifrices

Caries increment in proximal tooth surfaces during the five-year test period



(Koch G. Caries Research, 1970)

Fluoridated Toothpaste



Cochrane review

- 74 clinical studies on children and adolescents reviewed
- Effective on permanent & deciduous dentition
- 24% caries reduction, independent of water fluoridation
- Effectiveness increases with higher F concentration, higher baseline caries

Marinho et al., 2003

Factors to Consider in Fluoride Toothpaste Efficacy

- Concentration of F
- Frequency of use
- Supervision
- Rinsing habit
- Bio-availability of F
- Storage

Concentration of Fluoride

Effectiveness increases with stronger concentration of fluoride

- An increase in fluoride of around 500 ppm F in toothpastes containing 1000-2500 ppm F brings an additional 6% reduction in caries

Stephen, 1988; O'Mullane, 1997

- An 8% increase in the preventive fraction per 1000 ppm F concentration

Marinho et al., 2003

Low Concentration F Toothpaste

- 250 ppm F toothpaste less effective than 1000 ppm F toothpaste

  Ammari, Bloch-Zupan , Ashley, 2003

- 500 ppm F toothpaste was less effective than 1000 ppm F toothpaste in controlling the progression of active lesions

  Lima et al., 2008

Brushing Frequency

Greater effectiveness with more frequent application

- Brushing twice a day or more with a fluoride toothpaste confers greater caries reductions than brushing once a day or less

Chesters 1992; O'Mullane 1997; Chestnutt 1998; Ashley 1999

- 14% increase in the prevented fraction

Marinho et al, 2003

Effect of Supervision

More effective with supervision:

- 11% lower estimate of treatment effect found in trials where the use of fluoride was unsupervised

Marinho et al, 2003

Effect of Rinsing After Brushing

"Subjects using beakers had consistently higher (caries) increments than non-beaker rinsers"

Chesters et al. Caries Res 1992;4:299-304

Fluoride Compounds

- Stannous fluoride - antimicrobial; may stain enamel and anterior restorations
- Amine fluoride – antimicrobial
- Sodium fluoride
- Sodium monofluorophospate (SMFP)

Effect of Fluoride Compounds

Comparative efficacy of sodium fluoride and sodium monofluorophosphate

- Two meta-analyses report 7% greater reduction in caries increment with the use of sodium fluoride
- Little clinical significance between them

Johnson 1993; Stamm 1995

However, Marinho et al. 2003 found no difference in efficacy of different compounds.

Bioavailable F and Effectiveness

Toothpaste must contain fluoride in bio-available form or free available ionized form.

Ericsson (1961) showed with radioactive F^{18} that fluoride was bound to abrasives in the toothpaste and was therefore not bio-available for action in the mouth.

Bio available F and Effectiveness (continued)

NaF cannot be used in toothpaste together with soluble Ca compounds

NaF is soluble and free F will bind to free Ca to form calciumfluoride

Calciumfluoride is insoluble and can therefore not adhere to the surfaces and bacterial bio-film in the mouth

Bioavailable F and Effectiveness (continued)

Sodium monofluorophosphate (SMFP) can be used together with soluble calcium compounds.

The phosphate fluoride (PO4)2F is stable, and hence F will not bind to free calcium in the toothpaste.

The phosphate fluoride (PO4)2F is dissociated in the mouth by enzyme phosphatase in saliva so F is freely available to be effective.

Bioavailable F and Effectiveness (continued)

Since SMFP can be combined with soluble Ca compounds as abrasives, SMFP might be produced for a lower cost than NaF toothpaste

The disadvantage is that the FP group will dissociate over time, making free F available to bind to free calcium

Effect of Storage

F toothpaste stored at ambient temp (mean = 28.9°C) vs air conditioning (mean = 26.3°C) over one year in Brazil

- Silica based NaF and SMFP dentrifices were stable at both storage temperatures

- Calcium carbonate based containing SMFP showed decrease in free available F stored at ambient temperatures
  - Up to 40% loss

Conde, Rebelo, Cury, 2003

Original Paper

Caries Research

Caries Res 2005;39:224–230
DOI: 10.1159/000084802

Received: December 22, 2003
Accepted after revision: July 15, 2004

Total and Free Fluoride in Toothpastes from Some Non-Established Market Economy Countries

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[a]Department of Cariology, Endodontology, Pedodontology of the Academic Centre for Dentistry Amsterdam (ACTA), Amsterdam, and [b]WHO Collaborating Centre for Oral Health Care Planning and Future Scenarios, Nijmegen, The Netherlands

Product name	Company	F concentration (ppm) found in the analysis	
		Total F	Free ionized F
Delident	Charmanuel Level Ltd. India	1000	92
Colgate	Colgate, Egypt	1499	617
Liang Mian Zhen,	Lian Mian, China	844	109
Yongnan	Yongnan, China	1301	263

Toothpaste Shelf Life

70% of the fluoride should be bio-available before the end of the expiry date

Expiry date is 2 years after production

ISO Standard for toothpaste only recommends testing for total fluoride and not testing for bio-available F; and no minimum F concentration for a toothpaste to be classified as a F toothpaste.

Making fluoride toothpastes affordable

WHO Technical Report Series

846

FLUORIDES AND ORAL HEALTH

"Every effort must be made to develop affordable fluoride toothpastes for general use in developing countries".

WHO Expert Group 1994

What is an affordable fluoride toothpaste?

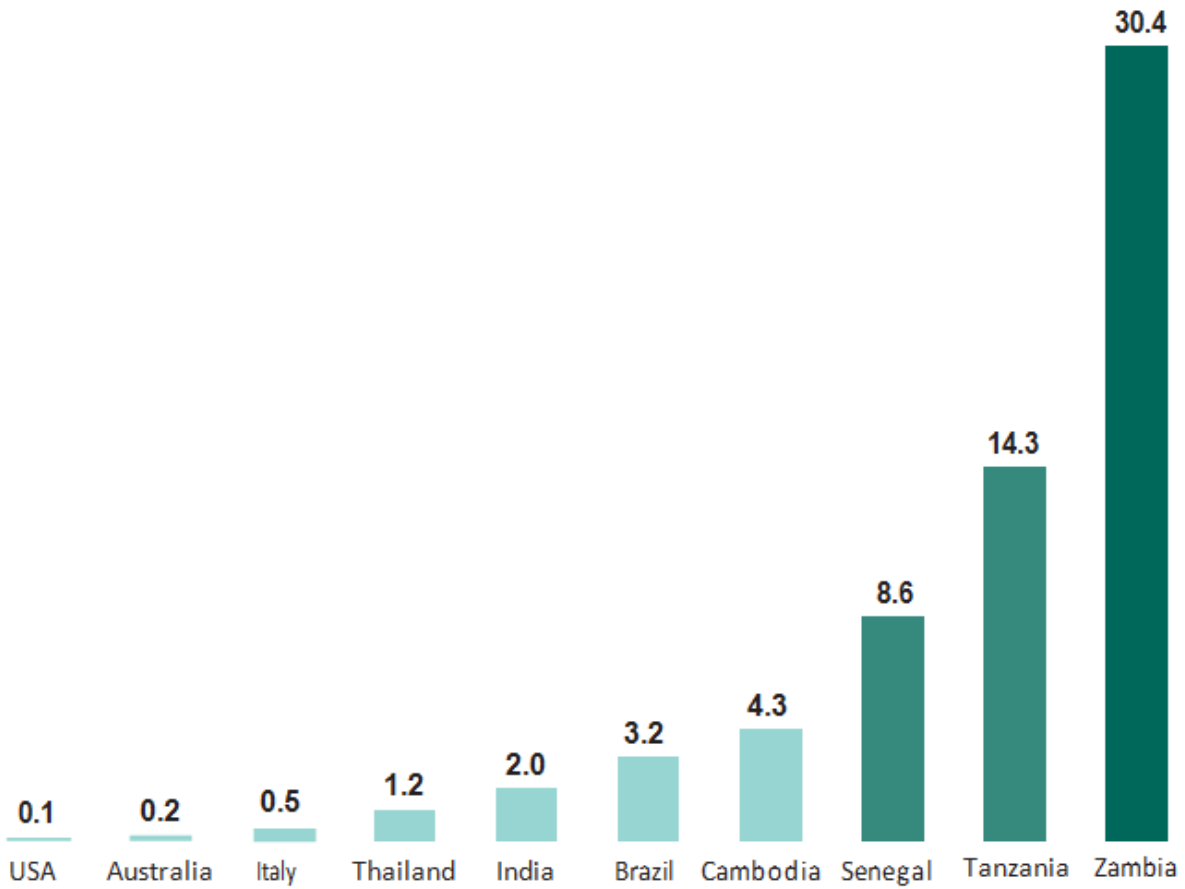
"One that is available at a price that allows people on low income to purchase it"

Jones S, Burt BA, Petersen PE, Lennon MA.
The effective use of fluorides in public health.
Bulletin World Health Organ 2005; 83 (9): 670-676.

AFFORDABILITY OF FLUORIDE TOOTHPASTE

Days of household expenditure by the poorest 10% of the population needed to buy a year's supply of the cheapest fluoride toothpaste per person

2006



From *The Challenge of Oral Disease – A call for global action* by FDI World Dental Federation.

Making Fluoride Toothpastes Affordable

Using toothpaste economically

"Research on methods of controlling the amount of toothpaste placed on the brush (for example, by restricting the size of the tube orifice and the size of the brush) should be encouraged."

Fluorides and Oral Health ***WHO Expert Group 1994***


13 2 2003

Drop technique


USA

Affordability

- Global inequities exist in the affordability of fluoride toothpaste and can be made more affordable by:
  - Removal of taxation
  - Local production
  - Packaging
  - Efficient usage

Fluoride Toothpaste Use in Children

- Tooth cleaning routinely right after the first primary tooth eruption
- Toothbrushing with <u>smear amount of fluoride toothpaste</u>, <u>once daily</u> <u>after 6 month old</u>

- 2-6 yr old use <u>pea size</u> of children fluoride toothpaste twice daily

Millennium Development Goals

Poor Health Status of Indonesian Children

- 90% of all children suffer from tooth decay
- 60% of all children suffer from intestinal worms
- 18% of all children are malnourished

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Oral Health Problem

- Tooth decay is the main reason for absenteeism from elementary school in West Java (61%)
- Concerning oral disease Indonesian school children rank in the top 10 countries in the world

Percentage of households/people with access to clean water and sanitation

44.2 % of the population of West Java lack access to clean water
45.8 % lack access to Appropriate Sanitation

Infectious Diseases

- Diarrhea and upper respiratory infections are leading causes of death for children in West Java

Intestinal Worm Infection

- Millions of Indonesians are infected in West Java
- The body of an infected person cannot absorb food properly which leads to malnutrition
- Pre-school and elementary students are the most vulnerable members of the population

Portrait of Sanitation in the Community

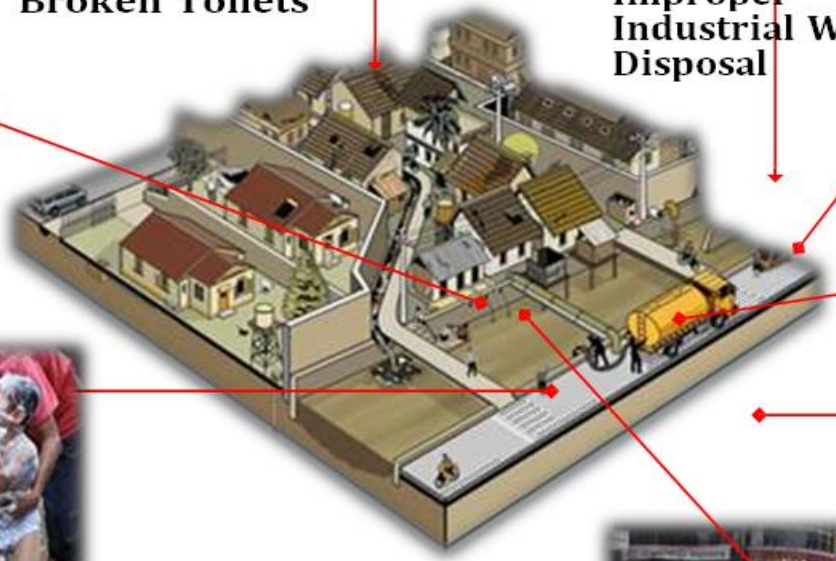
Blocked Sewers

Broken Toilets

Improper Industrial Waste Disposal

Open Defecation

Improper Toilet Construction



Washing and Bathing in Polluted Waters

Improper Waste Disposal

Improper Sewage Disposal

Focus on Schools

- The place where children, parents and the community gather
- Children spend most of their time in schools
- The ideal place to institutionalize behavioral change and to institute preventive programs

Use of School Structure

- Teachers serve as role models to children
- Existing school personnel can be trained to implement and monitor existing health programs
- Schools provide quality manpower to ensure proper implementation

Healthy Hygienic Habits

- Daily tooth brushing with fluoride toothpaste
- Daily hand washing with soap
- Twice a year deworming of all children

Caries Prevention with Fluoride
Toothpaste in Children: an Update

- There was strong evidence that daily use of fluoride toothpaste has a significant caries-preventive effect in children compared with placebo (prevented fraction 24%). **The effect was boosted by supervised tooth brushing**, increased brushing frequency to twice daily, and use of a **toothpaste concentration of 1,500 ppm Fluoride**.
- Eur Arch Paediatr Dent, 2009 Sep; 10(3):162-7
- www.ncbi.nlm.nih.gov/pubmed/19772846

Caries-Preventative Effect of Fluoride Toothpaste: a Systematic Review

…that toothpastes with **1.500 ppm of fluoride had a superior preventive effect compared with standard dentifrices with 1.000 ppm F** in the young permanent dentition (PF 9.7%), and

…that higher caries reductions were recorded in studies with **supervised toothbrushing** compared with non-supervised (PF 23.3%).

Acta Odontol Scand. 2003 De;61(6);347-55
http://www.ncbi.nlm.nih.gov/pubmed/14960006

Effect of washing hands with soap on diarrhea risk in the community: a Systematic Review

Handwashing could reduce diarrhea risk by 47%

The risks of severe intestinal infections and of shigellosis were associated with reductions of 48% and 59%, respectively

Lancet Infect Dis 2003 May; 3(5):275-81
http://www.ncbi.nlm.nih.gov/pubmed/12726975

WHO Intestinal Helminth Mass Treatment

- Incidence decrease of 20-50% with mass administration to children 1X per year
- Incidence decrease of 50% or greater with mass administration to children 2X per year

- WHO Expert Committee on Comprehensive School Health Education and Promotion

- http://whqlibdoc.who.int/trs/WHO_TRS_870.pdf

Basis for Intervention

- Evidence-based preventive effect of fluoride exposure on tooth decay
- Effectiveness of proper hand washing with soap in reducing common illnesses
- Safety and efficacy of mass administration of deworming medicine in areas of high prevalence

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Cost of Healthy Hygienic Habits Per Child Per Year

Contents of the Packet:

- 8 toothbrushes
- 4 bars of soap
- 1 bottle 500 ml toothpaste with Fluoride 1,450 ppm

Around
50 Cents

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Creating a School Facility

- Encourages children to develop good and healthy habits
- Paves the way for behavioral change
- Highlights the importance of water and improved sanitation

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Hand Washing and Tooth Brushing Facilities

Faucets or punched pipes for wetting/rinsing

Hand washing and tooth brushing is best done with flowing water

An adequate flow of water is necessary with proper drainage

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09/12/2012 11:00

Role of Partners

- Department of Education
- Provincial Leaders
- Local Government Leaders
- Principal and Teachers'
- Health Personnel
- Parents
- Corporate and Individual Sponsors

Expected Outcomes for Hand Washing, Tooth Brushing and Deworming

- 30 to 40% reduction of diarrhea
- 20 to 30% reduction of respiratory infection
- 50% reduction of worm infections
- 40 to 50% reduction of tooth decay
- Increase of school attendance and improvement in academic performance

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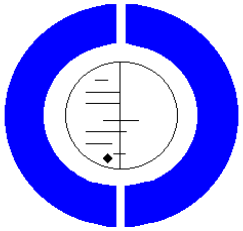
Flouride Rinses

Fluoride mouthrinses for preventing dental caries in children and adolescents

Regular supervised use of fluoride mouthrinses by children will reduce their tooth decay, even if they drink fluoridated water and use fluoridated toothpaste.

Fluoride mouthrinses for preventing dental caries in children and adolescents Valeria CC Marinho[1,*], Julian PT Higgins[2], Stuart Logan[3],
Aubrey Sheiham[4]
Editorial Group: Cochrane Oral Health Group
Published Online: 21 JUL 2003

Fluoridated Toothpaste in Combination with other Topical Fluorides

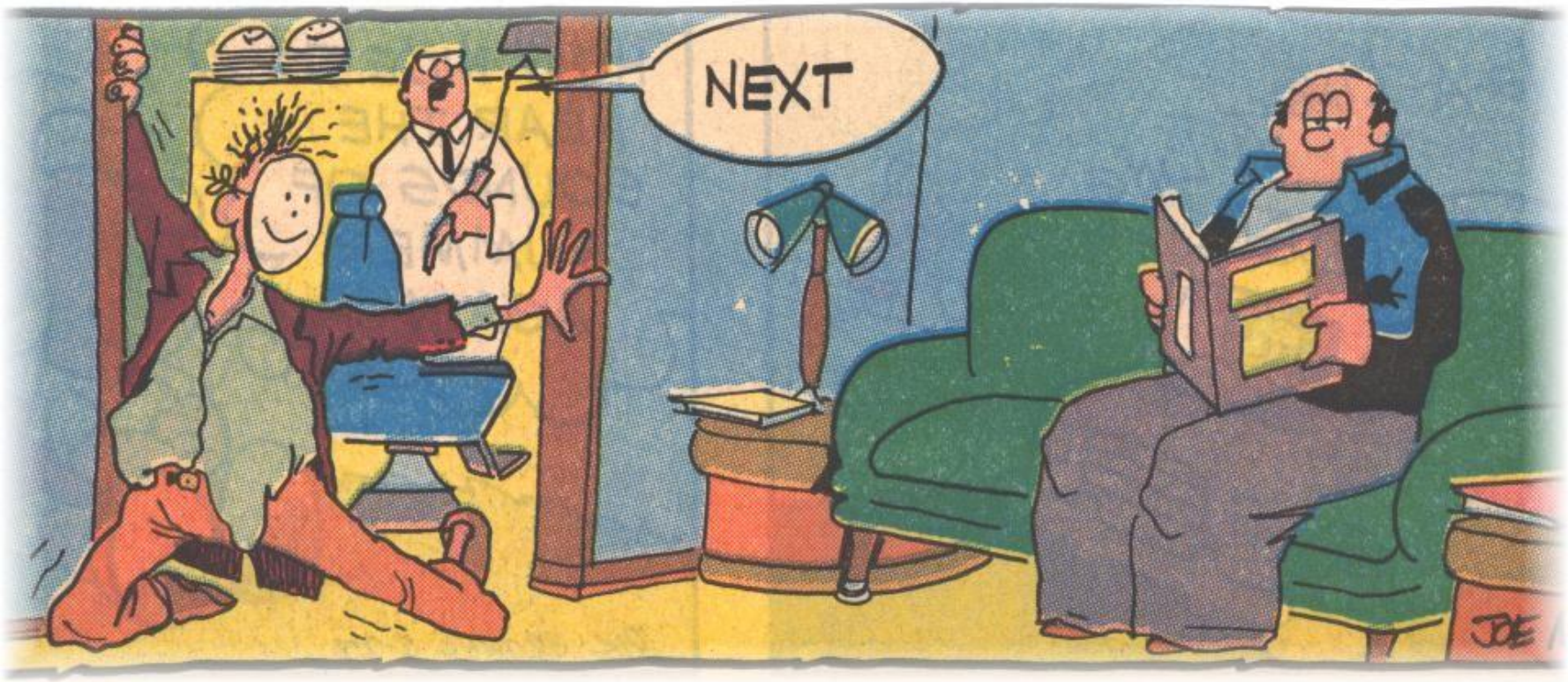


Cochrane review

- 12 studies included for meta-analysis
- Compared with fluoride toothpaste used alone, topical fluorides (mouthrinses, gels, or varnishes) used in addition to fluoride toothpaste reduce caries by 10% on average.
- Most results not significant statistically nor clinically.

Marinho et al., 2004

QUESTIONS?



Preach and Heal – Dr. Charles Fielding

Matthew 9: 35

And Jesus was going about all the cities and the villages, ***teaching*** in their synagogues, and ***proclaiming*** the gospel of the kingdom, and ***healing*** every kind of disease and every kind of sickness.

Ultimate Goal = Bringing the Gospel of the Kingdom of Jesus Christ

When someone is suffering from pain they are not at all interested in hearing what we have to say about spiritual things.

Eliminate their physical pain and they are often very open to spiritual discussions….

Treat only physical problems and they may feel better now but still have no hope for eternity