

European Association of Dental
Public Health
Constanta, Romania

Salt Fluoridation in the Region of the
Americas

Prof. Ramon J. Baez, DDS, MPH, HFADI

2010 September 9

Sincere appreciation

- To the EADPH Organizing Committee and the Borrow Foundation and the WHO GOHP for designating this presentation on Salt Fluoridation in the Region of the Americas as The “Borrow Foundation Lecture” and, for the support to participate in this conference.



The University of Texas Health Science
Center at San Antonio Dental School



World Health Organization
Collaborating Center for Translation of
Oral Health Sciences into Clinical and
Public Health Practice

Why Fluoridate Salt?

- For over 80 years salt has proved a reliable, safe, inexpensive and stable carrier to correct iodine deficiency on a large scale. Iodized salt is available to over 1 billion people and has paved the way for the introduction of fluoridated salt” *Hans Bürgi, 50th anniversary conference on salt fluoridation, October 2005*

Why Fluoridate Salt?

- Salt is consumed by virtually all populations
- Amount consumed is constant (± 10 g/day)
- Overdose is virtually excluded (safe)
- Fluoride addition is inexpensive
- Addition of Fluoride not extremely complicated
- Accessible to small and large processors
- Demonstrated cariostatic efficacy

Why Fluoridate Salt in the Americas?

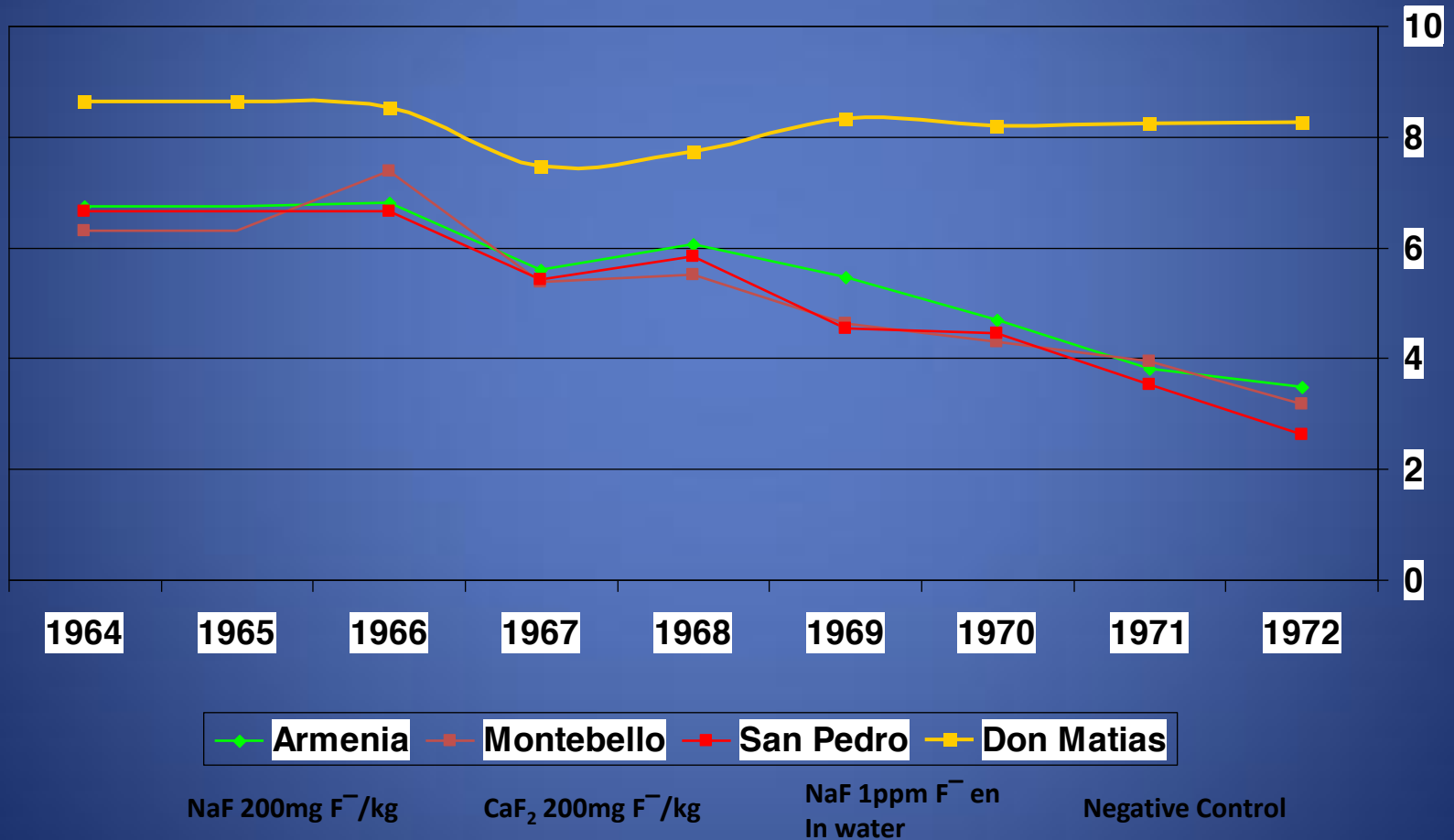
Urban population with piped Water Supply 1949-1960

Year	Cities with over 5,000 population	Total population	With water service	Without water service	Percent without piped water
1949	39	983,000	404,000	579,000	58.9
1960	157	4,371,000	2,832,000	1,989,000	45.5

Pan American Health Organization

Summary of Four-year report on health Conditions in the Americas 1957-1960, July 1962

MEAN DMFT IN CHILDREN 6 TO 14 YEARS IN FOUR COMMUNITIES – COLOMBIA, 1964 TO 1972



Decisive factors

- The high incidence and prevalence of dental caries in most countries
- Difficulty of using other mass preventive methods against dental caries
- Substantiated effectiveness
- Relatively low cost, ease of implementation, sustainability and evaluation.
- Ample coverage to reach urban and rural communities

STATUS OF IMPLEMENTATION BY COUNTRIES IN THE AMERICAS



S·I·M·P·O·S·I·U·M

el uso del **FLUOR** en la
PREVENCION



JULIO 5
de 1996
8 a 18 hs

SALON DE ACTOS DEL M.S.P.
ENTRADA LIBRE

AUSPICIAN:
O.M.S.
O.P.S.

ORGANIZAN:
M.S.P. Y COMISION HONORARIA
NACIONAL DE SALUD BUCAL

COMISION DE
F.O.D.I.
ASOCIACION
DONTOLÓGICA
DEL M.T.S.P.

2010/05/26

Source of salt used and quality

- Most countries utilize sea salt
- Few countries utilize mining rock salt (Bolivia and Colombia although both countries also use sea salt)
- Most countries use refined salt
- At least one country (Uruguay) uses granular salt because of people's preference (a similar situation occurred earlier in France).

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CODEX ALIMENTARIUS

CODEX STANDARD FOR FOOD GRADE SALT
(World-wide Standard)
CODEX STAN 150-1985

FOOD AND AGRICULTURE⁶ ORGANIZATION
OF THE UNITED NATIONS
WORLD HEALTH ORGANIZATION



● El sistema de iodación y fluoración SERRA aditiva la sal de forma homogénea, contribuyendo a la prevención de desórdenes y enfermedades sobrevenidas por falta de yodo y fluor en la dieta alimenticia de la población.

● The SERRA iodation and fluorination system, by means of a steady salt addition, allows the prevention of disorders and diseases triggered by a lack of iodine and fluor in the food diet within the population.

○ Le système d'iodation et de fluoration du sel permet, au moyen d'un rajout d'additifs homogène au sel, la prévention de désordres et maladies survenues dues à un manque d'iode et de fluor dans le régime alimentaire de la population.



2010/05/26



FINA
FLUORADA
YODADA

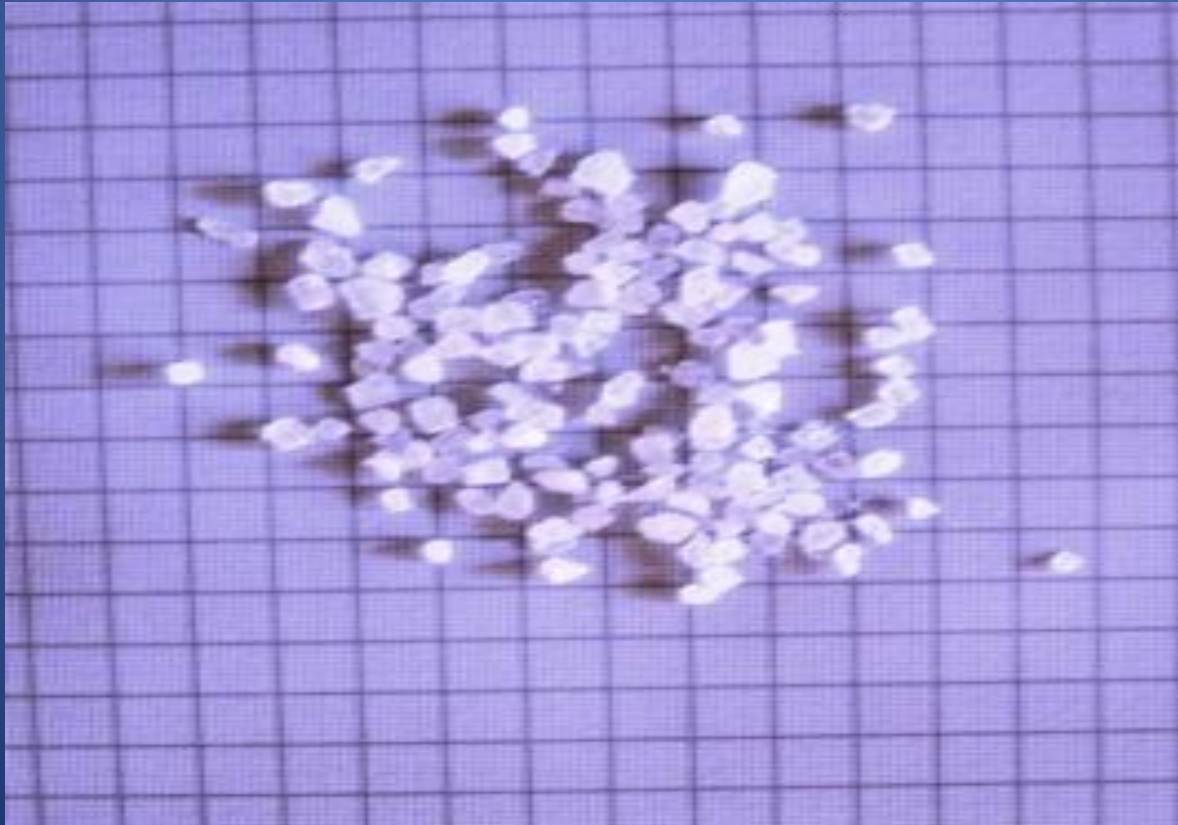
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**GRUESA
FLUORADA
YODADA**

2010/05/26

Coarse salt iodated and fluoridated

- Paper grid size 1mm





2010/05/26

Cooperación de la Industria Salinera

- Desde 1987, el compromiso y la responsabilidad social de la Empresa Salinera Nacional han sido fundamentales para el éxito del PFS Costa Rica.



PARTICIPACIÓN DE LAS EMPRESAS SALINERAS



COONAPROSAL

1. Planta ubicada en Colorado de Abangares, Guanacaste

Brinsa

2. Planta ubicada en Tacaes de Grecia
3. Planta ubicada en Punta Morales Puntarenas



Jamaica



Salt Processing plant [Alkali Ltd]

Caribbean Sea

Tanks for I and F solutions and pumping mechanism

[Alkali limited – Jamaica]



SALT PROCESS

EVAPORATION OF UNDERGROUND BRINE,
SAL DE ISTMO, MEXICO



Concentration of fluoride

- Refined salt
 - Refined fine grain salt in salt shaker (Colombia) 184 mg/Kg
 - Refined fine grain salt SEK (Uruguay) 220 mg/Kg
 - Refined fine grain salt Urusal (Uruguay) 188 mg/Kg
- **Coarse granular salt** Urusal 244 mg/Kg (Uruguay)

Fluoride concentration in salt samples from various countries

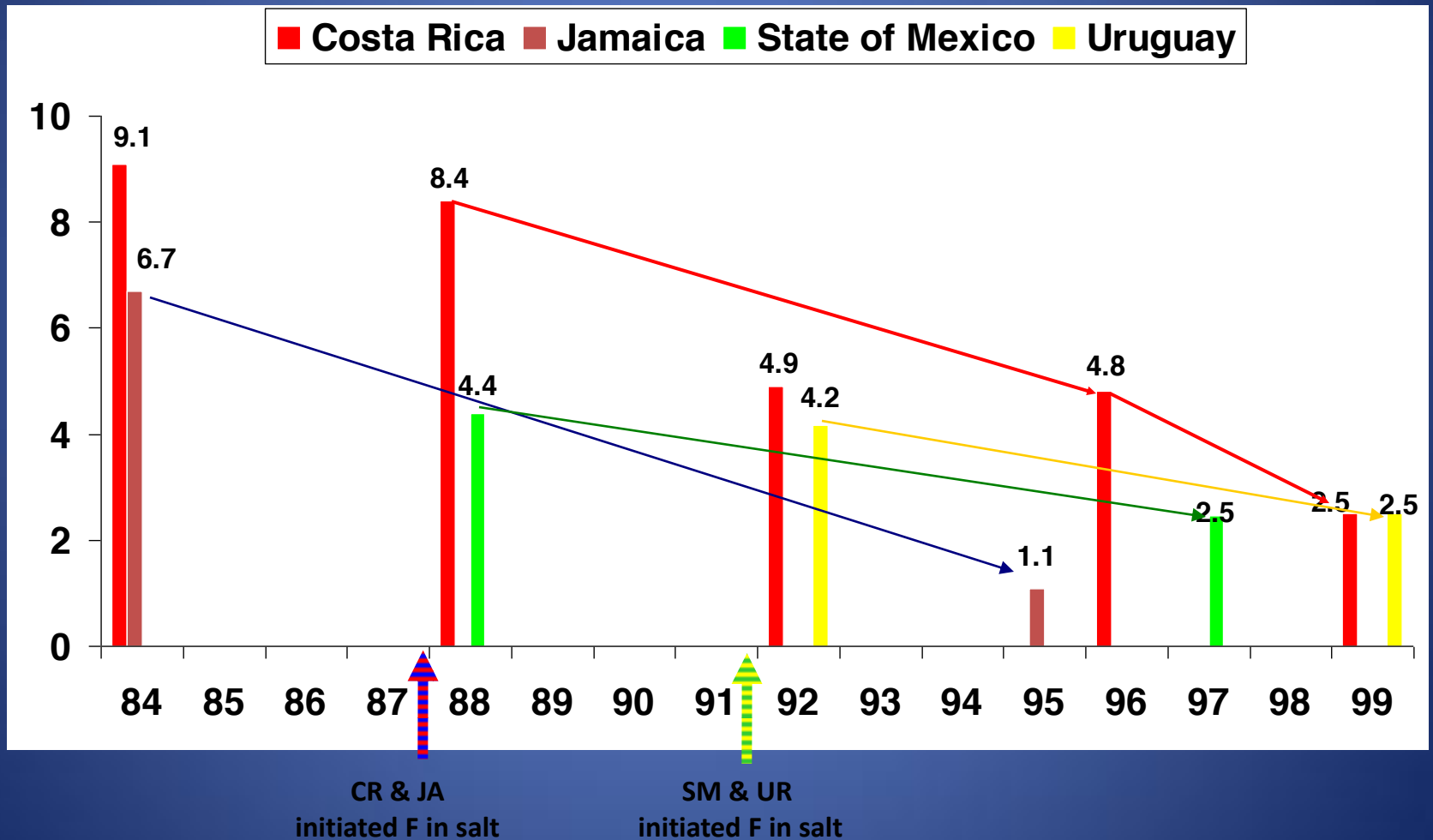
- Sample Colombian salt
500 g pack Obtained in open market in Ecuador
250.8 mg/kg
- Refisal: Colombia in salt shaker purchased in
grocery store in Bogota
260 mg/kg
- Ecuasal: Obtained in open market
180 mg/kg

TYPE OF SALT FLUORIDATED, CARIES REDUCTION AND REGULATION

Country	Caries reduction %	Type of salt	Regulation
Jamaica	84%	All salt fluoridated	Decree/Standard* 1987
Costa Rica	73%	Household use	Decree/standard 1989
Mexico	44%	Household use	Decree/standard 1981
Uruguay	40%	Household use	Decree/standard 1992
Colombia	50%	Household use	Decree/standard 1984

- JS87 2009 All salt iodated and fluoridated; all imported salt must comply; salt used for fabrication of seasoning and spices must comply with the standard.
- Alkali's market share 97%; Colombia and US <3% salt imported.

CHANGE IN THE MEAN NUMBER OF PERMANENT TEETH DECAYED, MISSING, OR FILLED IN 12 YEAR OLD CHILDREN IN COSTA RICA (CR), JAMAICA (JA), STATE OF MEXICO (SM) AND URUGUAY (UR)



STATUS IN OTHER COUNTRIES

- Belize (DMFT (0.65@12-1999) lowest in the Region at baseline)
- Bolivia (First follow up survey scheduled early 2006)
- Cuba (preliminary studies in late 90s, SF in 2000 – 100% coverage)
- Dominican Republic (preliminary studies 1997 no data available)
- Ecuador (initiated in 1997, partial salt fluoridation)
- Grenada (baseline survey 2.71@12-2000 – has not regulated FS)
- Honduras (preliminary studies 1997 [Hurricane destruction])
- Guatemala (preliminary studies)
- Nicaragua (preliminary studies 1997, initiated in 2009 ?)
- Panama reversed regulation to fluoride salt in 2001
- Paraguay (baseline survey 3.89 @12-1999 & 2.79 @12-2008)
- Peru (approved 1989 initiated; current status uncertain)
- Venezuela (2.12@12-1998). Currently experiencing importing difficulties of the F compound



RECOMMENDATIONS FOR THE SURVEILLANCE AND MONITORING OF FLUORIDE PREVENTION PROGRAMS

*PAN AMERICAN HEALTH ORGANIZATION
REGIONAL ORAL HEALTH PROGRAM
March 2001*

Epidemiological surveillance

- Used to determine the need of a public health action and evaluate effectiveness of programs.
- Data is used to:
 - a) Evaluate impact
 - b) Establish priorities
 - c) Identify specific population groups that might be at high risk
 - d) Observe course of illness and planning of programs

Epidemiological Surveillance

- Types of Surveillance systems
 - Active
 - Reaching out to various sources to solicit information
 - Biological indicators, laboratory tests or questionnaires
 - Passive
 - Routine reporting of special health events e.g.,
 - notifiable diseases to authorities by health care institutions and practitioners

Epidemiological Surveillance of Salt Fluoridation Programs

- System for routine reporting of conditions is not mandatory
- Commission may assist on reporting secondary problems of concern
 - reporting availability of fluoride supplements
 - reporting cases of enamel fluorosis

Strict epidemiological surveillance

- Fluoride exposure studies
 - Fluoride in drinking water
 - Fluoride in milk
 - Use of fluoride supplements
 - Use of toothpaste containing fluoride
 - Fluoride in diet
 - Fluoride in dental products
- Quality control of fluoridated salt
 - Internal
 - External
- Distribution network
 - Areas where FS should not be made available
- Periodic evaluation
 - Dentition status
 - Caries and enamel fluorosis

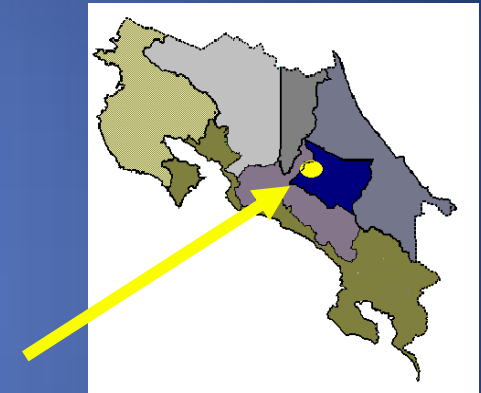
National Commission of salt fluoridation

- Government agencies
 - Ministry of Health - Oral Health programme and other agencies in charge of Health and Welfare programmes
 - Department of Trade (import & export div.)
 - Standardization agency
 - Ministry of Education
- NGOs
 - Health professions: Organized Dentistry, Academia, Medicine, Pharmacy, Nutrition, Social Sciences, Water Works, etc.
 - Salt industry
 - Processing plants and Distributors
 - Organizations interested in the welfare of children and elderly, i.e. UNICEF, Foundations, Rotary, AID, Lions, banks, etc.
 - Other interested parties, Iodization programme
 - Media: TV, Radio, Newspaper

Sub programa de vig. en zona con flúor natural en el agua

Divulgación masiva
VALLAS DE CARRETERA

Noroeste de la
Provincia de
Cartago CR



INGREDIENTS:
SALT, POTASSIUM IODIDE,
YELLOW PRUSSIAN OF SODA

SAL REFINADA, YODADA Y
FLUORIZADA PARA CONSUMO
HUMANO. NO SE PEGA

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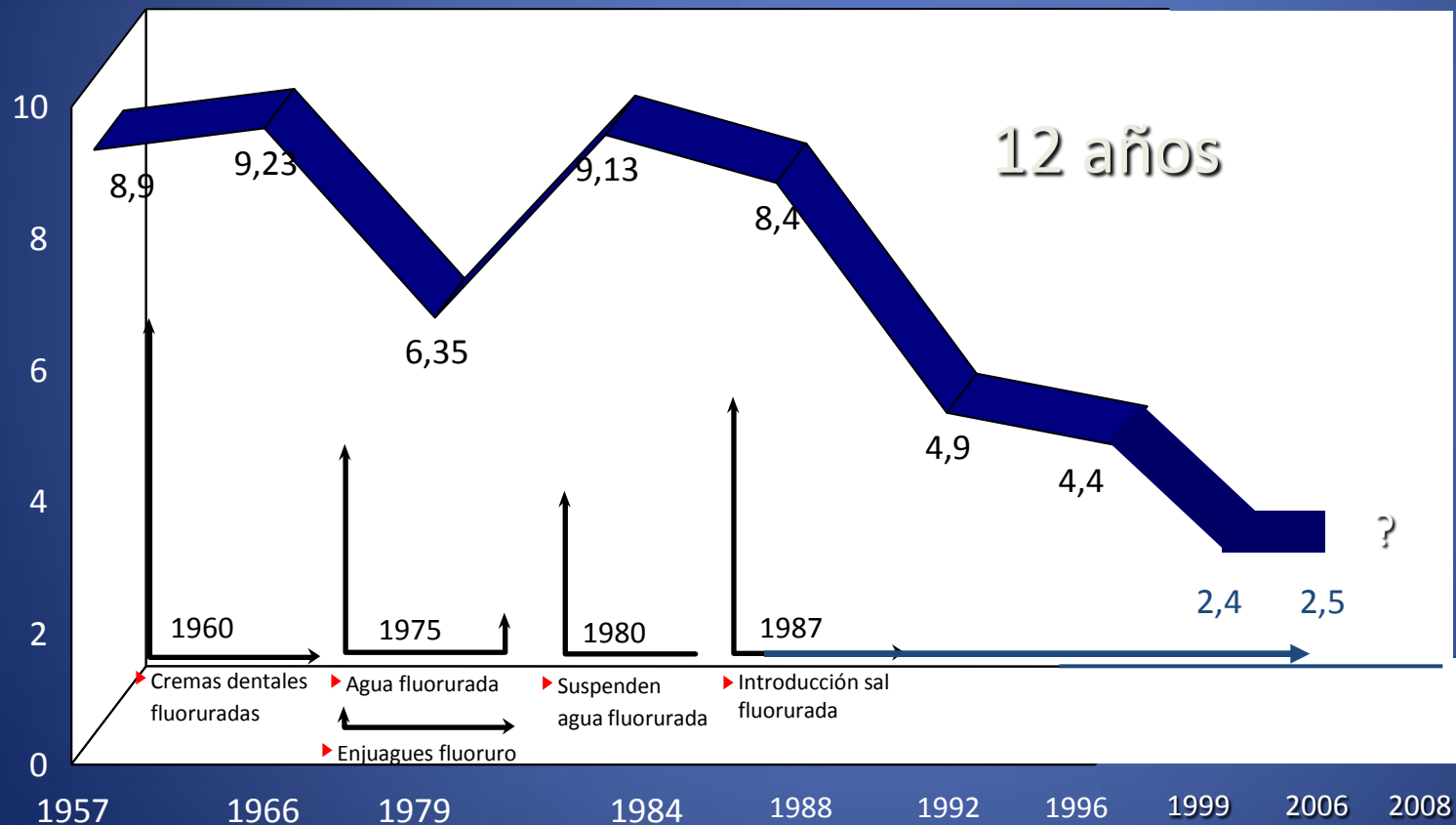


THIS SALT

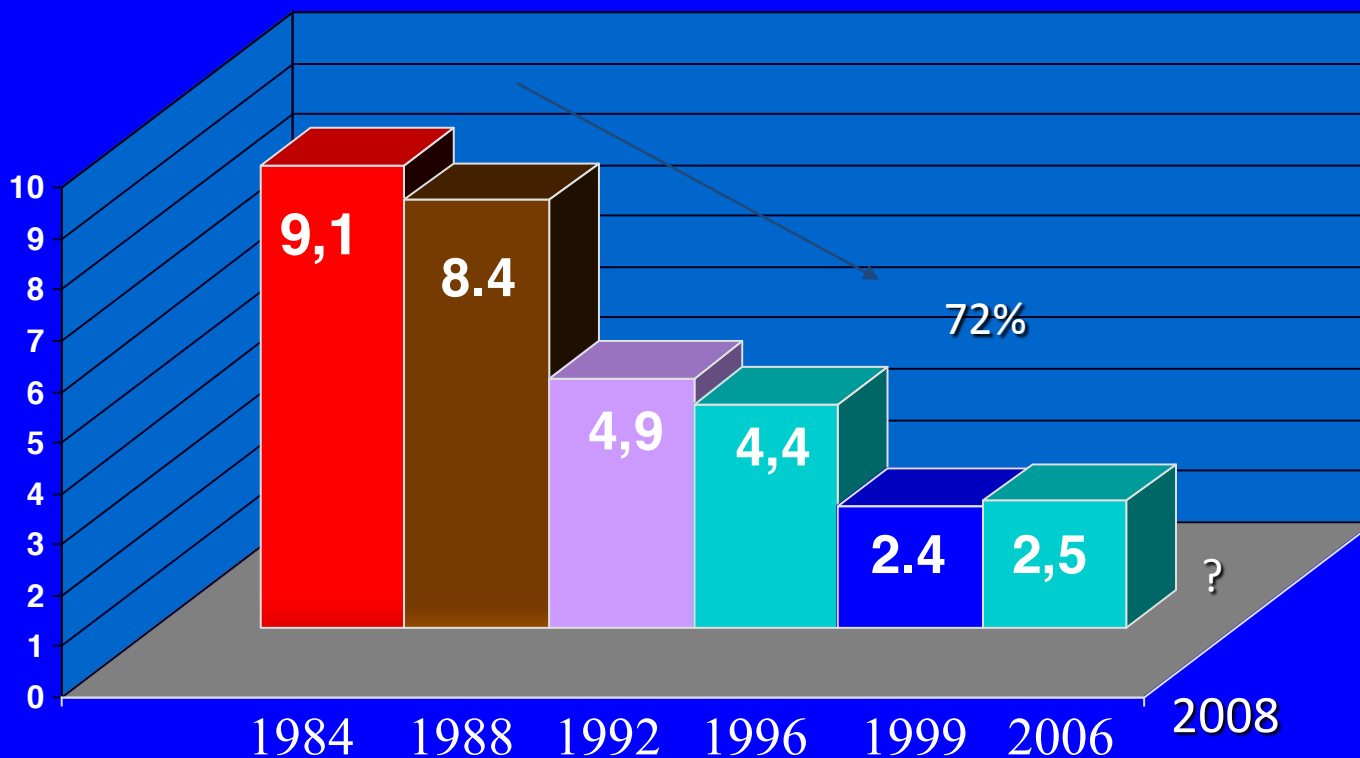
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CPOD EN NIÑOS ESCOLARES COSTA RICA, 1957-2006



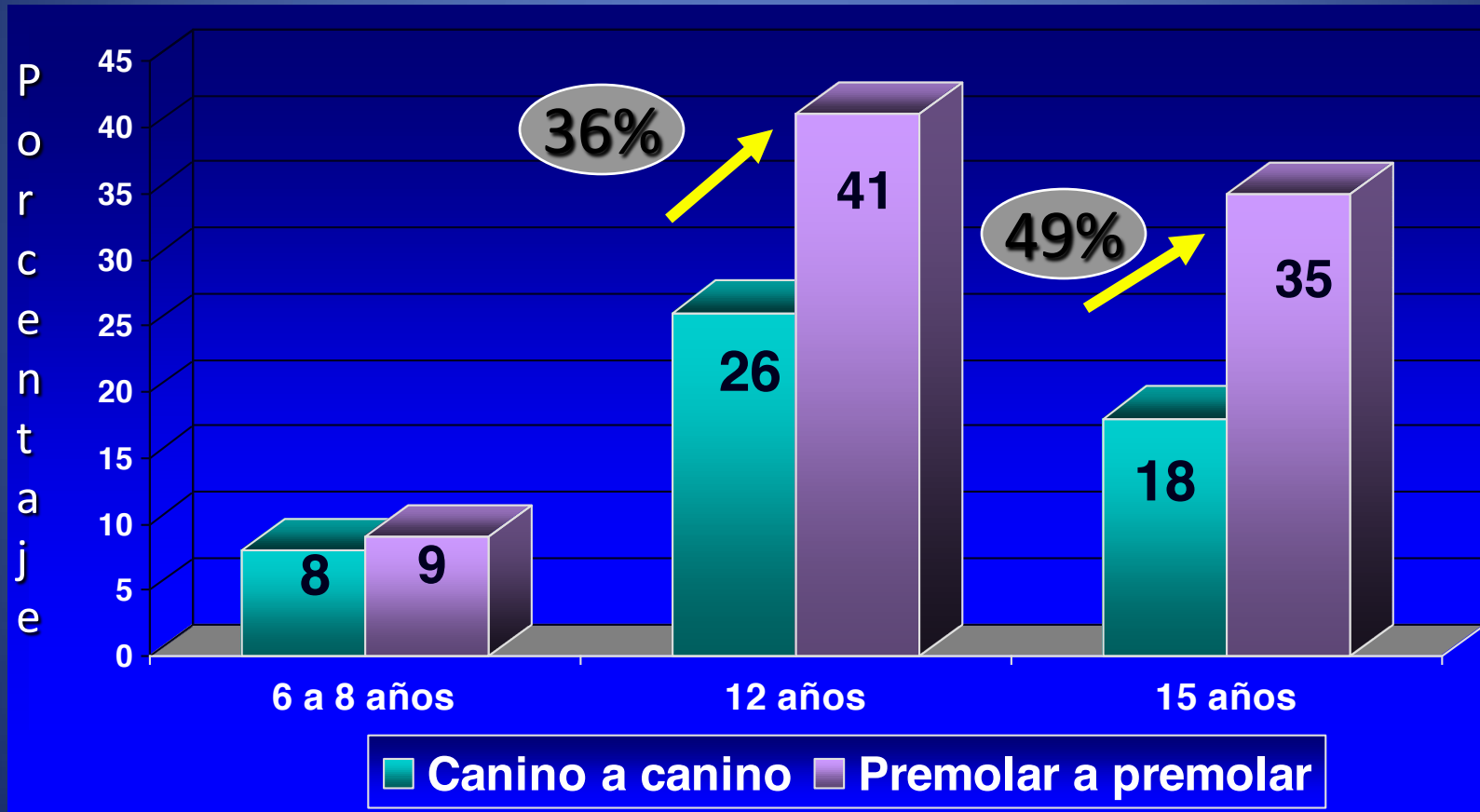
INDICE CPOD DE LA CARIES DENTAL EN ESCOLARES DE 12 AÑOS,
COSTA RICA
1984-2006



Fuente: MinSalud, 1985; Salas M.T, 1991-1994. Salas MT, 1996, ENN 1996; EN de Salud Oral, 1999; UCR, 2006

Prevalence of enamel fluorosis using Dean's criteria in three age groups

ENCUESTA NACIONAL DE SALUD ORAL, COSTA RICA 1999



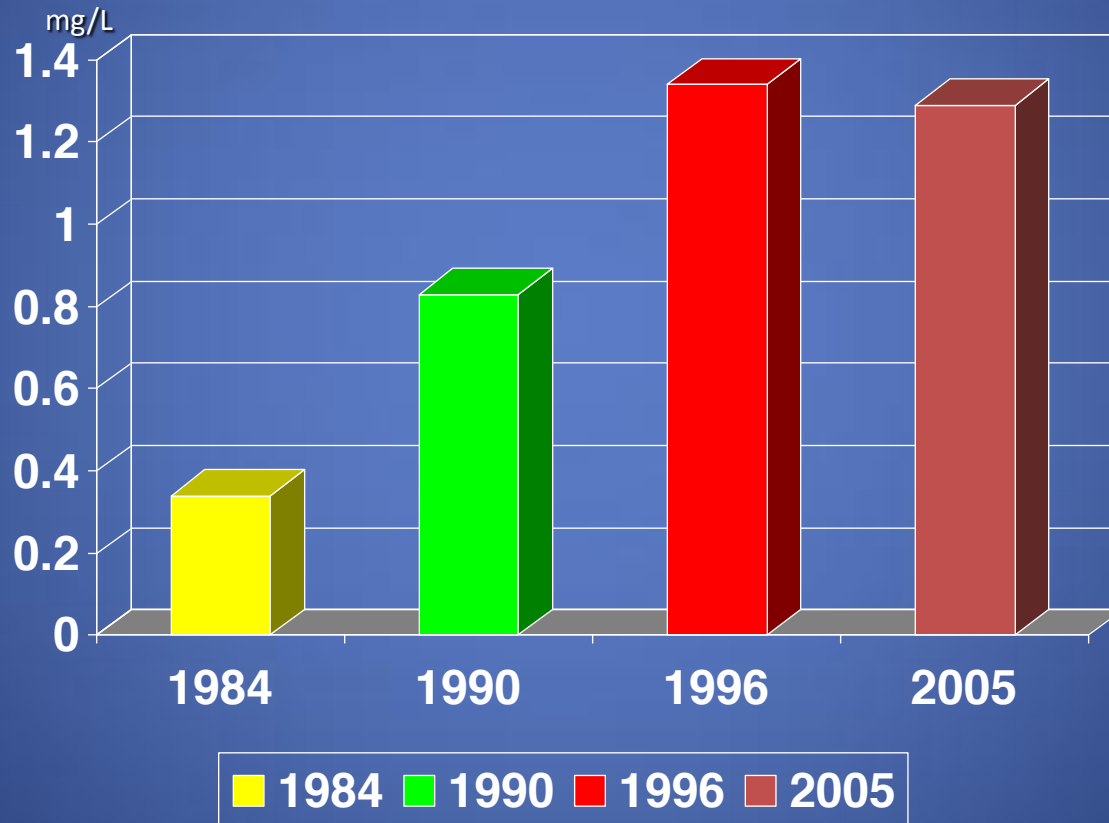
Doña Ana and El Paso Counties - 2001-2002

Enamel Fluorosis - Distribution of Scores by Severity by County

County	No. Children	Normal	Questionable	Very Mild	Mild	Moderate	Not Recorded (Unerupted)	CFI*
	N	0	1	2	3	4	9	
Dona Ana	80	5	23	13	9	3	27	0.64
El Paso	151	28	18	15	6		84	0.24
Total	231	33	41	28	15	3	111	

***Modified Dean's Community Index of Fluorosis: 0.6 or more begins to constitute a public health problem**

FLUORURIA EN ESCOLARES COSTA RICA, 1984-2005



Jamaica 21 years	Excretion, µgF/24h			Nocturnal excretion, µgF/h		
after Salt Fluoridation	Lower		Upper	Lower		Upper
Standards, age 3–5 years						
Low F intake	170		290	6		10
Optimal F usage	360		480	12		17
Present study, age 2–6 years						
Urban		220 to 332			7.25 to 10.54	
Rural		279 to 385			6.40 to 9.54	
Standards, age 6–7 years						
Low F intake	190		310	7		11
Optimal F usage	480		600	15		22
Fluoride concentration (ppm)						
Standards, all ages						
Low F intake	0.2		0.5	0.2		0.4
Optimal F usage	0.9		1.2	0.7		0.9
Urban		1.02 to 1.55			1.07 to 1.54	
Rural		0.94 to 1.30			1.07 to 1.46	
Confidence limits of present results (separately for urban and rural children) compared to WHO Provisional Standards (Lower and Upper) for urinary fluoride excretion and concentration under Low or Optimal fluoride usage (Schweiz Monatsschr Zahnmed Vol. 120 1/2010)						

Salt Fluoridation in the Americas

- Successful
 - Effective, Safe and Economic
 - Countries with adequate planning
 - Proper technology
 - Epidemiological surveillance
 - Internal and external quality control

Salt Fluoridation in the Americas

- Uncertain results
 - Countries with inadequate planning
 - Insufficient coordination among key organizations
 - Absence of studies on caries severity and Fluoride exposure
 - Operational difficulties
 - Inadequate technology
 - Difficulties in acquisition of Fluoride
 - Deficient or non-existent community education efforts
- Absence or inadequate epidemiological surveillance
 - Population covered including distribution networks
 - Follow up surveys on caries and fluoride exposure

Is the total caries reduction due to salt fluoridation?

- Children had been exposed to various levels of fluoride in water and most below optimal concentration to have a cariostatic effect.
- Fluoridated milk has only been available in two countries Chile and more recently in Peru in areas without salt fluoridation
- Toothpaste containing fluoride (1000-1500 mg/l) had been available in the countries for several years prior to salt fluoridation
- Use of fluoride supplements and fluoride rinses had been very limited
- The analysis of types of diet, use of fluoride toothpaste and dietary fluoride supplements, and access to dental health promotion and preventive and curative services do not contribute, to a large degree, to the reductions reported
- Most of the reduction in dental caries children could be attributed to the introduction of fluoridated salt for human ingestion.



Sunset in Boerne, Texas