Universidade de São Paulo
Faculdade de Saúde Pública
Departamento de Prática de Saúde Pública

Disciplina HSP 286
Uso de fluoretos em Saúde Pública

AULA 1 - *Fluoretos na natureza*

Docentes Responsáveis: *Paulo Capel Narvai e Paulo Frazão*

- Características químicas
- Principais fontes
- Distribuição na água

Tabela Periódica dos Elementos

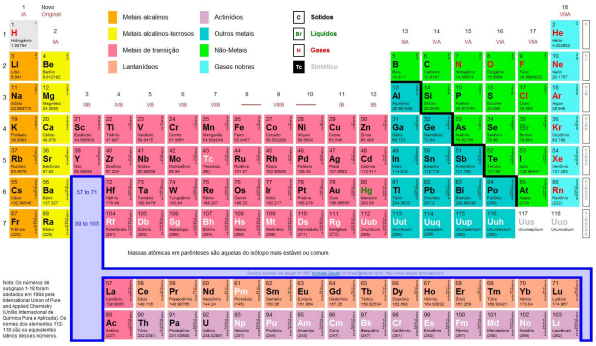
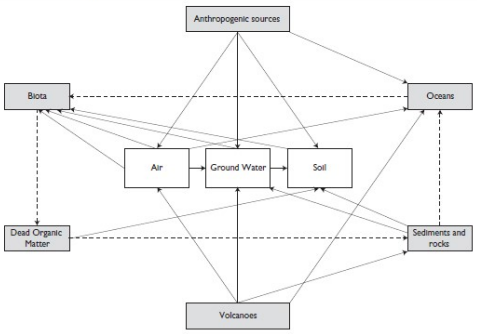
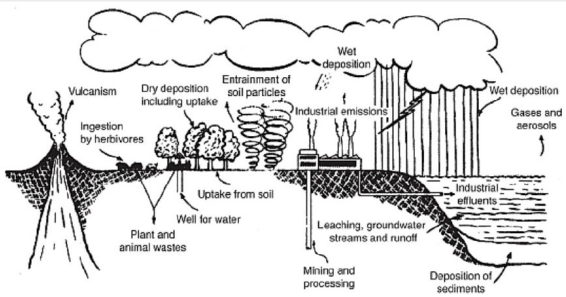


Figure 1 Environmental and anthropogenic sources of fluoride and their interaction with the environment

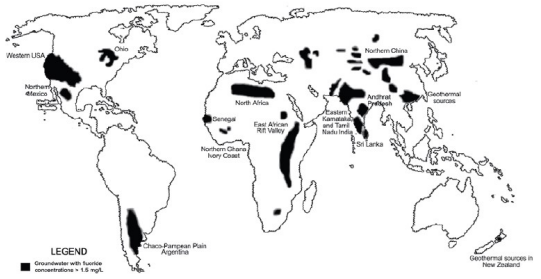


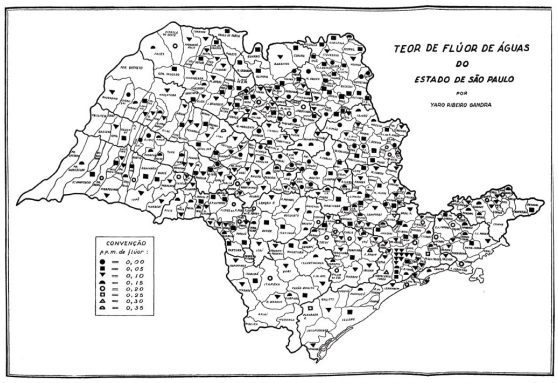


Trajetórias do fluoreto no ambiente

Fonte: Nanni 2006

Figure 2 Geographical areas with high natural fluoride levels





GANDRA, Y. R. — TEOR DE FLÚOR DE ÁGUAS DO E. DE S. PAULO
ARQ. FAC. HIG. S. PÚB. UNIV. SÃO PAULO, 4 (2) 1950

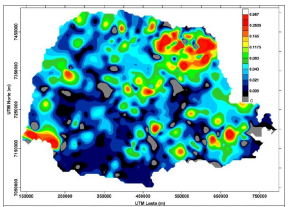


Figura 12 – Mapa geoquímico do F⁻ (mg/L) em amostras de águas fluviais de 696 bacias hidrográficas.

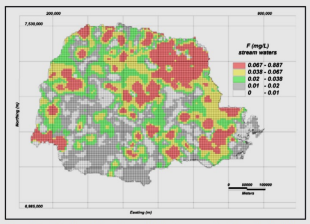
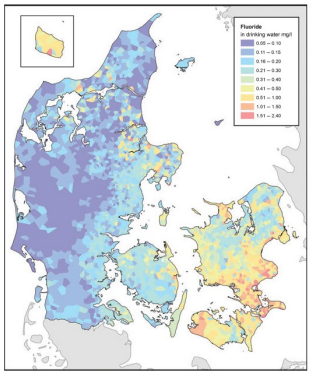


Figure 5 – Geochemical surface of F- in stream water. Case I - dental fluorosis occurs mainly in the northern region (highest peaks)

Fonte: Licht, Morita e Tarvainen, 1996

Fonte: Licht 2005

Fig. 2. Map of Denmark showing the fluoride concentration in drinking water ('Thiessen map'). The island of Bornholm is located in the Baltic Sea, but is shown in the upper left corner of the map.



Fonte: Kirkeskov L et al. Community Dent Oral Epidemiol 2010; 38: 206–212

Natural fluoride levels
from public water supplies in Piauí State, Brazil

Concentração de flúor ***in natura***
em águas de abastecimento público no Piauí, Brasil

Josiene Saibrosa da Silva [I]
Wallesk Gomes Moreno [II]
Franklin Delano Soares Forte [I]
Fábio Correia Sampaio [I]

Table 1. Number of cities according to the natural fluoride levels in the drinking water and estimated population exposed.

Fluoride levels (mg/L)	Cities		Urban population*	
	N	%	n	%
0.01 a 0.30	151	92.0	1,594,269	96.3
0.31 a 0.59	13	8.0	60,267	3.7
Above 0.60	-	-	-	-
Total	164	100.0	1,654,536	100.0

* Source: IBGE, 2000[16].

Fonte: Silva et al. 2009

Table 2. List of cities and estimated population exposed to natural fluoride concentration in the drinking water above 0.30 mg/L.

City	Samples (n)	Mean (SD) Fluoride (mg/L)	Source*	Estimated population **
Angical do Piauí	2	0.47 (0.14)	NA	5,065
Curral Novo do Piauí	2	0.46 (0.00)	W	1,050
Dom Inocêncio	2	0.42 (0.02)	W	856
Francisco Macedo	2	0.50 (0.08)	NA	639
Ipiranga do Piauí	2	0.39 (0.04)	NA	4,923
Jacobina do Piauí	2	0.56 (0.00)	NA	851
Jatobá do Piauí	2	0.36 (0.11)	NA	657
Luzilândia	2	0.42 (0.00)	NA	13,453
Miguel Alves	2	0.46 (0.00)	W	9,609
Miguel Leão	2	0.36 (0.05)	NA	749
Pio IX	2	0.49 (0.12)	NA	4,278
São Braz do PI	2	0.37 (0.04)	L	935
São Raimundo Nonato	2	0.43 (0.08)	NA	17,202
Total		-	-	80,438

* W = well, L = lake; NA= not available
** Estimated population based on IBGE records for the year 2000[16].

Fonte: Silva et al. 2009

Global Public Health, February 2006; 1(1): 31–48

Routledge
Taylor & Francis Group

Beyond the Millennium Development Goals: Public health challenges in water and sanitation

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água

Mortalidade por diarréia

saneamento

prevenção de doenças

6,5 bi – população global
1,1 bi - sem acesso regular a água (17%)
68% em 10 países

2,6 bi - sem acesso a saneamento (40%)
76,8% em 10 países

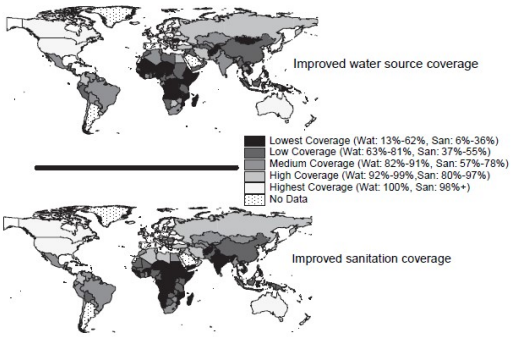


Figure 1. Quintile distribution of water and sanitation coverage (UNICEF 2004).

Table I. Countries with the largest populations lacking access to an improved water source and improved sanitation (UNICEF, 2004).

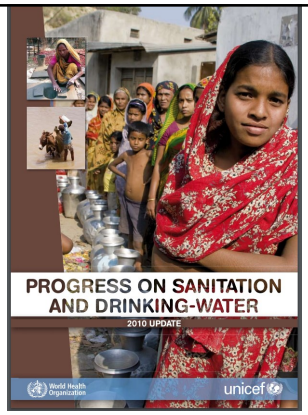
Water*		Sanitation**	
Country	Population lacking access to improved water source	Country	Population lacking access to improved sanitation
China	298 million	India	735 million
India	147 million	China	725 million
Ethiopia	54 million	Indonesia	104 million
Nigeria	48 million	Nigeria	75 million
Indonesia	48 million	Bangladesh	75 million
Bangladesh	36 million	Pakistan	69 million
Dem. Rep of Congo	28 million	Ethiopia	65 million
Vietnam	22 million	Vietnam	47 million
Afghanistan	20 million	Brazil	44 million
Brazil	19 million	Dem Rep. of Congo	36 million
Total	720 million	Total	1.98 billion
% of Total*	67.8%	% of Total**	76.8%

* Based on available data from 174 countries, total population lacking access: 1.06 billion.
** Based on available data from 165 countries, total population lacking access: 2.57 billion.

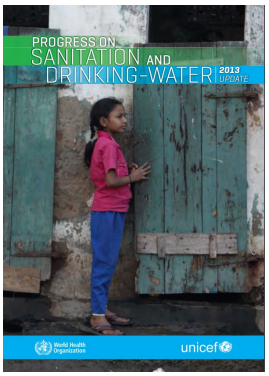
Table II. Countries with slow to moderate progress in achieving MDG targets in water and sanitation (adapted from UN Millennium Task Force 2005).

	Water supply		Sanitation	
	Low access, slow progress	Moderate access and progress	Low access, slow progress	Moderate access and progress
Countries	Ethiopia Guinea Haiti Libya Madagascar Mauritania Oman Papua New Guinea Togo	CAR China Cote d'Ivoire Malawi Namibia Niger Nigeria Philippines South Africa Uganda	Benin CAR Dominican Republic Ethiopia Guinea Haiti Madagascar Mali Niger Sudan Togo Yemen	Botswana Brazil Burundi Cameroon Chad China Cote d'Ivoire India Indonesia Malawi Namibia Nepal Pakistan Papua New Guinea South Africa Zimbabwe
% of world's population under 5 years old*	3.4%	23.8%	5.7%	48.4%
% of total child deaths attributable to diarrhoea**	7.2%	21.0%	12.2%	44.9%

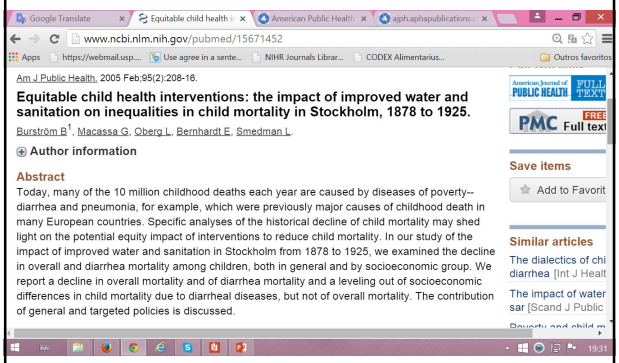
* UN 2004.
** Parashar et al. 2003 UNICEF, 2005.



https://www.unicef.org/eapro/JMP-2010Final.pdf



http://apps.who.int/iris/bitstream/handle/10665/81245/9789241505390_eng.pdf;jsessionid=1314AD297CDA57CB27F8A728981C616F?sequence=1



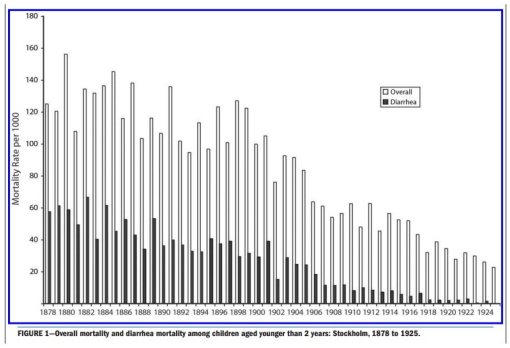


FIGURE 1—Overall mortality and diarrhea mortality among children aged younger than 2 years: Stockholm, 1878 to 1925.

Burstrom, B., Macassa, G., Oberg, L., Bernhardt, E. and Smedman, L. (2005) Equitable Child Health Interventions: The Impact of Improved Water and Sanitation on Inequalities in Child Mortality in Stockholm, 1878 to 1925. American Journal of Public Health, 95, 208-215.

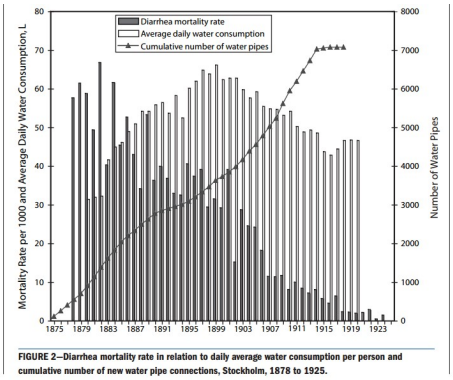


FIGURE 2—Diarrhea mortality rate in relation to daily average water consumption per person and cumulative number of new water pipe connections, Stockholm, 1878 to 1925.

Burstrom, B., Macassa, G., Oberg, L., Bernhardt, E. and Smedman, L. (2005) Equitable Child Health Interventions: The Impact of Improved Water and Sanitation on Inequalities in Child Mortality in Stockholm, 1878 to 1925. American Journal of Public Health, 95, 208-215.

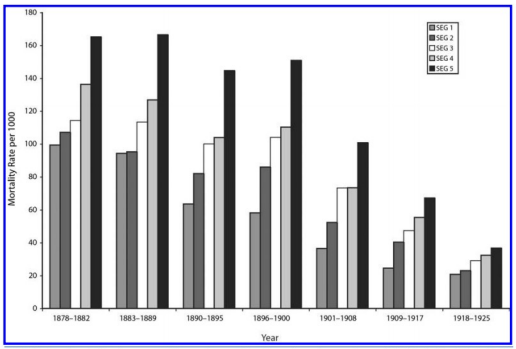


FIGURE 4—Overall mortality rates among children aged younger than 2 years, by socioeconomic group (SEG), Stockholm, 1878 to 1925.
Note. Groups are numbered in order of descending socioeconomic status.

Burstrom, B., Macassa, G., Oberg, L., Bernhardt, E. and Smedman, L. (2005) Equitable Child Health Interventions: The Impact of Improved Water and Sanitation on Inequalities in Child Mortality in Stockholm, 1878 to 1925. American Journal of Public Health, 95, 208-215.

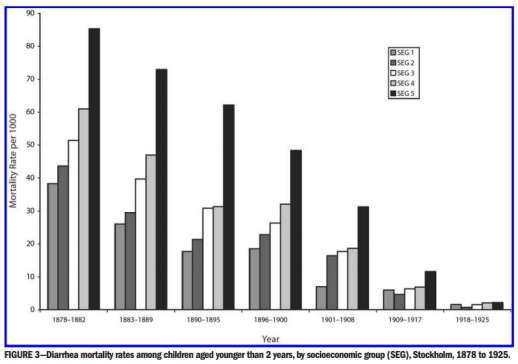


FIGURE 3—Diarrhea mortality rates among children aged younger than 2 years, by socioeconomic group (SEG), Stockholm, 1878 to 1925.
Note. Groups are numbered in order of descending socioeconomic status.

Burstrom, B., Macassa, G., Oberg, L., Bernhardt, E. and Smedman, L. (2005) Equitable Child Health Interventions: The Impact of Improved Water and Sanitation on Inequalities in Child Mortality in Stockholm, 1878 to 1925. American Journal of Public Health, 95, 208-215.

3. Fluorita (CaF2)

8. Hidroxiapatita (Ca5(PO4)3(OH))