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Dental health policies in Brazil and their impact on health inequalities

ABSTRACT

This text systematizes available knowledge about the main dental health policies in Brazil in regards to their current degree of implementation and their impact on health inequalities. Although the fluoridation of publicly distributed water is legally mandated in Brazil, its implementation has been subject to marked regional inequalities. Data are presented about the extent of implementation for the intervention, and studies are reviewed that evaluate the intervention's impact upon increasing inequality in the experience of dental caries. The provision of public dental services, which expanded considerably after the implementation of the National Unified Health Care System, is also discussed in relation to service provision and its impact on reducing inequality in access to dental treatment. The discussion of the differential effect of these interventions allowed for the proposal of targeted strategies (directing fluoridation to areas of greater need), aiming to reduce inequalities in the experience of dental caries in Brazil.

DESCRIPTORS: Oral Health. Public Health Dentistry. Fluoridation. Health Inequalities. Health Policy.

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INTRODUCTION

The monitoring of health inequalities is an important task in public health and part of the field of work commonly identified as “health surveillance”. Extensive literature analytically describes and explores the disparities in morbidity and mortality indicators between socioeconomic, racial and gender strata, across different times and places.

Risk or protective factors can occur in unequal patterns across social strata, having deleterious or salutary effects that affect the population in a heterogeneous way and increase inequalities in health. In this sense, it is necessary to evaluate health policies not only for the overall effect they have on the collective health, but also for the result that interventions have upon the preexisting situation of health inequalities.

In the last decades, two important interventions in oral health were greatly expanded in all of the country, based upon the constitutional principle of universal health actions and services, including oral health. The fluoridation of publicly provided water and the dental services available in the public network of the *Sistema Único de Saúde* (SUS – National Unified Health Care System) surpassed the historical limits for this type of care for children and pregnant women, notably for schoolchildren.

The objective of the present study was to systematize the available knowledge regarding the current efficacy level of these measures and their impact upon health inequalities. This is based on a discussion of data systematized according to the specialized literature and utilizing, as sources, the *Ministério da Saúde/ Departamento de Informática do SUS*, DATASUS (Ministry of Health’s SUS Health Information Department) and the *Fundação Instituto Brasileiro de Geografia e Estatística* (IBGE –Brazilian Institute of Geography and Statistics).

FLUORIDATION OF THE PUBLIC WATER SYSTEM

Fluoride was the first exogenous factor recognized as important for modifying the risk of dental caries, even before the microbiological etiology and the strong association to frequent sugar consumption were proven. In 1986, the World Health Organization and the FDI World Dental Federation promoted an international conference about the appropriate use of fluoride and concluded that this measure is low cost, can be

implemented without risk of fluorosis and is effective for the prevention of caries.¹¹ In 2007, the 60th World Health Assembly reiterated their endorsement of the intervention.^a Narvai¹² explains how this knowledge was established, from the initial observations of low prevalence of caries in children with dental fluorosis, to more recent studies that established the safety and effectiveness of the intervention.

Fluoridation of public water systems was recognized as one of the ten most important public health achievements of the 20th century.⁵ One of its appealing points is the fact that it does not require intervention by a professional public health agent, nor any initiative to be taken by the recipient populations besides just frequent drinking of publicly provided water or using it in food preparation. Fluoride can also be administered through topical application during a dental consultation or through the routine use of toothpaste. Despite being simple, it is difficult for these measures to reach the population in an extensive and regular fashion as fluoridated water.

In Brazil, the first cities to adopt water fluoridation did so in the 1950s. Law Number 6,050,^b Federal Decree Number 76,872^c and *Portaria GM/MS* Number 635^d are the legal guidelines in force that establish water fluoridation as an obligation throughout the country, for the public distribution systems that have water treatment stations. The effects of this legislation were not immediate, though, and the intervention was gradually implemented in the subsequent years, with marked regional inequalities.

In order to evaluate the degree that this intervention has been implemented, a useful source of publicly available information is the National Basic Sanitation Study (*Pesquisa Nacional de Saneamento Básico*)¹⁰ performed in 2000 by the IBGE Foundation. According to the study, until that year less than half (45%) of the 5,507 Brazilian municipalities had adopted this public health intervention (Table). The proportion was even lower when the number of districts was analyzed instead of cities: only 37% of the 8,656 Brazilian districts had adopted the intervention. This statistic is less susceptible to the extensive population variation within the municipalities. The scenario suggests that a considerable proportion of municipalities that have implemented fluoridation were unable to extend it to all inhabitants, possibly excluding the more rural districts and peripheries where the intervention is even more

^a World Health Organization. Sixtieth World Health Assembly. Resolution WHA60.17. Geneva; 2007.

^b Ministério da Saúde. Lei nº 6.050, de 24 de maio de 1974. Dispõe sobre a fluoretação da água em sistemas de abastecimento quando existir estação de tratamento. *Diário Oficial Uniao*. 27 maio 1974;Seção1:6021.

^c Ministério da Saúde. Decreto nº 76.872, de 22 de dezembro de 1975. Regulamenta a Lei nº 6.050, de 24 de maio de 1974, que dispõe sobre a fluoretação da água em sistemas públicos e abastecimento. *Diário Oficial Uniao*. 23 dez 1975;Seção2:16997.

^d Ministério da Saúde. Portaria nº 635, de 26 de dezembro de 1975. Aprova as Normas e Padrões, a seguir, sobre a fluoretação da água dos sistemas públicos de abastecimento, destinadas ao consumo humano. *Diário Oficial Uniao*. 30 jan 1976;Seção1:1-13.

Table. Percentage of municipalities and districts with fluoridation of publicly provided water in 2000, and coverage of the water distribution system in the regions of Brazil.

Variable	North (%)	Northeast (%)	Central-West (%)	Southeast (%)	South (%)	Brazil (%)
Fluoridated water						
Municipalities	7.3	15.9	40.1	70.1	68.9	44.8
Districts	7.0	14.0	26.7	55.3	48.9	37.0
Coverage of the water system ^a						
2000 Census	48.0	66.4	73.2	88.3	80.1	77.8
2007 PNAD	55.9	75.7	80.8	91.8	84.8	83.3

^a % of households connected to the water distribution network.

Sources: Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Saneamento Ambiental 2000. [cited 2010 Jan 27] Available from: <http://www.ibge.gov.br/home/estatistica/populacao/condicaoodevida/pnsb/default.shtm> and Instituto Brasileiro de Geografia e Estatística. Censo 2000. [cited 2010 Jan 27] Available from: <http://www.sidra.ibge.gov.br/cd/default.asp>

necessary, considering that the preventative power of fluoridation is relatively larger in places with greater socioeconomic inequality.^{8,16}

Water fluoridation is recognized as beneficial. This public health intervention began more than half a century ago and was legally mandated in Brazil for more than 30 years. Despite this, the available data point to an extremely unequal implementation in the country, considering the Federal units and the macro-regions: the intervention advanced more in the states of the South and Southeast, where most of the country's wealth is concentrated, and was insufficient in the North and Northeast regions. A public health intervention effective at reducing inequalities is itself subject to profound disparities in implementation, in regards to national public health policy.

Another source of inequality in access to fluoridated water is the non-universal coverage of the system for publicly distributed water (Table). As to be expected, this issue also showed greater advancement in the South and Southeast regions. Even though the coverage of the distribution system has expanded in all the regions, the states in the North and Northeast still suffer extensive lack of access to water, with obvious negative health outcomes.

The positive effect of water fluoridation can be seen in the reduced prevalence of dental caries, as measured in epidemiological studies of dental health conducted at the national level. After the mid-1980s, there was a marked decline in the indicators for caries, and the DMFT index, which describes the number of teeth with history of carries, decreased from 6.7 in 1986 to 2.8 in 2003, among children 12 years of age. Narvai et al¹³ studied these indicators and associated their favorable evolution to the expansion of fluoridated water and to other changes that occurred over the period.

Despite the favorable result, water fluoridation had an undesired effect in Brazil: the unequal distribution of

this preventative measure increased the socioeconomic disparity in prevalence of the disease. Based on the data from the epidemiological study of 2003, Peres et al¹⁵ recalculated the average 2.8 DMFT index for 12 year olds, by stratifying the children for residency in cities with and without fluoridated water, and found respective values of 2.4 and 3.5. The comparison speaks in favor of the intervention but also shows the social injustice involved in not meeting the legal mandate of fluoridation for all municipalities.

Peres et al¹⁵ also point to an increased negative correlation between the index of caries and the percentage of households connected to the water system. In cities that participated in the study, the greater the coverage by the water distribution system, the lower the DMFT index at 12 years. In order to guarantee universal access to fluoride, it is not enough to add it to the water being distributed. It is also necessary to guarantee access to piped water in all households or, at the least, to a community source and, surveillance of the intervention is certainly necessary.

When partially implemented and seen through a socioeconomic point of view, fluoridation had additional effects on the disparities in the prevalence of caries. In municipalities without fluoride, there was practically no difference in DMFT between children enrolled in public and private schools, in spite of the presumably higher socioeconomic position of the second group. In municipalities with fluoride, though, the DMFT index was 43% higher for children in public schools. Increased inequality associated with fluoride was also observed when contrasting between schools located in urban or rural areas. In comparison to their counterparts in urban areas, students in rural areas had a 16% greater DMFT index in towns without fluoride; this excess increased to 68% in towns with fluoride.¹⁵

The lack of universal access to fluoridated water keeps a large contingent of the population from benefiting from this effective intervention, which is

clearly cost-effective.⁷ Although it is understandable that fluoridation first occurred in municipalities with larger populations and greater resources to expend in the public interest, the fact that its expansion has been so slow, that in the 21st century more than half of Brazilian municipalities still have not adopted the intervention, necessitates adjustments to the development of this public policy. These adjustments are urgent and necessary principally because interrupting fluoridation, or not implementing it where it should be done, constitutes an illegal, scientifically unsustainable and socially unjust action.¹²

The actions taken since 2005 to revitalize and intensify the expansion of fluoridation, prioritizing the North and Northeast regions, must be recognized. According to the National Coordination of Oral Health in the Ministry of Health, during the period from 2005 to 2008, 711 new fluoridation systems were installed in 503 municipalities in 11 states, benefiting 7.6 million Brazilians. These numbers correspond to a pace of expansion of 10.5 municipalities/month and 5,205 people/day.

DENTAL CARE IN THE SUS PUBLIC NETWORK

In 1998, the *Pesquisa Nacional por Amostra de Domicílios* (PNAD – National Household Sample Survey) contained a specific section about need, access and use of health services. Based on this data, it was reported that the SUS financed 24.2% of dental care, a proportion in contrast to the much higher percentage of non-dental health care, of which 52.4% was provided by the public sector.⁴

Despite the unfavorable comparison, there was substantial progress incorporating dental health into the official health system in only one decade. The creation of the SUS in the 1998 Constitution is the initial point of reference for the provisioning of regular dental services at a large-scale through the public health system. Universality, integration and equity: the adoption of these constitutional principles by the SUS meant that oral health was recognized as an inseparable part of general health, as an obligation of the state and a right for all.

Nonetheless, expanding public dental services beyond the traditional maternal and child groups has presented great difficulties for the health system, since the resources destined to this end, although increasing, are insufficient to immediately meet all the potential needs of the population. To respond to this challenge, the strategy of prioritizing the flow of resources and selecting goals was adopted. The first goal proposed was provisioning services for children, pregnant women and dental urgencies in the basic health units. The incorporation of the dental health team in the 2000 Family Health Strategy and the establishment

of Dental Specialization Centers, in 2004, represented new impulses for increasing the supply of dental services.

The Family Health Strategy made it possible to adopt a more active stance for primary care in oral health, and the Dental Specialization Centers through the *Brasil Sorridente* program (Brazil Smiling) increased the supply of prosthetic services, of endodontics and dental radiology. Nonetheless, public dental services are not limited to clinical care and include community actions, epidemiological research, preventive actions, health education activities and services for groups with distinct needs, which can be understood as promotion of oral health. The financing of these actions involved, just in the scope of the federal government, annual investments that went from 56.5 million *reais* (Brazilian currency, ~0.5 USD) in 2003 to 427 million in 2005 and close to 600 million in 2008. From 2003 to 2008, approximately 2.4 billion *reais* were invested.⁶

After the 1998-PNAD, there was an important consolidation of public policy for oral health in the country¹⁴ and new evaluations of these policies could measure if the public sector's participation in the provisioning of dental care in fact increased. In attempting to test this hypothesis, the Figure presents comparative data about the proportional participation of physicians and dentists in the public sector for Brazilian regions in January of 2008. Besides the number of contracted dentists, the Ministry of Health also reports on the amount of resources dedicated to oral health, the amount of procedures performed and the total primary dental consultations in the program.

More than one third (37.1%) of dentists credentialed by the Federal Dentistry Council for professional practice maintain employment registration with the public service. This number is smaller than, although comparable to the proportion of physicians contracted by the SUS in relation to the total number enlisted in

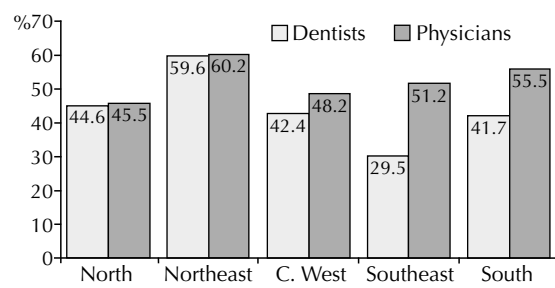


Figure. Percentage of dentists and physicians contracted by the *Sistema Único de Saúde* (SUS), in relation to the total qualified for professional duties in the Brazilian regions. January, 2008.

Sources: Ministry of Health/DATASUS, Federal Dentistry Council, Federal Medical Council.

the Federal Medical Council: 52.8%. The Figure shows that the proportion of dentists contracted by the SUS was greater in the North and Northeast regions, where percentages similar to those for physicians in the public sector were reached. In the South and Southeast, where more dentists are working (respectively 16% and 59% of the total in the country), their incorporation into the public sector was relatively smaller.

The data reflects efforts to create greater public provisioning of dental care in the regions in which they are most necessary. This interpretation is compatible with recent studies undertaken in specific regional contexts, which conclude that the planning of public dental services were characterized by redistributive and pro-equity trends, with greater provisioning of resources in cities with worse socioeconomic indicators.^{3,9}

The increased contracting of dentists in the public health network even had effects on the dental profession due to the increase in employment opportunities. Even though working in the public sector and working in private dentistry are not conflicting activities (many dentists contracted by the public network do maintain their participation in private practices), it can be said that the increased energy of public services for dental health has lessened the preponderance in Brazil of the hegemonic model of private dental practice.

There are still no national level evaluations regarding the effect of public dental services on the disparities in oral health indicators, and similarly, studies of the regional contexts are scarce. Nonetheless, the strategies of progressive expansion and the channeling of public resources for dental care to programmatic ends can be considered successful in regards to reducing health disparities as shown by the studies already realized.

In regards to the state of São Paulo (Southeastern Brazil), in 1998, racial and gender disparities were identified in the performance of restorative dental treatments. The study of school-age children indicated that blacks and browns had less access to dental care than whites and a lower proportion of their teeth were restored. Nonetheless, this disparity was associated with cities where the incorporation of dentists in the public network was lower, and the disparity was practically nonexistent in those where the public dental care services had progressed more, in terms of the rate of dentists contracted by the SUS.¹ Another study, also analyzing oral health data in the state of São Paulo, made analogous observations in regards to disparities in the provisioning of needed dental restoration for girls and boys.²

Nonetheless, these studies^{1,2} refer to the richest state in the Federation and do not allow for conclusions of a national scope. In a specific evaluation of Rio Grande do Norte (Northeastern Brazil), Souza &

Roncalli¹⁸ found that only the municipalities with high socioeconomic position displayed advances in incorporation of oral health in the Family Health Strategy. This observation highlights an important point for the organization of health services and how it is necessary that efforts to change assistance models be accompanied by public policies for social development, which go beyond the health sector.

FINAL CONSIDERATIONS

In a well-known study about “sick individuals, sick populations”, Rose¹⁷ proposed two complementary preventive strategies: one centered on the protection of more susceptible or vulnerable individuals and another focused on the determinants of a population’s morbidity. We present information on public dental services and the fluoridation of publicly provided water, as respective examples of the first and second intervention modalities.

Due to the impossibility of immediately implementing universal access to public dental services, new priority targets were established for the preferential direction of resources, such as treating children and pregnant women and providing services specializing in dental prosthetics, endodontics and dental radiology. Besides this, priority for urgent care is a consecrated principle in both the public and private sectors. The public dental service also gave priority to health promotion, by means of expanding primary services, health education, preventive actions and epidemiological studies. The expansion of the public dental service followed a strategy of focusing effort and resources towards these programmatic goals. This policy is still in a period of expansion, but there are already favorable indications in regards to its effect in reducing disparities in oral health.

Fluoridation of publicly distributed water is clearly a strategy of intervention on the determinants of dental caries in a population and one of the most important elements in reducing the indicators for the disease in Brazil and abroad. However, its adoption has not reached the desired universal scope of implementation, despite more than five decade of progressive expansion in Brazil. In spite of the anticipated initial difficulties, this limitation continues to be an important challenge to public health policy during the present period.

When public health interventions are introduced without strategic planning to allow for universal access for the recipients or to direct additional resources to the groups in most need, they end up having an undesirable effect of increasing health disparities. This effect was designated as the “inverse equity hypothesis”¹⁹ to characterize as unjust the fact that groups with higher socioeconomic status absorb earlier and to a greater extent the advantages

of beneficial public policies. Unjust, unnecessary and avoidable inequalities in health are appropriately known as “health inequities”.²⁰

Correcting this undesirable condition requires organized societal efforts by means of government action. By emphasizing the problem of how increased inequality in the experience of caries is associated with

how water fluoridation was and is being implemented, this article aimed to contribute to the planning of these public sector initiatives. Though the immediate universalization of this intervention is hardly feasible, the adoption of targeted strategies that preferentially direct the benefit to areas where it is most needed should be considered, thus effectively contributing to reducing inequalities in the distribution of caries.

REFERENCES

1. Antunes JLF, Junqueira SR, Frazão P, Bispo CM, Pegoretti T, Narvai PC. City-level gender differentials in the prevalence of dental caries and restorative dental treatment. *Health Place*. 2003;9(3):231-9. DOI:10.1016/S1353-8292(02)00055-2
2. Antunes JLF, Pegoretti T, Andrade FP, Junqueira SR, Frazão P, Narvai PC. Ethnic disparities in the prevalence of dental caries and restorative dental treatment in Brazilian children. *Int Dent J*. 2003;53(1):7-12.
3. Baldani MH, Almeida ES, Antunes JLF. Serviços públicos odontológicos: provisão e equidade no Estado do Paraná, Brasil. *Rev Saude Publica*. 2009;43(3):446-54. DOI:10.1590/S0034-89102009000300008
4. Barros AJD, Bertoldi IAD. Desigualdades na utilização e no acesso a serviços odontológicos: uma avaliação em nível nacional. *Cienc Saude Coletiva*. 2002;7(4):709-17. DOI:10.1590/S1413-81232002000400008
5. Centers for Diseases Control and Prevention. Achievements in public health, 1900-1999. Fluoridation of drinking water to prevent dental caries. *MMWR Morb Mortal Wkly Rep*. 1999;44(RR-13):1-40.
6. Frazão P, Narvai PC. Saúde bucal no Sistema Único de Saúde: 20 anos de lutas por uma política pública. *Saude em Debate*. 2009;33(81):64-71.
7. Frias AC, Narvai PC, Araújo ME, Zilbovicius C, Antunes JLF. Custo da fluoretação das águas de abastecimento público, estudo de caso – Município de São Paulo, Brasil, período de 1985-2003. *Cad Saude Publica*. 2006;22(6):1237-46. DOI:10.1590/S0102-311X2006000600013
8. Jones CM, Worthington H. Water fluoridation, poverty and tooth decay in 12-year-old children. *J Dent*. 2000;28(6):389-93. DOI:10.1016/S0300-5712(00)00005-1
9. Junqueira SR, Araújo ME, Antunes JLF, Narvai PC. Indicadores socioeconômicos e recursos odontológicos em municípios do Estado de São Paulo, Brasil, no final do século XX. *Epidemiol Serv Saude*. 2006;15(4):41-53.
10. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. A fluoretação das águas de abastecimento público como uma medida de garantia ao acesso a água tratada. *Rev Bras Saude Fam*. 2006;12(1):4-8.
11. Murray JJ. Fluoride and dental caries. In: Murray JJ, Nunn JH, Steele J. *Prevention of Oral Disease*. 4. ed. Oxford: Oxford University Press; 2003. p.35-60.
12. Narvai PC. Cárie dentária e flúor: uma relação do século XX. *Cienc Saude Coletiva*. 2000;5(2):381-92. DOI:10.1590/S1413-81232000000200011
13. Narvai PC, Frazão P, Roncalli AG, Antunes JLF. Cárie dentária no Brasil: declínio, polarização, iniquidade e exclusão social. *Rev Panam Salud Publica*. 2006;19(6):385-93. DOI:10.1590/S1020-49892006000600004
14. Narvai PC, Frazão P. Saúde bucal no Brasil: muito além do céu da boca. Rio de Janeiro: Editora FIOCRUZ, 2008.
15. Peres MA, Antunes JLF, Peres KG. Is water fluoridation effective in reducing inequalities in dental caries distribution in developing countries? Recent findings from Brazil. *Soz Praventivmed* 2006;51(5):302-10. DOI:10.1007/s00038-006-5057-y
16. Riley JC, Lennon MA, Ellwood RP. The effect of water fluoridation and social inequalities on dental caries in 5-year-old children. *Int J Epidemiol*. 1999;28:300-5. DOI:10.1093/ije/28.2.300
17. Rose G. Sick individuals and sick populations. *Int J Epidemiol*. 1985;14(1):32-8. DOI:10.1093/ije/14.1.32
18. Souza TMS, Roncalli AG. Saúde bucal no Programa Saúde da Família: uma avaliação do modelo assistencial. *Cad Saude Publica*. 2007;23(11):2727-39. DOI:10.1590/S0102-311X2007001100020
19. Victora CG, Vaughan JP, Barros FC, Silva AC, Tomasi E. Explaining trends in inequities: evidence from Brazilian child health studies. *Lancet*. 2000;356(9235):1093-8. DOI:10.1016/S0140-6736(00)02741-0
20. Whitehead M. The concepts and principles of equity and health. *Int J Health Serv*. 1992;22(3):429-45. DOI:10.2190/986L-LHQ6-2VTE-YRRN