Revista Odonto Ciência
Journal of Dental Science

ORIGINAL ARTICLE

Rev Odonto Cienc 2015;30(3):91-95
http://revistaseletronicas.pucrs.br/ojs/index.php/fo
: http://dx.doi.org/10.15448/1980-6523.2015.3.12933

Open Access

Socioeconomic factors and the provision of public oral care services in the State of Goiás, Brazil

Maria Goetti Queiroz[a], Sara Rodrigues Renovato[a], Patrícia Correia Siqueira[a], Ana Cristina Viana Campos[a], Cláudio Rodrigues Leles[a]

[a] Federal University of Goiás, Goiânia, Brazil

Abstract

Objective: The aim of this study was to evaluate the relationship between socioeconomic indexes (SEI) and the provision of public dental care services in the municipalities of the State of Goiás, Brazil.

Methods: Data were obtained from the Health Development Atlas, the Brazilian Federal Dental Council and the Primary Healthcare Information System (PHIS). The following socioeconomic indexes were used: Gini coefficient, Human Development Index (HDI), per-capita income and illiteracy rates. The k-means cluster analysis was used to group municipalities according to their socioeconomic variables, and these groups were compared according to the number of inhabitants per dentist, coverage of the Family Health Strategy (FHS) and Oral Healthcare Teams (OHT), and the Variable Budget for Primary Oral Healthcare (VBPOH) per inhabitant.

Results: Three subgroups were clustered according to their SEI: high (n=21), intermediary (n=109) and low (n=112). There was less funding for oral health per inhabitant and less coverage by the FHS and OHT for municipalities with better SEI, and the inhabitants/dentist ratio was higher in lower SEI ($p<0.001$).

Conclusion: The assumption of equity in the public health system was achieved. However, the distribution of dentists in municipalities with different socioeconomic levels is consistent with the rationale of the private market.

Key words: Socioeconomic indexes; Health care services; Oral health

Indicadores socioeconômicos e a oferta de serviços na atenção básica em saúde bucal em municípios do Estado de Goiás, Brasil

Resumo

Objetivo: O presente estudo ecológico transversal visou relacionar indicadores socioeconômicos dos municípios goianos, com a oferta de serviços odontológicos.

Métodos: Os dados foram obtidos no Atlas de Desenvolvimento Humano, Conselho Federal de Odontologia e Sistema de Informação da Atenção Básica, sendo utilizados os seguintes indicadores socieoeconômicos (ISE): Índice de Gini, IDH, renda per-capita e taxa de analfabetismo. Foi realizada análise de agrupamento (K-Means cluster) para segmentação dos municípios a partir desse conjunto de ISE e os grupos de municípios foram comparados em relação ao número de habitantes por cirurgião-dentista, cobertura da Estratégia da Saúde da Família (ESF) e equipes de saúde bucal (ESB), além do repasse do PAB Variável para saúde bucal por habitante.

Resultados: Foram formados três subgrupos definidos por estratos dos ISE: altos (n=21), intermediários (n=109) e baixos (n=112). Foi observado menor repasse para saúde bucal por habitante e cobertura pela ESF e ESB nos municípios com melhores ISE, enquanto a relação habitante/cirurgião-dentista foi maior nos municípios com piores ISE ($p<0,001$).

Conclusão: A cobertura ESF e ESB maior nos municípios com piores ISE evidencia que o princípio da equidade do SUS está sendo contemplado. No entanto, a proporção de habitantes por cirurgião-dentista menor nos municípios com melhores ISE obedece à lógica do mercado.

Palavras-chave: Indicadores sociais; Serviços de saúde; Saúde bucal

Correspondence:
Cláudio Rodrigues Leles
crleles@odonto.ufg.br

Received: Jan 3, 2013
Accepted: Jun 2, 2015

Conflict of Interests: The authors state that there are no financial and personal conflicts of interest that could have inappropriately influenced their work.

Introduction

The Social Determinants of Health is a set of social, economic, cultural, ethnic-racial, psychological and behavioral factors that influence the occurrence of health problems and their risk factors in the population [1]. Brazil is one of the countries that have the worst health inequities. Inequalities between population groups are not only systematic and important, but are also avoidable, unfair and unnecessary [2]. Hence, reducing these social inequalities in health, and thus meeting human needs, is an issue of social justice [3].

The Brazilian population's oral health status is even more unequal when it comes to access to and use of services [4]. Studies that relate basic oral health care indicators to municipal socioeconomic conditions are particularly important because they enable health care managers to create policies that can reduce inequalities, especially in terms of access to and utilization of services. Thus, socially-oriented health policies combined with actions that promote and recover oral health should mainly target municipalities with the worst socioeconomic indicators [5].

Social determinants, regional peculiarities and the different indicators provided by the Ministry of Health must be taken into account when creating effective proposals to address these issues [6]. Therefore, the aim of this study was to establish the relationship between socioeconomic indicators and the production and management of dental services offered by the municipalities of the State of Goiás, Brazil.

Methods

A cross-sectional ecological study was carried out using secondary data obtained from the Primary Care Information System from the Brazilian National Public Health System regarding municipalities in the State of Goiás, Brazil. Goiás has 246 municipalities and 1,374 public health settings, of which only 816 (59.45%) have outpatient dental care [7,8]. The health care and resources variables, obtained from PHIS, the Federal Board of Dentistry and the National Health Fund, were: the number of inhabitants per dentist (hab/D), coverage of Family Health Strategy (FHS) and coverage of the Oral Health Teams (OHT), and the Variable Budget for Primary Oral Healthcare (VBPOH) – the minimum basic healthcare funding. The Ministry of Health, according to Ordinance No. 698/GM of March 30, 2006, states that the VBPOH resources are allocated to finance Primary Care Health strategies, and are transferred from the National Health Fund of Municipalities through their adherence and implementation of actions signed into their health plan [9]. Four socioeconomic indicators (SEI) were analyzed: the Gini Index, Human Development Index (HDI), per capita income (in Brazilian currency – reais) and the illiteracy rate (%). The Gini index measures inequality in the distribution of individuals according to household income per capita, and ranges from 0 (perfect equality) to 1 (maximum inequality).

The HDI is a comparative measure that encompasses three dimensions – (1) education: the combination of the adult literacy rate with the combined rate for the three schooling levels (primary, secondary and higher education); (2) income: purchasing power of the population based on GDP per capita adjusted for local cost of living; and (3) life expectancy at birth as an index of population health and longevity. The HDI incorporates three important aspects regarding an individual's well being: a long and healthy life, access to knowledge, and a decent standard of living. Its score ranges from 0 to 1; the closer to 1, the higher a location's level of development. For purposes of analysis it is divided into three categories: $0 \leq HDI < 0.5$ (low human development), $0.5 \leq HDI < 0.8$ (medium human development) and $0.8 \leq HDI \leq 1$ (high human development). The per capita income represents the ratio between the sum of the per capita income of all individuals and the total number of individuals. The illiteracy rate indicates the percentage of illiterate people who are older than 15 years.

From these four SEI, a cluster analysis (K-Means cluster) was carried out to group the municipalities according to this set of numerical variables. Three subgroups were then formed, defined by their SEI: municipalities with a high (cluster 1), intermediate (cluster 2) and low (cluster 3) SEI. Cluster analysis is a set of statistical techniques used to place objects into groups or homogeneous groupings according to their characteristics, revealing previously undetected relationships. The groups obtained should have both an internal homogeneity (within each group), as well as a great external heterogeneity (between groups). The K-means clustering method was based on Euclidean distance, with the centroid measure as the criterion of aggregation of responses. The ultimate goal of the analysis is to minimize the distance between each point and its respective centroid [10].

SPSS 17.0 software was used to create the database and for statistical analysis. Descriptive analysis was carried out to compare the number of inhabitants per dentist, FHS and OHT coverage, and the transfer of the VBPOH per inhabitant (VBPOH/hab) of groups of municipalities. One-way analysis of variance and the Bonferroni test were used to compare the different levels of the SEI. Significance level was set at $p<0.05$.

Results

The municipalities were grouped into three distinct groups with similar socioeconomic conditions and a predominant indicator: 112 (45%). Municipalities were classified as low SEI, 109 (44.3%) were classified as intermediate, and 21 (8.5%) as high. Of the total number of municipalities (n=246), four (1.6%) were excluded from analysis because they were not classified in any group. Figure 1 illustrates the geographic distribution of the municipalities in Goiás, according to their SEI group.

Table 1 shows the descriptive data of the socioeconomic variables used for cluster analysis. The analysis of variance

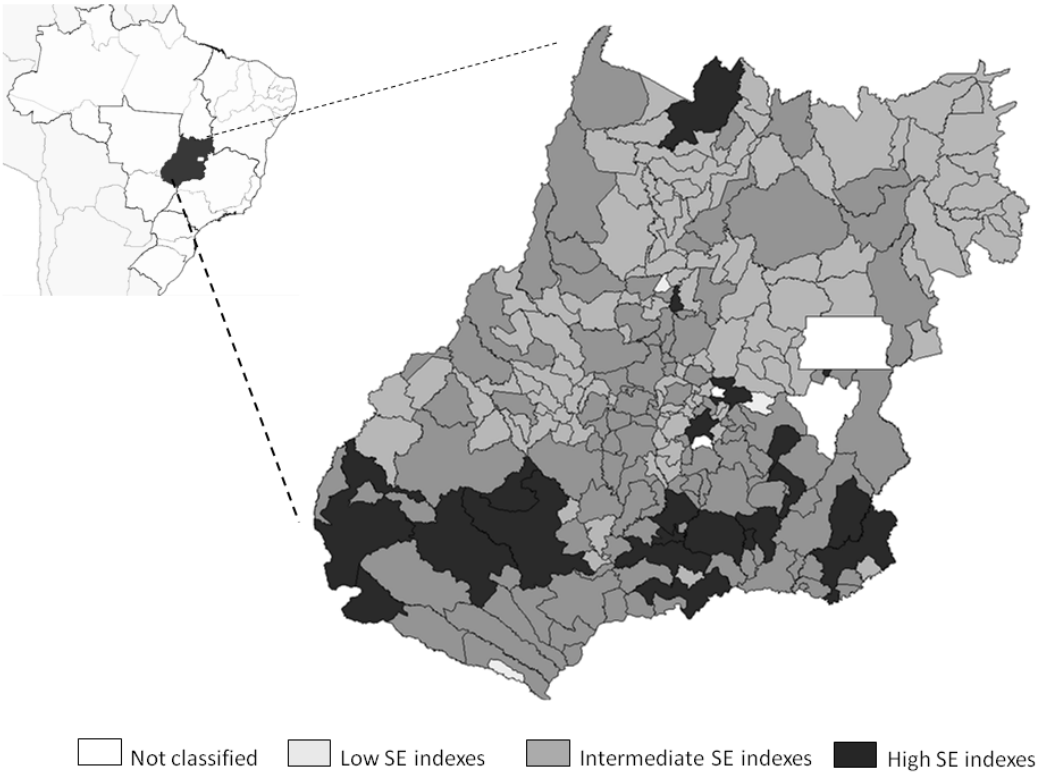

Figure 1. Map of the distribution of Goiás municipalities according to socioeconomic indicators. Goiás, Brazil, 2009.

Table 1. Mean and standard deviation of variables according to the SEI classification. Goiás, Brazil, 2009.

	N	Income per Capta	HDI	Illiteracy Rate (%)	Gini index
Municipalities	242	197.88 (60.50)	0.73 (0.04)	17.62 (4.91)	0.56 (0.05)
High SEI	21	336.90 (51.99)	0.80 (0.02)	11.01 (2.97)	0.62 (0.05)
Intermediate SEI	109	218.33 (23.44)	0.75 (0.02)	15.97 (3.06)	0.57 (0.05)
Low SEI	112	151.92 (26.96)	0.71 (0.03)	20.46 (4.74)	0.55 (0.05)
F-Anova (*P* value)	–	423.7 (<0.001)	138.3(<0.001)	68.8 (<0.001)	18.0 (<0.001)

showed that the per capita income was the most influential variable for the formation of the groups, and the highest F values promoted the greatest separation among clusters. All indicators were lower for the group of municipalities with low SEI (p<0.001). However, the comparison of groups is merely illustrative, since the groups were formed with the goal of maximizing the differences between municipalities.

Figure 2 shows a box plot graph that helps identify outliers (the distance between the municipality and the centroid of the group). The low SEI group had six cases with a distance greater than 1.5 times the interquartile range (Montividiu do Norte, Mambaí, Sítio d'Abadia, Monte Alegre, Damianópolis and Buritinópolis). In the high SEI group, the extreme outlier was the city of Goiânia, the capital of Goiás State. The intermediate SEI group was more homogeneous than the other groups. The HDI and illiteracy rate variations are greater in the low SEI group, while the per capita income and the Gini index variations are greater in the high SEI group.

The mean HDI was 0.67 for cluster 1, 0.73 for cluster 2, and 0.79 for cluster 3, showing that all the groups have a medium human development index. There was greater variation in the per capita income (R$ 131.3 to R$ 325.8) and the illiteracy rate (25.1% to 11.1%). The Gini index was greater in the high SEI group (cluster 3), followed by the low SEI group, while the intermediate SEI group had the lowest social inequalities.

Table 2 shows that there was greater FHS (p=0.003) and OHT (p=0.001) coverage in municipalities with the worst SEI. The inhabitants per dentist ratio was also higher in municipalities with the worst SEI, with a higher concentration of professionals in those with the highest SEI (p=0.031). There was a greater allocation of financial resources (VBPOH) in municipalities with the worst SEI: up to 2 times higher than in municipalities with the highest SEI.

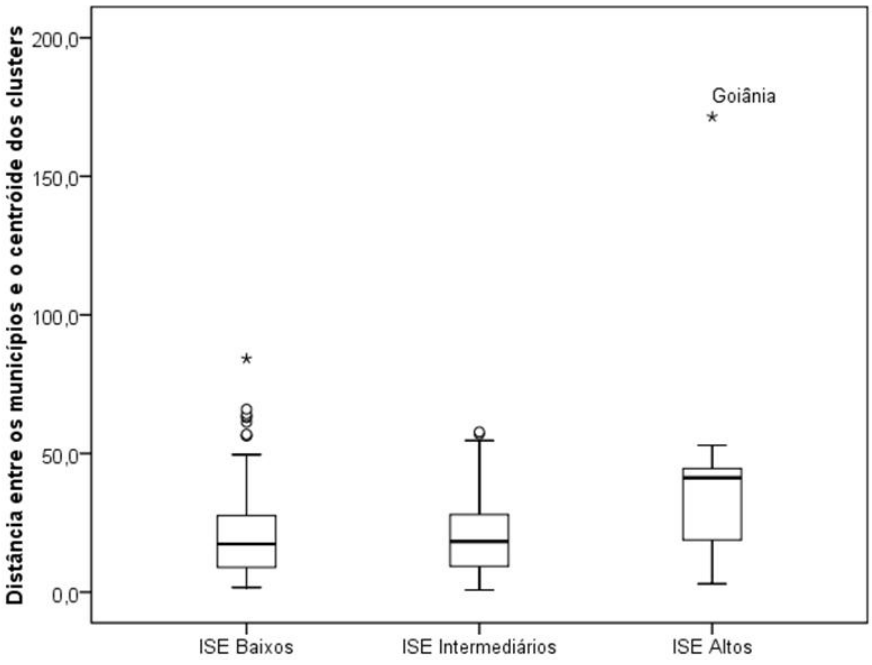

Figure 2. Shows a box plot graph that helps identify outliers (the distance between the municipality and the centroid of the group

Table 2. Mean distribution of Goiás municipalities regarding condition of production and management of dental services. Goiás, Brazil, 2009.

	Group	N	Mean (SD)	Median	*P*-value	Contrast
Dentists per inhabitant	Low SEI	77	3340(2443)	2903	<0,001	A
	Intermediate SEI	97	2266(2242)	1409		A
	HIgh SEI	21	1223(726)	818		B
% coverage by OHTSB	Low SEI	112	86.0(27.2)	100	<0,001	A
	Intermediate SEI	109	82.4(28.5)	98.3		A
	HIgh SEI	21	56.1(34.9)	48.7		B
% coverage by FHS	Low SEI	112	90.2(21.1)	100.0	<0,001	A
	Intermediate SEI	109	86.2(24.1)	100.0		A
	HIgh SEI	21	65.9(31.4)	59.0		B
Transfer of VBPOH/inhabitant (In Brazilian R$)	Low SEI	111	7.78(3.5)	7.90	<0,001	A
	Intermediate SEI	105	6.47(3.3)	6.2		A
	HIgh SEI	19	3.76(2.4)	3.2		B

* Analysis of variance; ** Bonferroni Test.

Discussion

Living and working conditions, including healthcare and behaviors, are powerfully shaped by factors – such as income or wealth, education, and social standing (respect, prestige, or acceptance in society) – that reflect people's economic and social resources and opportunities and influence their ability to make healthier choices [11]. A population's health is also influenced by the quality of and access to consumer goods and services. Therefore, relating these factors to a population's health status can reveal the social inequalities in health [12].

Overall results show that, all groups of municipalities have an intermediate HDI, close to the mean of the whole state (0.77). When the overall Gini index (0.61), income per capita (R$ 285.96) and the illiteracy rate of the State of Goiás (11.37%) were compared with the values for the low SEI municipalities, it is clear just how extreme the per capita income and illiteracy rates are for these underprivileged populations [13].

In 2007, the population whose family income was up to half a minimum wage per capita, had an illiteracy rate of 18%, while the population with an income of more than 2 minimum wages, had a 1.4% illiteracy rate [14]. The same pattern could be observed in the municipalities of Goiás: the lower the per capita income (cluster 1), the higher the illiteracy rate (25.14%). This indicator is important, because education plays an increasingly vital role in a globalized society, and illiteracy is a major factor leading to marginalization and social exclusion [15]. The Commission of National Determinants of Health [2] reached the same conclusion: in order for these municipalities to develop economically and socially, public educational policies must be implemented, as recommended by the Brazilian legislation.

A significant portion of Brazilians (15.9%) reported never having made a dental appointment, equivalent to

27.9 million people. They relate this fact to household income, because while 31% of the population with monthly household income of up to 1 minimum wage reported never having made a dental appointment. This proportion dropped to 3% among those who had monthly household income greater than 20 minimum wages [5].

There was a progression of coverage of the Family Health Strategy (FHS) at both the national and regional levels, so that the greater the coverage of FHS, the greater the proportion of municipalities of the lower income group. Likewise, for the distribution of municipalities in extracts according to HDI ranges, the behavior was similar, showing that the lower the HDI, the higher the level of coverage by FHS [16]. These data affirm the results obtained in this study, which showed that there was greater coverage by FHS (p=0.003) and OHT (p=0.001) in the municipalities with the worst indicators.

As found in other study [17], there was a greater allocation (up to twice as much) of financial resources (VBPOH) for the municipalities with the worst SEI compared to those with better SEI. However, there was a higher concentration of professionals in municipalities with better SEI (p=0.031), therefore, the inhabitant/dentist ratio was higher in municipalities with the worst SEI. Healthcare systems organized around the principle of universal coverage should requires that everyone within a country can access the same range of services according to needs and preferences, regardless of income, social status, or residency, and that people are empowered to use these services [18].

A study in a Brazilian south state (Paraná) found that the municipalities with the highest number of dentists and dental equipment/1000 inhabitants registered in the public health system had the worst social status with regard to sanitation, income and concentration of income and education [19]. A possible explanation for the greater concentration of dental professionals in municipalities with better socioeconomic conditions is that the dental profession follows the rationale of the private market [12].

The data presented in this study reflect a scenario of social inequalities which may have consequences on the population's health status. Further studies could further investigate these differences and discuss the importance of equity in the access to health services and their quality.

Conclusions

The variation of the HDI and the illiteracy rate is higher in municipalities with low SE indicators, while the variation in per capita income and the Gini index is higher in municipalities with high indicators. The Family Health Team and Oral Health Team coverage is greater in municipalities with the worst socioeconomic indicators, as is the transfer of Basic Care funds (resource allocation). This shows that the Brazilian National Public Health System applies the principle of equity in the State of Goiás.

The information about the profile of municipalities enables technical teams to plan the management and development public health policies promoting equity in health, and helps these teams to efficiently allocate the healthcare resources. Furthermore, managers (not just health care managers) are also able to design medium and long term actions, including the creation of a State research agenda.

It is important to adopt public policies aimed at reducing inequalities, and that promote positive and sustainable change in social indicators. These policies must not only be compensatory but should promote regional development, or rather, have an impact on the equal distribution of income, health, education, housing, transportation, and so forth.

References

1. Buss PM, Pellegrini Filho A. A saúde e seus determinantes sociais. Physis: Rev. Saúde Coletiva 2007;17:77-93.
2. Comissão Nacional sobre Determinantes Sociais da Saúde. As Causas Sociais das Iniqüidades em Saúde no Brasil. Rio de Janeiro: Editora Fiocruz, 2008.
3. Marmot M. Social determinants of health inequalities. Lancet. 2005; 365:1099-104.
4. Barros AJD, Bertoldi AD. Desigualdades na utilização e no acesso a serviços odontológicos: uma avaliação em nível nacional. Ciênc Saúde Coletiva 2002;7:709-17.
5. Fernandes LS, Peres MA. Associação entre atenção básica em saúde bucal e indicadores socioeconômicos municipais. Rev. Saúde Pública 2005;39:930-36.
6. Viana AL, Fausto MCR, Lima LD. Política de Saúde e Equidade. São Paulo em Perspectiva 2003;17:58-68.
7. Brasil. Ministério da Saúde/DATASUS – Departamento de Informática do SUS. Cadernos de Informação 2009. Cadernos do Estado de Goiás. Disponível em: http://tanmet.datasus.gov.br/tabdata/cadernos/GO/GO_Goias_GeralUF.xls (acesso em 22/07/2009).
8. Goiás. Secretaria de Estado da Saúde. Superintendência de políticas de Atenção Integrada à Saúde. Gerência e Gestão da Atenção Básica. Área Técnica de Saúde Bucal. Política Estadual de Saúde Bucal do Estado de Goiás. Goiânia, 2008.
9. Brasil, Ministério da Saúde. Portaria nº 698/GM de 30 de março de 2006. http://dtr2001.saude.gov.br/sas/PORTARIAS/Port2006/GM/GM-698.htm (acesso em 21/02/2011).
10. Hair JF, Anderson R E, Tatham R L, Black W C. Multivariate data analysis. 6th edition. Prentice Hall, Upper Saddle River, NJ, 2006.
11. Braveman PA, Egerter SA, Mockenhaupt RE. Broadening the focus: the need to address the social determinants of health. Am J Prev Med. 2011;40:S4-18.
12. 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. Saúde 2006;15:41-53.
13. PNUD, Programa das Nações Unidas para o Desenvolvimento. IPEA, Instituto de Pesquisa Aplicada. Fundação João Pinheiro. Atlas do desenvolvimento humano no Brasil. Brasília: PNUD; 2000.
14. IBGE. Instituto Brasileiro de Geografia e Estatística. Estudos e Pesquisas Informação Demográfica e Socioeconômica. n.23. Síntese de Indicadores Sociais: Uma Análise das Condições de Vida da População Brasileira. Rio de Janeiro, 2008
15. PNUD. Relatório do Desenvolvimento Humano 2004: Liberdade Cultural num Mundo Diversificado. Disponível em: http://hdr.undp.org/en/media/hdr04_po_frontmatter.pdf (acesso em 15 fev, 2011).
16. Brasil. Ministério da Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Saúde da família no Brasil : uma análise de indicadores selecionados: 1998-2005/2006. Brasília : Ministério da Saúde, 2008.
17. IBGE. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional por Amostra de Domicílios. Acesso e Utilização de Serviços de Saúde, 2003. Rio de Janeiro, 2005.
18. Marmot M, Friel S, Bell R, Houweling TA, Taylor S; Commission on Social Determinants of Health. Closing the gap in a generation: health equity through action on the social determinants of health. Lancet. 2008;372:1661-9.
19. Baldani MH, Almeida ES, Antunes JL. Equity and provision of public dental services in the State of Paraná, Southern Brazil. Rev Saude Publica.2009;43:446-54.