Research note

Analysis of the supply of specialized oral health care services in the Brazilian National Health System: Brazil, 2014*

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Abstract

Objective: to analyze the availability of public specialized dental care services at Dental Specialties Centers (CEO) in Brazil in 2014. **Methods:** secondary data on the CEO ratio and dental surgeon ratio were analyzed by population as well as the adequacy of the quantity of complete dental consulting rooms per CEO type, the adequacy of the ratio between the working hours of dental auxiliaries /technicians and those of dental surgeons and the adequacy of the availability of recommended minimum specialties. Possible statistical differences between macro-regions were verified. **Results:** we found a ratio of one CEO per 217,797 inhabitants and one dental surgeon per 26,811 inhabitants; 97% of CEOs had the recommended number of dental consulting rooms; 26% had equivalent working hours between dental auxiliaries /technicians and dental surgeons; 60% offered the recommended minimum specialties. **Conclusion:** there were limitations in the provision of National Health System specialized oral health care services as well as regional differences.

Keywords: Oral Health; Specialties, Dental; Health Services Accessibility; Public Health; Epidemiology, Descriptive.

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Introduction

The supply of health services can be understood as the availability of services to the population.[1] Availability, in turn, is the existence of a given service within the reach of a service user at the right place and time.[2] Analysis of service supply can be useful for health planning, because important issues such as access, accessibility, use of health services, care continuity and comprehensiveness are influenced by it.[3-6]

In the field of oral health, in 2004, stronger financial incentives provided by the National Oral Health Policy (PNSB) both increased specialized dental services and implanted Dental Specialties Centers (CEO).[7] Specialized dental care expansion in the public sector led to an increase of approximately 400% in specialized dental procedures.[8]

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Despite the progress made, CEOs are still unable to meet the needs of the population, due to several factors such as the demand for specialized services not previously offered by the Brazilian National Health System (SUS).[9] In addition, the effective functioning of the CEOs depends on an adequate interface between primary care and CEOs.[10]

Analysis of the supply of specialized dental care services is essential for planning actions, in order to adapt their organizational and geographic aspects, so that they can ensure the continuity and comprehensiveness of oral health care.[11] Based on this understanding, this study aimed to analyze the supply of public specialized dental care services in the CEO modality in Brazil in 2014.

Methods

This is a normative assessment of the supply of SUS specialized dental care services based on the norms provided within the legal-political framework of Ministry of Health (MoH) ordinances. We used data from the Brazilian Institute of Geography and Statistics (IBGE), from the database of the external evaluation of the National Program for Improving Access and Quality of Dental Specialty Centers (Pmaq-CEO) and the National Registry of Health Care Facilities (CNES), referring to the year 2014.

We included all CEOs that were implanted in Brazil in 2014.

Figure 1 describes the study variables, the measurement of the variables and the source of the data used. The following elements were analyzed: (i) the ratio between the resident population and the number of CEOs; (ii) the ratio between the resident population and the number of dental surgeons working in CEOs; (iii) the adequacy of the quantity of complete dental consulting rooms per CEO type; (iv) the adequacy of the ratio between the working hours of dental auxiliaries/technicians and those of dental surgeons; and (v) the adequacy of the supply of recommended minimum specialties.

The number of dental surgeons was obtained from the total working hours of dentists who work in minimum specialties, divided by 40. This procedure was performed for comparison purposes, since dentists can be hired for either 20 or 40 hours a week, and the Pmaq-CEO database does not hold this information.

We considered the number of dental consulting rooms in operation to be adequate when it was equal to or higher than expected for CEO type (Type I = 3 or more; Type II = 4 or more; Type III = at least 7).[12] We also considered the ratio between the weekly working hours of auxiliaries/technicians and those of dentists to be adequate when the calculated value was equal to or greater than 1, indicating that the dentist would not be working alone. The supply of specialties was considered to be adequate in relation to the norms established by the MoH ordinance when the CEO offered the five minimum specialities,[12] with at least one professional working in each one of them.

The collected data were tabulated and analyzed on a Microsoft Excel Office spreadsheet (version 2013), by calculating the absolute and relative frequencies of the variables. The variables were analyzed for the country's five macro-regions, and differences in the distributions were tested using Pearson's chi-square test, with the aid of R statistical software (https://www.R-project.org/), taking a 5% significance level.

As we used secondary data from public domain databases, the project did not need to be submitted to a Research Ethics Committee, as per Brazilian National Health Council Resolution No. 510, dated 7 April 2016.

Variables	Measurement of the variables	Source
Ratio between the resident population and the number of Dental Specialty Centers (CEOs).	Quantity of CEOs implanted divided by the population in each location	CNES[a] IBGE[b]
Ratio between the resident population and the number of dental surgeons working in CEOs	Number of dental surgeons working in CEO specialties (variables VII 3.4.1-VII 3.4.5 and VII 3.6.1-3.6.7 of the database) divided by the population residing in each location	External Pmaq-CEO evaluation IBGE[b, c]
Adequacy of the quantity of complete dental consulting rooms per CEO type	Quantity of dental chairs in good condition (variable VII.3.2 of the database) in each CEO type (variable VII.3.1 of the database)	External Pmaq-CEO evaluation[c]
Adequacy of the ratio between the working hours of dental auxiliaries/technicians and those of dental surgeons	Sum of the weekly working hours of dental auxiliaries and technicians who work in the CEO (Variables 3.7.4 and 3.7.5 of the database) divided by the sum of the weekly working hours of dental surgeons who work in the minimum specialties (variable VII.3.6 of the database)	External Pmaq-CEO evaluation[c]
Adequacy of supply of recommended minimum specialties	Provision of five minimum specialties with professional dental surgeons working in each one of them (variables VII 3.4.1 to 3.4.5 of the database)	External Pmaq-CEO evaluation[c]

a) CNES: National Registry of Health Care Facilities.
b) IBGE: Brazilian Institute of Geography and Statistics.
c) Pmaq-CEO: Program for improving access to and quality of Dental Specialty Centers.

Figure 1 – The study variables, measurement of variables and data source used to analyze the supply of specialized oral health care services in the Brazilian National Health System, Brazil, 2014

Results

In 2014, Brazil had 931 CEOs, distributed over 780 of the country's 5,570 municipalities. Of these CEOs, 349 (37%) were Type I, 474 (51%) were Type II and 109 (12%) were Type III. Table 1 presents the distribution of CEOs and the number of dental surgeons working in CEOs in the Brazilian macro-regions, as well as the respective ratios between CEOs and population.

The Northeastern region had the greatest number of CEOs in Brazil with 357 (38%), followed by the Southeastern region with 337 (36%). The Northern region had the lowest number of CEOs with 60 (6%). The ratio between CEO and population was 217,797 inhabitants per CEO. The best ratio was found in the Northeastern macro, with 157,384 inhabitants per CEO, while the worst was found in the Northern region, with 287,184 inhabitants per CEO.

There was an overall ratio of one CEO dental surgeon per 57,640 inhabitants. The best ratio between inhabitants and CEO dental surgeons was found in the Northeastern region (one dentist per 46,670 inhabitants), followed by the Midwest, Southern and Southeastern regions; while the worst ratio was found in the Northern macro-region (one dentist per 72,982 inhabitants).

Ninety-seven percent of CEOs had an adequate number of complete dental consulting rooms per CEO type ; 26% had an adequate ratio between the working hours of nursing auxiliaries/technicians and those of dental surgeons; and 60% had adequate supply of recommended minimum specialties (Table 2).

CEOs located in the Southeast region had the lowest percentage for adequate ratio between the working hours of nursing auxiliaries/technicians and those of dental surgeons, while proportionally the Northern region had the lowest percentage of adequate supply of recommended minimum specialties. The proportional difference between the regions was statistically significant (Table 2).

Discussion

The Northeastern region had the best ratio between CEO and dental surgeons per inhabitant, while the Northern region had the worst. The quantity of complete dental consulting rooms was adequate in most CEOs. The majority of CEOs were not adequate with regard to the working hours of nursing auxiliaries/technicians in relation to those of dental surgeons. In addition, some CEOs did not offer the minimum number of specialties recommended by the Ministry of Health.

Table 1 – Number and percentage of Dental Specialties Centers (CEOs) and dental surgeons working in CEOs, by macro-region, and their ratio to the resident population, Brazil, 2014 (N=931)

Macrorregião e Brasil	CEO		DS[a]		Population	Ratio	
	N	%	N	%	N	Population/CEO[b]	Population/DS[c]
Northern	60	6	236	5	17,231,027	287,184	72,982
Northeastern	357	38	1,204	34	56,186,190	157,384	46,670
Southeastern	337	36	1,341	38	85,115,623	252,569	63,462
Midwest	62	7	294	8	15,219,608	245,478	51,785
Southern	115	12	443	15	29,016,114	252,314	65,532
Brazil	931	100	3,518	100	202,768,562	217,797	57,640

a) Dental surgeons working in CEOs.
b) Ratio between the resident population and the quantity of CEOs.
c) Ratio between the resident population and the number of dental surgeons working in CEOs.

Table 2 – Adequate Dental Specialty Centers (CEOs) in relation to the analyzed variables (%), per macro-region, Brazil, 2014 (n=931)

Variables	North	Northeast	Midwest	Southeast	South	P- value[d]	Brazil
Dental chairs[a]	95	96	100	99	95	0.077	97
Ratio auxiliary/dentist[b]	33	28	22	18	38	<0.001	26
Minimum specialties[c]	31	48	69	73	71	<0.001	60

a) Adequacy of the quantity of complete dental consulting rooms per CEO type.
b) Adequacy of the ratio between the working hours of dental auxiliaries/technicians and those of dental surgeons.
c) Adequacy of the availability of recommended minimum specialties.
d) Pearson's chi-square test.

Lack of available information about the working hours of each CEO dental surgeon is the main limitation of this study. Moreover, there is no ideal standard for the ratios analyzed that could have allowed opinions to be given as to the ratios found. A further limitation is that the data could not be compared over time as there was only one Pmaq-CEO evaluation cycle for the period analyzed.

The best ratio found between the population and the quantity of CEOs reinforces the pioneering nature of the Northeast region in implementing public health policies.[13] In 2001, 59.2% of all SUS oral health care teams (ESBs) were located in the Northeast, compared to 4.9% in the North. In 2013, these proportions were 48.5% and 7.8%, respectively.14 In 2012, the proportion of the population covered by ESBs was highest in the Northeast (37.89%) and lowest in the North (6.15%).[15]

Labor force availability is an essential factor in the supply of secondary oral health care services. In this study, there was difference in the ratio between the number of dental surgeons and inhabitants in some macro-regions, especially in the North. This fact is explained by the tendency of professionals to take up residence close to the place where they graduated or in large urban centers and in places where it is easier to take refresher and postgraduate courses.[16,17] According to Federal Council of Dentistry data for 2014, the majority of dentistry degree courses were concentrated in the Southeastern (43%), Northeastern (19%) and Southern (18%) macro-regions.[16]

The number of complete dental consulting rooms per CEO type was adequate in relation to MoH ordinance norms, indicating that the supply of secondary dental care is in accordance with the recommended procedure.[12] Supply of minimum specialties oscillated in the Brazilian regions. The lack of these specialties compromises referral of primary care service users to secondary care and restricts treatment options,[17] thus interfering with care comprehensiveness. Furthermore, in cases in which more conservative dental procedures could be carried out, more complex treatment ends up being provided, leading to future demands for costly rehabilitation for

the patient or the public health system.[18] Moreover, the greater the ESB coverage, the worse the performance of specialized oral health care.[18]

The standard collective oral health team is comprised of a dental surgeon and dental auxiliaries/technicians.[19] The lack of dental auxiliaries/technicians working together with dental surgeons can negatively influence the efficiency and duration of their work, as well as productivity.[20] In this study, discrepancy between the working hours of nursing auxiliaries/technicians and those of dental surgeons and the MoH ordinance norm was found in most CEOs, which suggests that dentists are often working alone.

In conclusion, there were limitations in the supply of SUS specialized dental care services, with regional differences. This study suggests the creation of an ideal standard ratio for CEO and dental surgeon per inhabitant for each Brazilian region, considering the local particularities and the epidemiological picture of each location. Such a standard would allow evaluation of health professional availability in each location, helping health planning processes in relation to the allocation of human resources.

Authors' contributions

Rios LRF and Colussi CF outlined the study, analyzed and interpreted the data. Rios LRF was responsible for writing the first version of the manuscript and Colussi CF critically reviewed its intellectual content. All authors approved the final version for publication and declared themselves to be responsible for all aspects of the study, ensuring its accuracy and integrity.

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