

# Number of dentists and GDP *per capita* in the municipalities of the state of Paraíba with undergraduate courses in Dentistry

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## ABSTRACT

This study aimed at relating the distribution of Dentistry courses, number of dental surgeons (DS) and GDP *per capita* in municipalities of the state of Paraíba with undergraduate courses in Dentistry. This is a descriptive cross-sectional study using secondary data from the Brazilian Federal Council of Dentistry (CFO), the Brazilian Institute of Geography and Statistics (IBGE) and the National Registry of Higher Education Courses and Institutions. All data used in this study is publicly accessible. The state has 16 undergraduate courses in Dentistry, distributed in 6 municipalities: Araruna (1; 6.25%), Cabedelo (1; 6.25%), Cajazeiras (2; 12.50%), Campina Grande (6; 37.50%), João Pessoa (4; 25.00%) and Ducks (2; 12.50%). The municipalities with the highest GDP *per capita*, such as João Pessoa (R\$ 24,319.82) and Campina Grande (R\$ 21,077.30), also had a higher number of DS, with a positive correlation between the values of GDP *per capita* of each municipality and the number of courses and professionals. Besides, Cabedelo, a municipality in Paraíba with only one Dentistry course, which is in the private network, and 126 active DS, has the highest GDP *per capita* in the state (R\$ 42,556.16) (table 2). According to the results presented in this study, GDP *per capita* seems to be responsible for the distribution of SD in municipalities with undergraduate courses in Dentistry. However, factors such as quality of life, labor market and health tend to strongly influence the distribution of these professionals.

**Descriptors:** Dental Schools. Dentistry. Economic Development.

## 1 INTRODUCTION

Since its regulation within the Brazilian territory, in 1966<sup>1</sup>, Dentistry has been historically characterized by its evolution as a professional category; with a recent mercantilization and multiplication in the number of dental surgeons (DS), which is proportionally higher than the population growth rate<sup>2</sup>.

Despite the growing number of DS, the distribution of these professionals among the regions of the country is irregular<sup>2-4</sup>, possibly due to the higher concentration of higher education institutions (HEIs) in regions with greater economic development, such as Southeast and the South<sup>5,6</sup>.

The large number of spots offered in undergraduate Dentistry courses contributes to the concentration of professionals in certain locations, in addition to leading to the saturation of the labor market<sup>6</sup> and a possible crisis in the profession, which motivated the Brazilian Federal Council of Dentistry (CFO), in 2017 and 2019, to ask the Ministry of Education to suspend the opening of new Dentistry courses in Brazil<sup>7</sup>.

The presence of a university campus transforms the social, cultural and economic environment of a municipality, due to the attraction of students and investments, job creation and greater supply of qualified professionals, transforming this region into a scientific and technological pole<sup>8,9</sup>.

In the context of the state of Paraíba, the municipalities in which HEIs are based are more economically developed and attract the population of adjacent municipalities in search of academic training and job opportunities<sup>10</sup>.

Therefore, this study aims at relating the number of SDs and GDP *per capita* in municipalities of Paraíba with undergraduate courses in Dentistry.

## 2 METHODS

This is a descriptive cross-sectional study using secondary data from the Brazilian Federal Council of Dentistry (CFO)<sup>11</sup>, the Brazilian Institute of Geography and Statistics (IBGE)<sup>12</sup> and the National Registry of Higher Education Courses and Institutions<sup>13</sup>. Data collection was performed between April and May 2020.

The number and distribution of undergraduate courses in Dentistry were collected on the website of the National Registry of Higher Education Courses and Institutions<sup>13</sup>. The number of DS was obtained from the CFO<sup>11</sup> website, consulting the number of DS registered in the state of Paraíba and in the municipalities with undergraduate courses in Dentistry. In the research, only those professionals that were active until the date of the search were considered, according to the record in the CFO.

The estimated number of inhabitants for each of the municipalities of Paraíba was collected from the IBGE website<sup>12</sup>. Initially, the search was conducted on the IBGE *Estados* website<sup>14</sup> to verify the total population of Paraíba, followed by the search on the IBGE *Cidades* website<sup>15</sup>, consulting the estimated population of the municipalities with undergraduate courses in Dentistry. The gross domestic product (GDP) *per capita* of each municipality was also collected in the statistical data of the IBGE website<sup>12</sup>.

The data were tabulated using the Microsoft Excel 2013 software (Microsoft, Redmond, WA, USA) in which they were analyzed descriptively. Subsequently, the Software SPSS version 20.0 (IBM, Armonk, NY, USA) was used to perform Spearman correlation analyses between the values of GDP *per capita* of each municipality and the number of courses and professionals, with a 5% significance level ( $p < 0.05$ ). All data used in this search are publicly accessible.

### 3 RESULTS

In Paraíba, a northeastern state with 4,018,127 inhabitants, there are 5,121 DS, with a proportion of one DS every 784.64 inhabitants. The state has 16 undergraduate courses in Dentistry, distributed in 6 municipalities: Araruna (1; 6.25%), Cabedelo (1; 6.25%), Cajazeiras (2; 12.50%), Campina

Grande (6; 37.50%), João Pessoa (4; 25%) and Patos (2; 12.50%); four of these courses in the public network (25.00%) and 12 in the private network (75.00%) (table 1). It is important to emphasize the increase in the offer of courses in the state private network, starting in 2015, with the opening of 10 new courses (62.50%) (table 1).

Table 1. Distribution of Dentistry courses in the state of Paraíba by municipality, institution, administrative category, beginning of the course and percentage of courses by municipality

Municipality	Institution	Administrative Category	Beginning of the Course	Courses by Municipality (%)
Araruna	State University of Paraíba	Public	20/09/2010	6.25%
Cabedelo	University Center UNIESP	Private	04/09/2015	6.25%
Cajazeiras	Santa Maria College	Private	15/02/2016	12.50%
	Higher Institute of Cajazeiras	Private	02/06/2016	
Campina Grande	Campina Grande College	Private	12/07/2017	37.50%
	Integrates Colleges of Patos	Private	09/05/2019	
	Rebouças College of Campina Grande	Private	11/03/2019	
	State University of Paraíba	Public	03/03/1972	
	University Center FACISA	Private	19/02/2018	
João Pessoa	University Center Maurício de Nassau	Private	01/02/2018	25.00%
	Nova Esperança Nursing College	Private	05/04/2016	
	Federal University of Paraíba	Public	06/01/1953	
	University Center João Pessoa	Private	01/08/2007	
Patos	UNINASSAU College João Pessoa	Private	29/06/2015	12.50%
	Federal University of Campina Grande	Public	09/03/2009	
	University Center of Patos	Private	24/03/2008	
<b>Paraíba</b>	<b>16 courses</b>	<b>-</b>	<b>-</b>	<b>100%</b>

Municipalities with higher GDP *per capita*, such as João Pessoa (R\$ 24,319.82) and Campina Grande (R\$21,077.30), also had a higher number of DS, with one DS every 340.5 inhabitants in João Pessoa and one professional every 456.78

inhabitants in Campina Grande (table 2). Cabedelo, a municipality in Paraíba with only one Dentistry course, which is in the private network, and 126 active DS, has the highest GDP *per capita* in the state (R\$ 42,556.16) (table 2).

Table 3 shows the results of the correlation analysis between the values of GDP *per capita* of each municipality and the number of undergraduate courses and professionals. Although the correlation values were positive, they were not statistically significant.

Table 2. Distribution of DS, DS/inhabitant ratio and GDP *per capita* in municipalities with undergraduate courses of Dentistry in the state of Paraíba

Municipality	Number of DS	Number of Inhabitantes	DS/inhabitant Ratio	GDP <i>per capita</i>
Araruna	14	20,312	1/1450.86	R\$ 8,104.98
Cabedelo	126	67,736	1/537.6	R\$ 42,556.16
Cajazeiras	80	61,993	1/774.91	R\$ 17,623.96
Campina Grande	897	409,731	1/456.78	R\$ 21,077.30
João Pessoa	2,376	809,015	1/340.5	R\$ 24,319.82
Patos	250	107,605	1/430.42	R\$ 15,882.57

Table 3. Spearman correlation analysis between the GDP *per capita* values of each municipality and the number of undergraduate courses and DS

		Correlations		
		Number of courses	GDP <i>per capita</i>	Number of DS
Number of courses	Correlation coefficient	1.000		
	<i>p</i> -value	.		
GDP <i>per capita</i>	Correlation coefficient	0.206	1.000	
	<i>p</i> -value	0.695	.	
Number of DS	Correlation coefficient	0.265	0.029	1.000
	<i>p</i> -value	0.612	0.957	.

#### 4 DISCUSSION

The results observed in this research show the wide range of undergraduate courses in Dentistry in Paraíba, mostly in the private network. This expansion of new courses in the state, from the year 2015, represents a phenomenon described by Pinto (1983)<sup>16</sup>, and that occurs throughout the country since the

1980s, when the increase in the number of undergraduate courses led the Ministry of Education to prohibit the opening and expansion in the number of vacancies in universities.

A greater number of universities, either public or private, are concentrated in large urban centers, which contributes to an unequal distribution of professionals, considering that

due to the competitiveness of the labor market, the graduate tends to remain in the university centers, possibly justifying the high number of professionals in these locations.

The permanence of the professional in a region is also associated with factors such as personal characteristics, desired lifestyle, geographical characteristics of the place, family issues, work market, search for specialization and professional updating and access to culture and leisure<sup>17,18</sup>. Besides, Mathias et al. (2015)<sup>19</sup> points out that the saturation of the labor market, resulting from the increasing supply of Dentistry courses and iniquity in the distribution of DS, can positively affect the exercise of the profession, such as the need for innovation, search for differentiation and greater generation of value to patients, stimulated by increased competition.

In this study, when relating the number of inhabitants with the number of DS of each municipality, it was observed that all the municipalities evaluated presented density below one DS every 1500 inhabitants, with João Pessoa being the municipality with the highest number of professionals, about four times more than the proportion of 1:1500<sup>3</sup>. This indicator has some limitations, since it does not consider socioeconomic, cultural and epidemiological variables<sup>20</sup>.

The data obtained in this study show that the GDP per capita of the municipalities are also proportional to the number of courses and DS (table 3). Among the municipalities studied, João Pessoa and Campina Grande have the highest GDP *per capita*, R\$ 24,319.82 and R\$ 21,077.30, respectively, and the highest number of undergraduate courses in Dentistry and DS.

GDP is an indicator related to economy growth, which helps to understand it. However, it alone does not respond by the number of DS in municipalities with Dentistry courses, as observed by Rezende et al. (2019)<sup>9</sup>. Factors such

as quality of life, education and health are important in this relationship, which would justify the number of DS and undergraduate courses in Cabedelo, although it has the highest GDP *per capita* among the municipalities studied.

## 5 CONCLUSION

According to the results presented in this study, GDP *per capita* seems to be responsible for the distribution of DS in municipalities with undergraduate courses in Dentistry. However, factors such as quality of life, labor market and health tend to strongly influence the distribution of these professionals. Moreover, controlling the expansion of courses and, consequently, the number of trained professionals is imperative to improve the current situation of Dentistry and its future as a profession.

## RESUMO

### **Número de cirurgiões-dentistas e PIB *per capita* nos municípios paraibanos com cursos de graduação em Odontologia**

O objetivo deste estudo foi relacionar a distribuição dos cursos de Odontologia, número de cirurgiões-dentistas (CD) e PIB *per capita* em municípios paraibanos com cursos de graduação em Odontologia. Trata-se de um estudo transversal descritivo com utilização de dados coletados diretamente dos *sites* do Conselho Federal de Odontologia, do Instituto Brasileiro de Geografia e Estatística e do Cadastro Nacional de Cursos e Instituições de Ensino Superior. Todos os dados utilizados nesta pesquisa são de acesso público. A Paraíba possui 16 cursos de graduação em Odontologia, distribuídos em 6 municípios: Araruna (1; 6,25%), Cabedelo (1; 6,25%), Cajazeiras (2; 12,50%), Campina Grande (6; 37,50%), João Pessoa (4; 25,00%) e Patos (2; 12,50%). Os municípios com maiores valores de PIB *per capita*, como João Pessoa (R\$24.319,82) e Campina Grande (R\$21.077,30), apresentaram também maior

número de CD, com uma correlação positiva entre os valores do PIB *per capita* de cada município e a quantidade de cursos e profissionais. Apesar disso, Cabedelo, município paraibano com apenas um curso de Odontologia, sendo este na rede privada, e 126 CDs em atividade, tem o maior PIB *per capita* do estado (R\$ 42.556,16). O PIB *per capita* parece ser responsável pela distribuição de CDs nos municípios com cursos de graduação em Odontologia, no entanto, fatores como qualidade de vida, mercado de trabalho e saúde, tendem a exercer forte influência na distribuição destes profissionais.

**Descritores:** Faculdades de Odontologia. Odontologia. Desenvolvimento Econômico.

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