

# Surgery in Brazilian Health Care: funding and physician distribution

## *Cirurgia no Sistema Brasileiro de Saúde: financiamento e distribuição de médicos*

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### ABSTRACT

**Objective:** to analyze demographic Brazilian medical data from the national public healthcare system (SUS), which provides free universal health coverage for the entire population, and discuss the problems revealed, with particular focus on surgical care. **Methods:** data was obtained from public healthcare databases including the Medical Demography, the Brazilian Federal Council of Medicine, the Brazilian Institute of Geography and Statistics, and the National Database of Healthcare Establishments. Density and distribution of the medical workforce and healthcare facilities were calculated, and the geographic regions were analyzed using the public private inequality index. **Results:** Brazil has an average of two physicians for every 1,000 inhabitants, who are unequally distributed throughout the country. There are 22,276 board certified general surgeons in Brazil (11.49 for every 100,000 people). The country currently has 257 medical schools, with 25,159 vacancies for medical students each year, with only around 13,500 vacancies for residency. The public private inequality index is 3.90 for the country, and ranges from 1.63 in the Rio de Janeiro up to 12.06 in Bahia. **Conclusions:** A significant part of the local population still faces many difficulties in accessing surgical care, particularly in the north and northeast of the country, where there are fewer hospitals and surgeons. Physicians and surgeons are particularly scarce in the public health system nationwide, and better incentives are needed to ensure an equal public and private workforce.

**Keywords:** General Surgery. Public Health Administration. Public Policy. Surgery Department, Hospital. Medically Underserved Area.

### INTRODUCTION

In 1988, Brazil developed a national public healthcare system (SUS), which provides free universal health coverage for the population and is managed by all levels of the government. It is a complex and dynamic system that still faces many difficulties. There are several aspects that should be taken in consideration to explain the difficulties in healthcare, including the geographic area, the size of the population, and the differences in distribution of this population.

Brazil is a developing country of continental dimensions, it is the most populous country in South America with a population of over 200 million inhabitants. It is one of world's largest economies and a regional leader in Latin America. However, it continues to have economic and social inequalities that plague many other developing countries.

It has three levels of autonomous government – federal, 26 states and a federal district, along with 5.570 municipalities. Since 1991, Brazil has been considered an urban country with low demographic

density, as around 75% of the total population lives in an urban area<sup>1</sup>.

Brazil could be mistaken for a developed country if only the gross domestic product (GDP) were considered, as it is the sixth largest in the world, valued at US\$ 2,254 trillion<sup>2</sup>. However, a closer look reveals that the human developing index (HDI) ranks at 79<sup>th</sup> in the world<sup>3</sup>. This can best be explained by the socio-economical discrepancies among different regions. The country has five geographical regions with variable demographic, economic, social, cultural and health conditions, leading to widespread social inequalities: North, Northeast, Southeast, South and Midwest.

Attaining a high quality of surgical and anesthesia care is the one of the key concepts in achieving healthcare equality for all people today. Drs. Farmer and Kim noted that there are five billion people without access to surgery around the world, largely in low and middle income countries (LMIC)<sup>4</sup>. Similarly, there are over 500,000 post-delivery maternal mortalities each year who did not have access to a cesarean section. Thus, they concluded that surgery is "an indivisible and an indispensable part of healthcare".

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Evidence and metrics to evaluate the quality of a health system, particularly for surgical procedures, are often imprecise. Recent systematic reviews of surgical care in LMIC have concluded that surgeries correcting congenital deformities and cesarean sections are quite cost effective, especially compared to other public health interventions<sup>5,6</sup>. More specifically, previous studies compared the benefits of cleft lip repair as it related to an individual's lifetime income, which can increase by almost ten times for those who had surgery when compared to those without surgical repair<sup>7</sup>.

Though the numbers of physician and medical school are considered important aspects in the evaluation of a health system, the geographic distribution can also play a role in the quality of access to healthcare. According to the Brazilian Federal Council of Medicine, the country currently has 257 medical schools, more than the United States and China with 149 and 150, respectively<sup>8</sup>, but they are not homogeneously distributed in the country. Additionally, most of the medical schools in Brazil are private.

Medical data in Brazil is still scarce, especially in the more remote areas of the country and even more so in terms of surgical care. In this aspect, the book *Medical Demography in Brazil*<sup>9,10</sup> by the Brazilian Federal Council of Medicine (CFM) and the Regional Council of Medicine of the State of São Paulo (CREMESP) is pioneer. It is a national study that provides primary data about different aspects of healthcare, most notably physician distribution.

With this in mind, the authors sought to further analyze existing Brazilian medical data and discuss the problems revealed, with particular focus on surgical care.

## **METHODS**

Raw data was obtained from the both volumes of the book *Medical Demography in Brazil*, from 2011 and 2013<sup>9,10</sup>. Further information was collected from the CREMESP and CFM (Brazilian Federal Council of Medicine), which conglomerates all Medical Specialty Societies. The CFM uses four different databases: AMS (Sanitary Medical Assistance), IBGE (Brazilian

Institute of Geography and Statistics), CNES (National Database of Healthcare Establishments) and RAIS (Annual Recordings of Healthcare Information). Data for comparison from other countries was collected from the WHO World Health Statistics 2014. The authors also reviewed previous literature on the cost-effectiveness and impact of surgery in a patient's life.

This study also uses the Public/Private Inequality Index (PPII) as characteristic measure of the workforce<sup>10</sup>. The PPII is a ratio of the density of physicians working in the private sector, divided by the density of physicians working in the public sector, for a determined region. Both of these densities are divided by the patient population of either the public or private health sector.

Therefore, the higher the ratio, the larger the shift towards the private system and away from the public healthcare system, in terms of workforce distribution. This is used to give some epidemiological data regarding the medical workforce throughout Brazil and serves to measure sector inequality.

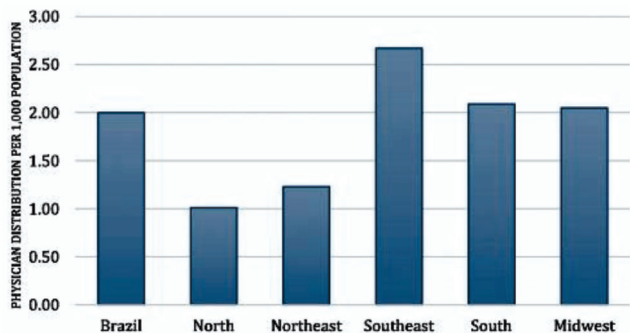
## **RESULTS**

Brazil has an average of two physicians for every 1,000 inhabitants, who are unequally distributed throughout the country (Figure 1). There are 22,276 board certified general surgeons, with a ratio of 11.49 for every 100,000 people. Most of them are located in the southeast of the country (Figure 2). The population density follows a similar pattern, though there are still higher ratios of general surgeons in the South, Southeast and Midwest when compared to the North and Northeast (Figure 2).

The country has 94.070 health facilities, with 52.021 public and 42.049 private facilities (Figure 3)<sup>11</sup>.

Brazil currently has 257 medical schools, with 25,159 vacancies for medical students each year. Following medical school, there are around 13,500 vacancies for residency. Overall, of 388,015 practicing physicians in Brazil, though 180,136 physicians (46.43%) have no residency training<sup>9,10</sup>.

The PPII is shown in figure 4, and ranges from 1.63 in the Rio de Janeiro up to 12.06 in Bahia. The PPII is 3.90 for the entire nation of Brazil<sup>9,10</sup>.



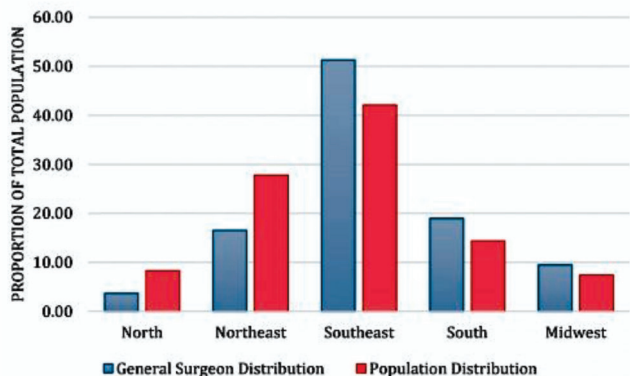
**Figure 1.** The density of physicians in Brazil by region.

According to the WHO, Brazil annually spends a total of US\$1,035 per capita (8.9% of GDP) on healthcare, compared to US\$8467 (17.7% of GDP) in the United States and US\$4474 (11.3% of GDP) in Germany<sup>12</sup>. In Brazil, 45.7% of this expenditure is public, compared to 47.8% in the United States and 76.5% in Germany<sup>13</sup>.

## DISCUSSION

The national public healthcare system (SUS) was developed to ensure that every citizen has access to effective and free healthcare. Nevertheless, a high but uncertain percentage of the population has little access to health professionals and thus lives under very low-quality healthcare.

The growth of physicians in Brazil has been nearly exponential for at least 40 years. From 1970 to 2012, the number of physicians grew 557.72%. Comparatively, the population only grew by 101.84%. Even though the growth of the medical workforce vastly outweighs the population expansion, the federal government recently established a higher national



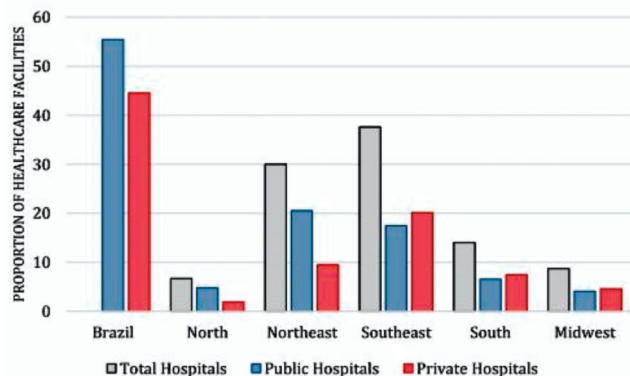
**Figure 2.** The proportion of general surgeons and the population who live and work in each region.

target of 2.5 doctors per 1,000 inhabitants – Brazil has already reached 400,000 doctors and a density of two doctors per 1,000 inhabitants. However, there is no plan to reduce inequalities in the concentration and distribution of physicians among regions and municipalities, or between the public and private sectors of health, which is, in fact, one of the major problems encountered in Brazilian healthcare.

Brazil has adopted the strategy of the “overflow” of professionals and is determined that the additional professionals will settle in the locations that are currently underserved. This disorganized settlement is even less effective, considering that the number of specialists and the questionable quality of their training, leading to further worsening of the quality of surgical treatment. The quantity of physicians has been increasing successfully, but the quality of their medical training has remained stagnant.

The shortage of physicians and surgeons is a problem worldwide. However, in the particular case of Brazil, what draws attention is the unequal distribution throughout the country, with physicians more concentrated in the south, southeast and along the coast (Figures 1 and 2). General hospitals distribution follows a similar pattern (figure 4). As previously reported, Brazil has around 22,276 board certified general surgeons and 18,236 anesthesiologists<sup>9</sup>, which compares to more populous countries such as the USA, for instance, which has around 23,000 general surgeons<sup>14</sup>.

Furthermore, analyzing the public/private inequality index (PPII), reveals that physicians are much more concentrated in the private healthcare system. The national PPII is 3.90, which means that patients in the private system have access to nearly four times as many physicians as patients in the public sector. The range displayed throughout regions and states is dramatic. In Bahia, in the northeast region, the ratio is 12.06, suggesting that the patients in the public sector have access to less than 10% of the number of physicians that may be accessed in the private sector. In the southeast region, the ratio comes down to 2.05 in São Paulo and 1.63 in Rio de Janeiro (Figure 4). Only 25% of the population of Brazil is covered by a private health insurance<sup>15</sup>, with the remaining 75% completely relying on public care.



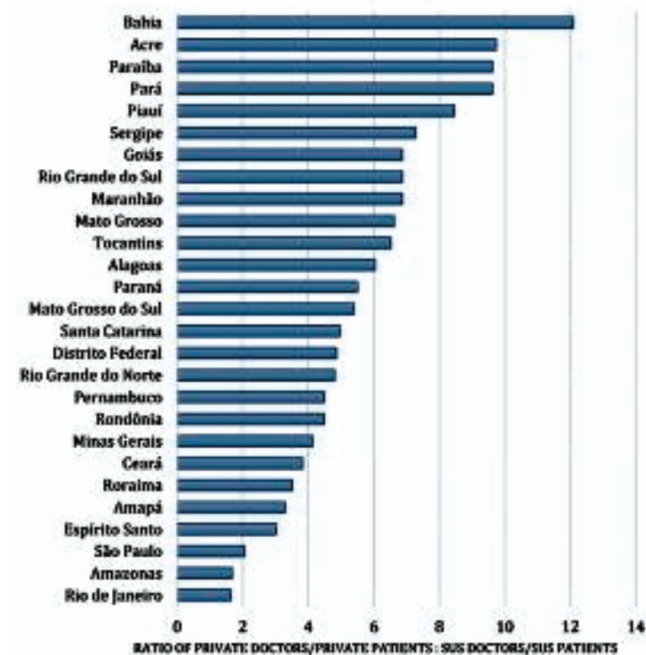
**Figure 3.** The distribution and characteristics of public and private health facilities in Brazil by region.

Perhaps one of the most aggravating factors to this situation is the questionable quality of recent medical graduates – 55% medical of recent graduates from São Paulo failed the exam applied by the CREMESP<sup>16</sup>. Additionally, there is a large lack of vacancies in medical residency to all graduates. Most graduates of medical schools in Brazil have not completed residency training: of 388,015 practicing physicians in Brazil, 46.43%, or 180,136, have no residency training<sup>9,10</sup>. Since there are no medical residency positions for all of these doctors, many of them will remain untrained. There are only enough vacancies in residency for 52% of the 15,751 medical students who graduate in Brazil in 2011. Though the number of residency vacancies has been raised to around 13,500 in 2014, the number of medical school graduates has also increased to 25,159. Thus, only 54% of medical students have a position in residency available to them.

The geographic distribution of these positions also follows the distribution of specialized physicians, further compounding the problem. The southeastern states, particularly São Paulo, act as a specialist center, as they are typically the places with the best general healthcare infrastructure. These states receive residents from other Brazilian states, and retain many of them for the rest of their career. The inadequate distribution of specialized human resources throughout Brazil may be due to a lack of attractiveness to work in the more remote regions. Lack of basic infrastructure in these more rural areas is a barrier to surgical workforce recruitment. Ultimately, this poor distribution of the medical and surgical workforce certainly contributes to the low quality of surgical care in certain regions of the country.

There is no evidence that suggests that there are places that are overcrowded with surgeons and hospitals, though it is clear that certain regions have large deficiencies in workforce and thus insufficient surgical treatment. This lack of healthcare infrastructure also may be a direct consequence of the scarce investment. In terms of healthcare expenditure, Brazil is far below other well-developed countries. According to the WHO, Brazil annually spends a total of US\$ 1,035 per capita (8.9% of GDP) on healthcare, compared to US\$ 8,467 (17.7% of GDP) in the United States and US\$ 4,474 (11.3% of GDP) in Germany<sup>12</sup>. In Brazil, 45.7% of this expenditure is public, compared to 47.8% in the United States and 76.5% in Germany<sup>13</sup>.

The access to healthcare data and statistics is still scarce in Brazil, creating some limitations to this study. The regions with limited data are typically the regions with poor health coverage as well. One concern with the data used in this study is the overlap between several different medical associations, recording similar indicators. For instance, a general surgeon may be registered in two different states, or may have another title, so he may not be recognized as a general surgeon, in certain datasets. With this in mind, the authors still believe the study has important implications in



**Figure 4.** The Public Private Inequality Index of the medical workforce in Brazil by state.

identifying the problems with the health system in Brazil, particularly regarding surgical care.

A significant part of the local population still faces many difficulties in accessing surgical care. It is especially concerning in the north and northeast of the country, where there are fewer hospitals and surgeons, and the population relies almost completely on the public health system. Physicians and particularly surgeons are scarce in the public health system nationwide, and better incentives should be created to ensure an equal public and private workforce. The lack of public investment in healthcare is evident when compared to other countries of similar sized and

developed countries. Improving the healthcare system should involve investing in infrastructure and creating long-lasting projects to attract healthcare providers to the low-income areas of the country. In the current setting with restricted resources, it is important to prioritize highly cost-effective interventions.

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## RESUMO

**Objetivo:** analisar dados demográficos do Sistema Único de Saúde (SUS) brasileiro, que promove cobertura de saúde universal a toda população, e discutir os problemas revelados, com particular ênfase nos cuidados cirúrgicos. **Métodos:** os dados foram obtidos a partir dos bancos de dados de saúde pública da Demografia Médica, do Conselho Federal de Medicina, do Instituto Brasileiro de Geografia e Estatística e do Cadastro Nacional dos Estabelecimentos de Saúde. A densidade e a distribuição do trabalho médico e dos estabelecimentos de saúde foram avaliadas, e as regiões geográficas foram analisadas usando o índice de desigualdade público-privado (IDPP). **Resultados:** o Brasil tem, em média, dois médicos por 1000 habitantes, que são desigualmente distribuídos no país. Tem 22.276 cirurgiões gerais certificados (11,49 por 100.000 habitantes). Existem no país 257 escolas de medicina, com 25.159 vagas por ano, e apenas cerca de 13.500 vagas de residência médica. O índice de desigualdade público-privado é de 3,90 para o país e varia de 1,63 no Rio de Janeiro até 12,06 na Bahia. **Conclusão:** uma parte significativa da população brasileira ainda encontra muitas dificuldades no acesso ao tratamento cirúrgico, particularmente na região norte e nordeste do país. Médicos e, particularmente, cirurgiões são escassos no sistema público de saúde e incentivos devem ser criados para assegurar uma força médica igual no setor público e no setor privado em todas as regiões do país.

**Descritores:** Cirurgia Geral. Sistema Único de Saúde. Assistência à Saúde.

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