

The state of the surgical workforce in Brazil

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Background. A critical insufficiency of surgeons, anesthesiologists, and obstetricians exists around the world, leaving billions of people without access to safe operative care. The distribution of the surgical workforce in Brazil, however, is poorly described and rarely assessed. Though the surgical workforce is only one element in the surgical system, this study aimed to map and characterize the distribution of the surgical workforce in Brazil in order to stimulate discussion on future surgical policy reforms.

Methods. The distribution of the surgical workforce was extracted from the Brazilian Federal Medical Board registry as of July 2014. Included in the surgical workforce were surgeons, anesthesiologists, and obstetricians.

Results. There are 95,169 surgeons, anesthesiologists, and obstetricians in the surgical workforce of Brazil, creating a surgical workforce density of 46.55/100,000 population. This varies from 20.21/100,000 population in the North Region up to 60.32/100,000 population in the South Region. A total of 75.2% of the surgical workforce is located in the 100 biggest cities in Brazil, where only 40.4% of the population lives. The average age of a physician in the surgical workforce is 46.6 years. Women make up 30.0% of the surgical workforce, 15.8% of surgeons, 36.6% of anesthesiologists, and 53.8% of obstetricians and gynecologists.

Conclusion. Brazil has a substantial surgical workforce, but inequalities in its distribution are concerning. There is an urgent need for increased surgeons, anesthesiologists, and obstetricians in states like Pará, Amapá, and Maranhão. Female surgeons and anesthesiologists are particularly lacking in the surgical workforce, and incentives to recruit these physicians are necessary. Government policies and leadership from health organizations are required to ensure that the surgical workforce will be more evenly distributed in the future. (Surgery 2016;■:■-■.)

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A CRITICAL INSUFFICIENCY OF SURGEONS, ANESTHESIOLOGISTS, AND OBSTETRICIANS EXISTS AROUND THE WORLD, leaving billions of people without access to safe operative care.¹ In Brazil, the overall distribution of medical professionals is largely uneven, with high concentrations of physicians in the cities in the South and Southeast and few to none in rural regions and in the North and Northeast.²⁻⁴ The distribution of the surgical workforce in Brazil, however, is poorly described and rarely assessed.

This is not isolated to Brazil, as there are large gaps in knowledge about the distribution of the

surgical workforce throughout most low- and middle-income countries.⁵ Assessing the surgical workforce is of utmost importance, as operation is a cost-effective intervention and can treat a large portion of the global burden of disease,⁶ including neoplasia, trauma, obstetric, and other noncommunicable diseases; 32.4% of all deaths in Brazil were estimated to be due to surgical disease in 2013.⁷ Mapping and analyzing the distribution of the surgical workforce is also known to be beneficial and essential in health policy development.⁸

Brazil is a large and urban country. It is a federal republic organized into 26 states and one federal district. The country is divided into 5 major regions: North, Northeast, South, Southeast, and Central West. The South, Southeast, and Central West have incomes and social and economic indicators much higher than those in the North and Northeast. Similarly, the regions most deprived of hospital beds are also the North (1.8 beds/1,000 inhabitants) and the Northeast (2.0/1,000).⁹

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All Brazilians have the right to health care through the National Health System that was created in the Federal Constitution of 1988. Additionally, more than a quarter of the population also uses private health insurance, usually provided by employers.¹⁰ Brazil has about 400,000 doctors (1.9 physicians per 1,000 inhabitants), which is comparable with both upper-middle income countries (2.0 physicians per 1,000 inhabitants) and Latin America and the Caribbean (2.0 physicians per 1,000 inhabitants).¹¹ The distribution of the surgical workforce of Brazil is poorly described, though thought to be largely concentrated in bigger cities and in the private sector.⁷

The surgical workforce is one element in a complex surgical system. This study aimed to map and characterize the distribution of the surgical workforce in Brazil in order to stimulate discussion on future surgical policy reforms.

METHODS

The distribution of the surgical workforce was extracted from the Brazilian Federal Medical Board registry as of July 2014. Every physician currently in practice in Brazil is required to participate in this registry. Inclusion criteria for the surgical workforce were surgeons, anesthesiologists, and obstetricians (SAO). Surgeons included specialists in general surgery, cardiovascular surgery, orthopedic surgery, hand surgery, abdominal surgery, otolaryngology, head and neck surgery, pediatric surgery, plastic surgery, thoracic surgery, vascular surgery, urology, and neurosurgery. Exclusion criteria for the surgical workforce were physicians >75 years of age, physicians with a medical graduation at <20 years of age, registry with the medical board prior to medical graduation, or missing dates of registration with the medical board. The correspondence address of each physician was used as the address of current practice.

The number and distribution of the physicians in the surgical workforce and their sex and age were analyzed. The ratio of SAO per 100,000 population was calculated for each of the 26 states and federal district, each region, and for the country of Brazil. Practice in an urban or rural setting was also determined and was categorized as urban if the physician practiced in one of the 100 most populated cities in the country (>268,593 inhabitants).

Population density and territorial data were obtained online from the Instituto Brasileiro de Geografia e Estatística, the national geographic and statistical database of Brazil.⁹ These data were

updated as of July 2015. All analyses were performed in SPSS software (version 8.0; IBM Corp, Armonk, NY) and in QGIS (version 2.10; Open Source, <http://www.qgis.org>). Age was compared with a *t* test, and all other variables were compared with a χ^2 test. The study was approved by the Ethics Committee of the Faculty of Medicine, University of São Paulo (CEP No. 797,424 on 03/09/2014) using CNPq resources (No. Process: 405077/2013-3).

RESULTS

There are 95,169 SAO in the surgical workforce of Brazil, creating a surgical workforce density of 46.55/100,000 population (Fig 1, Table). This varies from 20.21/100,000 population in the North Region up to 60.32/100,000 population in the South Region. In the surgical workforce, there are 51,827 surgeons (25.35/100,000 population), 18,800 anesthesiologists (9.20/100,000 population), and 25,519 obstetricians (12.48/100,000 population); 56.1% of the surgical workforce, 55.8% of surgeons, 59.8% of anesthesiologists and 53.5% of obstetricians are located in the state capital cities in Brazil. Women make up 30.0% of the surgical workforce, 15.8% of surgeons, 36.6% of anesthesiologists, and 53.8% of obstetricians and gynecologists (Fig 2). There are more women in the surgical workforce in the state capitals when compared with the interior (33.8% vs 25.3%, $P < .001$).

The average age of a physician in the surgical workforce is 46.6 years: 45.5 years for surgeons, 48.2 years for anesthesiologists, and 48.0 years for obstetricians and gynecologists. The surgical workforce is younger in the state capitals (46.1 years) vs the interior (47.4 years, $P < .001$). Physicians graduating from public medical schools make up 65.9% of the surgical workforce, 65.8% of surgeons, 68.9% of anesthesiologists, and 64.3% of obstetricians and gynecologists. More of the surgical workforce graduated from public schools in the state capitals (70.1%) when compared with the interior (61.0%, $P < .001$).

DISCUSSION

As a nation, Brazil meets the minimum requirement of 20–40 SAO per 100,000 population as recently recommended by The Lancet Commission on Global Surgery.^{1,12} However, it is below both the average 59.8 SAO/100,000 in South American countries that have estimated these data and the average 63.9 SAO/100,000 of South American countries in the upper-middle income group.^{13,14} This relative deficiency is not worrisome, however, as the large

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