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ARTICLE

Regional governance arrangements of the Brazilian Unified National Health System: provider diversity and spacial inequality in service provision

Arranjos regionais de governança do Sistema Único de Saúde: diversidade de prestadores e desigualdade espacial na provisão de serviços

Modalidades regionales de gestión en el Sistema Único de Salud: diversidad de prestadores y desigualdad espacial en la provisión de servicios

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Abstract

The study analyzes regional Brazilian Unified National Health System (SUS, in Portuguese) governance arrangements according to providers' legal sphere and the spacial provision of middle and high-complexity services. These arrangements express the way in which State and health system reforms promoted the redistribution of functions between governmental and private entities in the territory. We carried out an exploratory study based on national-scope secondary data from 2015-2016. Using cluster analysis based on the composition of the provision percentages of the main providers, we classified 438 health regions. In middle-complexity health care, municipal public providers (outpatient) and private philanthropic providers (hospital) predominate. In high complexity provision, philanthropic and for-profit providers (outpatient and hospital) predominate. Middle-complexity provision was recorded in all health regions. However, in 12 states, more than half of the provision is concentrated in only one health region. High-complexity provision is concentrated in state capital regions. Governance arrangements may be more or less diverse and unequal, if different segments and regional concentration levels of middle and high-complexity provision are considered. The study suggests that the convergence between decentralization and mercantilization favored re-scaling of service provision, with increase in the scale of participation of private providers and strengthening of reference municipalities. Governance arrangement characteristics challenge SUS regionalization guided by the collective needs of the population.

Delivery of Health Care; Regional Health Planning; Governance; Private Sector; Health Policy

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Introduction

In the international public policy literature, governance has been a frequent object of investigation, with different meanings, purposes and approaches [1,2,3].

Especially in Latin America, Marques [4] identifies an association between the concept and two distinct forms of government organization. One is related to an increased participation of private agents in State functions and activities; the other points to society's broader participation in decision-making processes. According to the author, though they point to different perspectives, in both meanings, the "State is viewed with suspicion". These interpretations favor the dissemination of prescriptive views on governance, as synonymous with "good government", one that is efficient, horizontalized and democratic. Additionally, they contributed to disseminating "*fictions regarding public policies and the politics that surround them*" [4] (p. 15), such as using governance as an alternative arrangement to traditional government institutions and the necessarily positive meaning attributed to governance.

Despite acknowledging these limitations, several works highlight the pertinence of governance as a category for analyzing public policy. The concept of governance is associated with "the act of governing policies" and its use enables us to call into question the meaning of this process amid recent changes in the exercise of power, which have favored the emergence of new actors and the simultaneous, autonomous and independent action of several public, private, and corporate groups and organizations [5,6]. It therefore emphasizes the need to understand polycentric configurations of government arrangements that express greater or lesser State protagonism in the processes of designing, implementing and controlling policies.

This approach also enables us to question the interactions between State, market and society in systems endowed with varying degrees of institutionalization, assuming the existence of, at times, unclear limits between them and the incorporation of informal devices through which collective actions are guided [4]. Additionally, many studies value the territorial dimension of governance by incorporating forms of re-scaling the State's actions, multiple government levels and spatial scales in their analysis of institutions and actors involved in policy processes [7,8,9].

In studies on health policies, we can observe different connotations and uses of governance [10,11,12]. The concept's dissemination took place starting in the 1990s, when movements in favor of reforming public health systems were intensifying and variations in the exercise of State authority started being observed [13,14]. In Europe and Latin America, the changes favored a broader sphere of action for regional and local actors, the incorporation of market mechanisms into the public administration and the greater presence of the private sector in the funding, provision and regulation of actions and services [15,16,17]. In this context, concerns were raised with regard to the factors that condition reforms and their repercussions in terms of maintaining health systems' public nature and the population's health, with governance used at times as a way to evaluate the performance of specific organization and management models [11,18,19,20] and at times as an analytical method for understanding policies [21,22].

Based on this discussion, the article seeks to analyze regional Brazilian Unified National Health System (SUS, in Portuguese) governance arrangements, according to providers' legal sphere and the spatial provision of middle and high-complexity services in Brazil.

Regional governance arrangements encompass the actors, structures and processes that shape the exercise of authority and policy decisions within the territory [3]. Among the many dimensions and aspects of governance arrangements, this study prioritized the analysis of the composition of public (federal, state and municipal) and private (for profit and not for profit) establishments that predominate in the SUS specialized care segments, in different spatial scales. We consider that the configurations of the public-private mix of service provision express the way in which State and health system reforms promoted the redistribution of functions between governmental and private entities in the Brazilian territory [23].

The justification for the study's approach is based on two main arguments. The first is related to the understanding of care provision as an economic and spatial dimension of the health policy's power. We highlight the expressive volume of visits and public expenditures in specialized care [24], the many interest groups mobilized around it and its importance in conforming health care networks within SUS [25]. Thus, the legal sphere of middle and high-complexity providers matters for under-

standing governance, given the identification of the main public and private actors responsible for providing these services. The second refers to the specificity of the health policy trajectory over the past three decades and its ramifications for regional health governance in Brazil. The implementation of SUS was influenced by different factors and competing projects which favored the expansion in public service offer concomitantly with transformations in the economic dynamics and the growth of the supplementary private sector [26]. Additionally, associated mercantilization and decentralization processes led to the diversification of actors (public and private) in public service management and provision, and to the establishment of different regional SUS governance arrangements [27,28].

From different perspectives, some studies have sought to explore the intergovernmental and public-private relationships that permeate SUS governance in the states and health regions [23,28,29,30,31,32]. However, for the most part, studies analyze one or a few cases, or prioritize a certain spatial scale (state, regional or local). The meaning and repercussions of this process on the national territory and on a multi-scale perspective remain under-explored.

This study was guided by the following questions: how are the regional SUS government arrangements configured in terms of the public and private middle and high-complexity providers? What are the conditioning factors and possible implications of these arrangements, considering the spatial distribution of specialized care in Brazil?

Methods

This is an exploratory study based on national-scope secondary data originating in the Health Ministry's health information systems, made available by the SUS Informatics Department (DATASUS; http://datasus.saude.gov.br/) and referring to the provision of middle and high-complexity outpatient and hospital services. Middle and high-complexity care, due to its particularities, was used as a proxy of the diversity of actors, both public and private, that act within SUS and of the relationship they establish with one another.

Middle and high-complexity outpatient procedures and hospital admissions are those classified as such in the "complexity" selection of the SUS Ambulatory Information System (SIA-SUS) and Hospital Information System (SIH-SUS). Although there is a near-infinite number of outpatient procedures classified as middle complexity, and though their occurrence in Brazilian states is diverse, in the two year period we studied, 95% of them were concentrated in: consultations, laboratory and imaging exams and physiotherapy. Likewise, middle-complexity hospital admissions encompass a wide variety of procedures which, for the most part (63%), included: diverse clinical treatments, delivery/birth and obstetric surgery.

The high-complexity outpatient care includes groups that encompass the following procedures: (1) diagnostic; (2) clinical; (3) surgical; (4) organ, tissue and cell transplants; and (5) medications. We did not include the medication group in this study for a few reasons: (a) medication dispensation is not comparable to the other procedures; (b) in 15 states, this procedure only takes place in the capital; (c) it falls under state responsibility in almost all municipalities and health regions; (d) since this group represents 95% of all procedures, its inclusion would make it impossible for us to apprehend the diversity of actors who participate in the provision of the others. With regard to high-complexity admissions, they encompass the first four procedure groups mentioned above.

The data we analyzed refer to the years 2015-2016. This choice was based on the homogeneity of the variables we selected for analysis and on reducing the influence of a possible casual variation by aggregating two subsequent years.

From SIA-SUS, we extracted data regarding the middle and high-complexity outpatient production, both according to the location where care took place (approved quantity) and their processing considered: (a) the spatial scale: macro-region, state/Federal District, health region; (b) legal sphere responsible for providing the service: public administration (federal, state/Federal District, municipal and others), not-for-profit entities, other corporate entities; (c) the concentration of outpatient care in the health regions of all states and the Federal District. The health regions correspond to a specific spatial division at the state level which were formally established for SUS planning, negotiation and intergovernmental management [23].

Fom SIH-SUS, we extracted data related to middle and high-complexity hospital admissions (approved Hospital Admission Authorizations – AIH), by location of hospital admission and considering the same variables detailed above, related to spatial scale, legal sphere and concentration.

We calculated the percentages of the middle and high-complexity outpatient and hospital production in the period 2015-2016 for each health region according to the categorization of the main providers: public federal (PF); public state/Federal District (PS); public municipal (PM); private not-for-profit or philanthropic (PrP); private for-profit (PrFPP).

The data analysis was carried out in two dimensions in order to assess: (1) the profiles of public and private providers in the regions; (2) the regional concentration of service provision. We carried out a cluster analysis in order to classify regions into groups constructed based on the similarity of regional profiles (established by the composition of the percentages of the production according to the main provider categories) and by the difference to the profiles of regions classified into the other groups. We ran the set of regions through a cluster analysis using the *k-medoids* method (partitioning around medoids [33]) through a joint analysis of five indicators (proportion of FP, SP, MP, Ppr and FPPr providers) calculated based on the middle and high-complexity outpatient and hospital production. Partitioning around medoids enabled us to group health regions according to characteristics shared by the main providers (intra-group homogeneity and inter-group heterogeneity).

We created maps to represent the groups created through the *k-medoids* method, of the four care segments we analyzed (middle and high-complexity outpatient and hospital care). We used graphic visualization methods and the functions *fviz_nbclust* and *hcut* (available in the Factoextra package; https://cran.r-project.org/package=factoextra) to support the assessment of the optimal number of groups. We used the municipal grid of the Brazilian Institute of Geography and Statistics (IBGE, in Portuguese) aggregated according to health region, available in the DATASUS page. The analysis encompassed the 438 health regions, which vary greatly in terms of number of municipalities, ranging from 1 to 42 (the Federal District alone is a health region). For data processing, we used the free software R (https://www.r-project.org), in the RStudio environment, and using the packages Cluster (https://cran.r-project.org/web/packages=cluster), Factoextra (graphic visualization methods and the functions *fviz_nbclust* and *hcut* were used to support the assessment of the optimal number of groups) and Glue (https://cran.r-project.org/web/packages=glue).

We assessed the regional concentration through the percentage of the middle and high-complexity outpatient and hospital production in each health regions, with the total production of the state (and the Federal District) of each service as the denominator. These data were tabulated and organized into graphs using the software Excel (https://products.office.com/).

Results

Territorial diversity of public and private provider profiles

In outpatient care, the cluster analysis identified four classification profiles for middle complexity and six for high complexity. In hospital care, the health regions had three profiles for middle complexity and eight clearly distinct profiles for high complexity. Each group reflects characteristics shared by the health regions and, consequently, configure the regions' general pattern and the best possible approximation for each situation, given the diversity of the empirical basis we investigated.

Table 1 presents the medians of the variables used to characterize the provider groups in each service provision segment, as well as the number of regions contained in each group. In outpatient care, the main group among the health regions (41.1%) was Group 2 (predominance of municipal provider) and the municipal provider had high medians in all groups. In middle-complexity hospital care, Group 3 (predominance of philanthropic provider) encompassed most health regions (45.7%). Philanthropic providers were also strongly present in the other groupss in this segment, along with municipal providers (Group 1) or with state and municipal providers (Group 2).

In high-complexity outpatient care, Group 2 (predominance of for-profit private provider) encompassed 32.2% of health regions, while Group 6 (predominance of philanthropic provider) encompassed 24.6% (Table 1). With regard to high-complexity hospital care, the pattern we observed

Table 1

Medians of all indicators included in the analysis, according to classification group. Brazil, 2015-2016.

Indicator	Group	Number of regions	Public federal	Public state	Public municipal	Private philanthropic	Private for-profit
Middle-complexity outpatient production	1	64	0.00	43.34	24.21	2.67	6.20
	2	180	0.00	2.87	67.71	4.95	6.50
	3	113	0.00	1.45	28.97	21.12	36.07
	4	81	0.00	0.01	37.80	46.79	6.67
Middle-complexity hospital production	1	143	0.00	0.00	51.91	13.06	0.00
	2	95	0.00	63.57	10.33	4.61	0.00
	3	200	0.00	0.00	1.330	91.06	0.00
High-complexity outpatient production	1	36	0.00	84.44	0.01	0.00	0.00
	2	141	0.00	0.00	0.01	0.00	91.85
	3	43	0.00	0.00	0.00	0.00	0.00
	4	74	0.00	6.44	0.88	47.36	38.83
	5	36	0.00	0.00	98.60	0.00	0.00
	6	108	0.00	0.00	0.10	95.19	1.03
High-complexity hospital production	1	49	0.00	0.00	100.00	0.00	0.00
	2	51	0.00	100.00	0.00	0.00	0.00
	3	94	0.00	0.00	0.00	0.00	0.00
	4	22	0.00	48.49	0.00	41.21	0.00
	5	5	93.38	0.00	0.00	4.49	0.00
	6	19	0.00	0.00	0.00	0.00	94.56
	7	40	0.00	0.74	0.13	66.67	13.79
	8	158	0.00	0.00	0.00	100.00	0.00

Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).

had the lowest composition diversity of predominant providers and Group 8 (predominance of private philanthropic provider) included the greatest number of health regions (36.1%). In both high complexity segments, we found a high proportion of regions characterized by scarcity/lack of providers (9.8% of regions in outpatient care and 21.5% in hospital care).

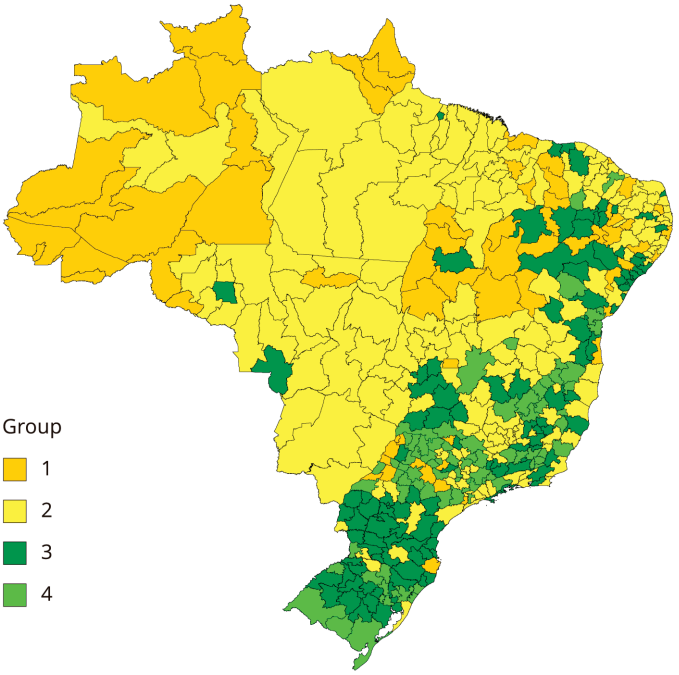
The spatial distribution of the four middle-complexity outpatient care provider groups shows that: (a) state providers (Group 1) had a larger presence in the health regions located in states in the North macro-region; (b) municipal providers (Group 2) predominated in the health regions in the North and Central and also had an expressive participation in the Northeast; (c) although in conjunction with municipal providers (Groups 3 and 4), private – philanthropic and/or for profit – providers were especially predominant in the health regions in the South, Southeast and part of the Northeast (Figure 1).

Private philanthropic providers (Group 3) predominate in the health regions of states in the South and Southeast in middle-complexity hospital care (Figure 2). On the other hand, public municipal and/or state providers (Groups 1 and 2) predominate in the North, Northeast and Central (except in the states of Ceará and Mato Grosso do Sul) always followed in importance by philanthropic providers. State providers were relevant in the health regions in the North (except those in Pará), in Piauí and Pernambuco, while municipal providers predominated in the regions in the Central and many states in the Northeast.

In the high-complexity outpatient care, the set of six groups informs (Figure 3): (a) scarcity or lack of predominant providers (Group 3) in all macro-regions, although with different magnitudes and locations, depending on the state; (b) greater importance of public providers (Groups 1 and 5) in the health regions of the states that make up Legal Amazon; (c) prominence of philanthropic and for-

Figure 1

Middle-complexity outpatient production: distribution of health regions according to provider groups. Brazil, 2015-2016.



Source: data extracted from the SUS Outpatient Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).

Note: Group 1: predominance of state provider, secondary importance of municipal provider; Group 2: predominance of municipal provider; Group 3: predominance of municipal provider and private for-profit provider, secondary importance of private philanthropic provider; Group 4: predominance of private philanthropic provider and municipal provider.

profit private providers in all macro-regions, whether along with state public providers (Group 4), or dominating provision (Groups 2 and 6); (d) predominance of philanthropic private providers (Group 6) in the health regions in the South and Southeast, in comparison with those in the Northeast, where the frequency of the private for-profit providers (Group 2) was greater.

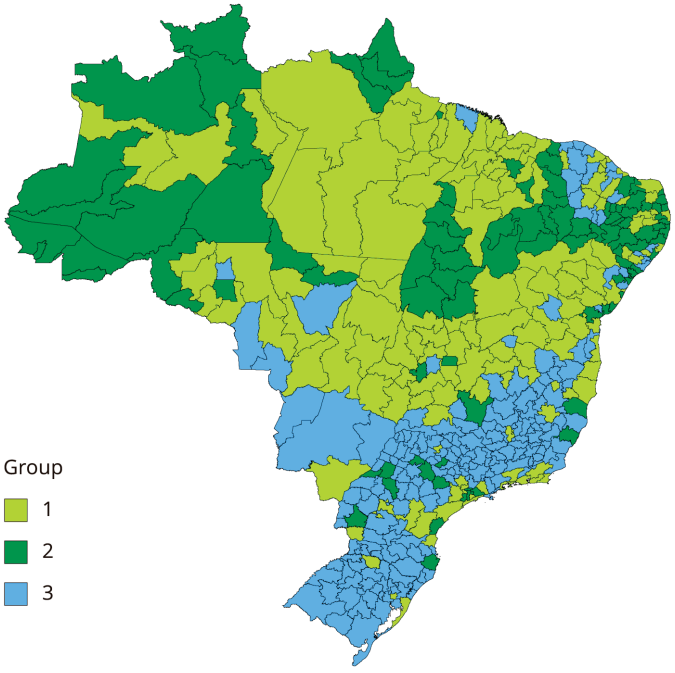
Finally, in addition to the greater scarcity or lack of predominant providers in all macro-regions and most states (Group 3), the eight groups of high-complexity hospital care showed particular situations: (a) predominance of private providers (Groups 6, 7 and 8) in the health regions located in the Southeast, South and part of the Center-West; (b) predominance of public state and/or municipal providers in half of the north of Brazil, in isolation (Groups 1 and 2) or alongside private philanthropic providers (Group 4); (c) predominance of the federal public provider (Group 5) in one or two health regions of some states (Amazonas, Minas Gerais, Rio de Janeiro, Rio Grande do Sul); (d) marked presence of the private philanthropic provider which, in isolation (Group 8) or along with for-profit providers (Group 7), is distributed through health regions across the entire national territory, except for the North region; (e) care voids (Group 3) concentrated in the North, Central and Northeast (Figure 4).

Regional concentration of care provision

The provision of middle-complexity outpatient care, in 2015-2016, was recorded by 5,162 municipalities (92.7% of existing municipalities) and in all 438 Brazilian health regions.

Figure 2

Middle-complexity hospital production: distribution of health regions according to provider clusters. Brazil, 2015-2016.



Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).
Note: Group 1: predominance of municipal provider, secondary importance of private philanthropic provider; Group 2: predominance of state provider, secondary importance of municipal provider and private philanthropic provider; Group 3: predominance of philanthropic provider.

The states with the highest percentage of regional concentration of middle-complexity outpatient production were those in which a single region had more than 50% of the entire state production. Excluding the Federal District, due to its particularity, twelve states were in this situation: five in the North macro-region, four in the Northeast, Rio de Janeiro and Mato Grosso do Sul (Figure 5). The highest concentration percentages were recorded in the region which includes the state capital.

On the other hand, the bigger the number of regions dividing the production, the lower the concentration. Thus, the least concentrated states were Santa Catarina, Minas Gerais, Rio Grande do Sul, São Paulo, Mato Grosso and Goiás. In the first, 13 regions were responsible for 51.5% of the production; in the others, 48.5% was diluted in three regions.

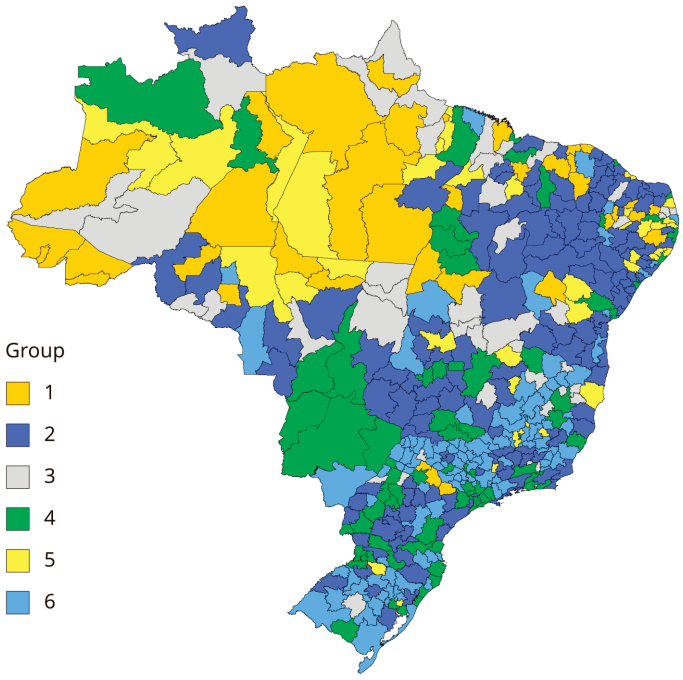
With regard to hospital care, there were middle-complexity admissions in 3,277 municipalities (58.8%), distributed across all 438 health regions.

Concentration was also present in this segment, but was smaller when compared to that of outpatient care. In 11 states, a single region concentrated more than 50% of admissions. States in the North (Roraima, Amapá, Acre, Amazonas) and Northeast (Pernambuco, Sergipe) had the highest concentration percentages (Figure 6), which were always found in the region that contained the state capital. On the other hand, Rio Grande do Sul, Santa Catarina, Bahia, Minas Gerais, Maranhão and São Paulo were the states with the lowest concetration of middle-complexity hospital care, that is, 73.4% to 100% of all of these admissions took place in an expressive number of health regions.

As for the high-complexity outpatient care, the number of municipalities that provided it (1,020) was much smaller, corresponding to 18.3% of the total. However, this production was registered in

Figure 3

High-complexity outpatient production: distribution of health regions according to provider clusters. Brazil, 2015-2016.



Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).
Note: Group 1: predominance of state provider; Group 2: predominance of private for-profit provider; Group 3: scarcity/lack of providers; Group 4: predominance of private philanthropic and for-profit providers, secondary importance of state provider; Group 5: predominance of municipal provider; Group 6: predominance of private philanthropic provider.

399 health regions (91.1%), though concentrated in a small number of municipalities, usually the state capital and regional reference municipalities. On the other hand, high complexity admissions took place in 668 municipalities (12%) and 350 health regions (79.9%), reflecting a higher concentration of this care and ratifying care voids.

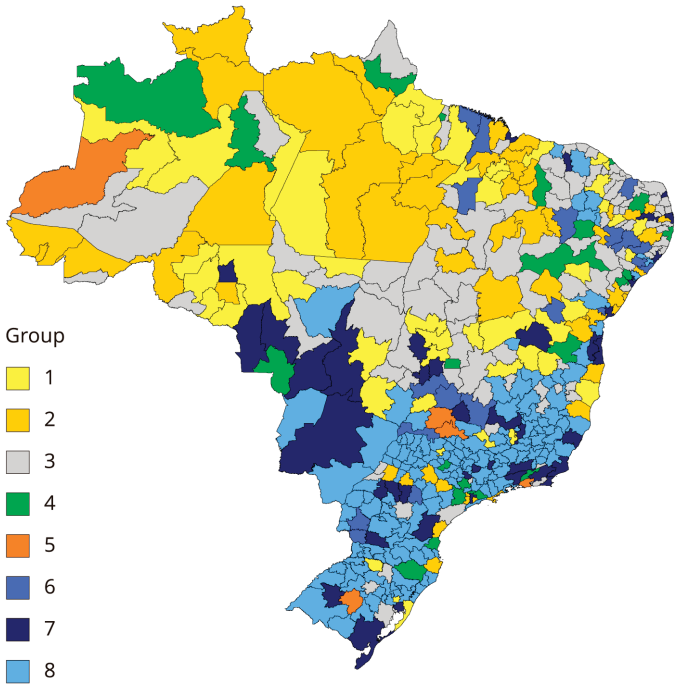
In general, high-complexity care (outpatient and hospital) is extremely concentrated in the regions which include the state capitals. This was the rule in the states of the North, Northeast and Central. This concentration was only slightly smaller in the states of the South, in addition to Minas Gerais and São Paulo.

Discussion

The study showed significant differences in the amount and composition of providers involved in the regional SUS governance arrangements. In the case of middle-complexity outpatient care, the main provider is municipal, jointly with the state, especially in the North macro-region, or with private providers, especially philanthropic, in the South, Southeast, Northeast and part of the Central. However, when the production is less concentrated (such as in the South and Southeast), the profile of the predominant providers is more diversified, involving public (municipal and state) and private (philan-

Figure 4

High-complexity hospital production: distribution of health regions according to provider clusters. Brazil, 2015-2016.



Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).
Note: Group 1: predominance of municipal provider; Group 2: predominance of state provider; Group 3: scarcity/lack of providers; Group 4: predominance of state provider and private philanthropic provider; Group 5: predominance of federal provider; Group 6: predominance of private for-profit provider; Group 7: predominance of private philanthropic provider, secondary importance of private for-profit provider; Group 8: predominance of private philanthropic provider.

thropic and for-profit) spheres. The only exception was the Northeast, because, in most states located in this macro-region, there is a high concentration of the production (more than 50% in a single health region). Even so, there is great diversity of provider profiles in the health regions.

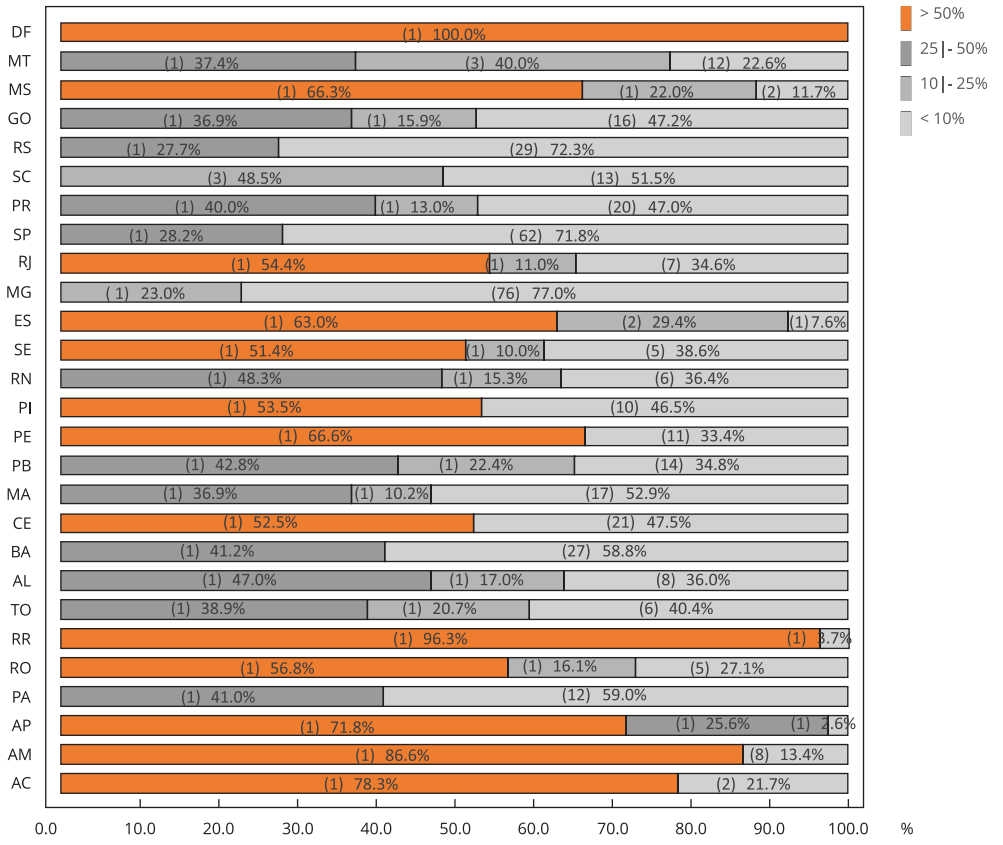
On the other hand, in the middle-complexity hospital production, in comparison with the outpatient care, we found a lower spatial concentration and lower diversity of predominant providers, in which municipal and philanthropic providers stand out.

In high-complexity care (outpatient and hospital), although there is a higher number of groups, the diversity of providers that predominate in a given health region is smaller, denoting a certain functional specialization among health establishments. This characteristic is associated with the existence of care voids in all macro-regions and an important concentration of care provision in a few reference municipalities and in a few health establishments.

In general, middle-complexity is less spatially concentrated, when compared with high complexity [34], and the provision of both outpatient and hospital services was registered in all 438 regions of the country. This fact may be related to investment and expansion efforts directed at the public and private SUS offer at this level of care, resulting from regionalization strategies developed in states starting in the 2000s [35]. However, in outpatient care, there is still a high spatial concentration of certain types of diagnostic and therapeutic support services, such as ultrasounds, diagnostic methods in specialties and radiology, which are not offered in a large number of health regions. On the other hand, hospital

Figure 5

Distribution of the number of health regions and their percentages * of middle-complexity outpatient production in the states and the Federal District. Brazil, 2015-2016.



AC: Acre; AL: Alagoas; AM: Amazonas; AP: Amapá; BA: Bahia; CE: Ceará; DF: Distrito Federal; ES: Espírito Santo; GO: Goiás; MA: Maranhão; MG: Minas Gerais; MS: Mato Grosso do Sul; MT: Mato Grosso; PA: Pará; PB: Paraíba; PE: Pernambuco; PI: Piauí; PR: Paraná; RJ: Rio de Janeiro; RN: Rio Grande do Norte; RO: Rondônia; RR: Roraima; RS: Rio Grande do Sul; SC: Santa Catarina; SE: Sergipe; SP: São Paulo; TO: Tocantins.

Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).

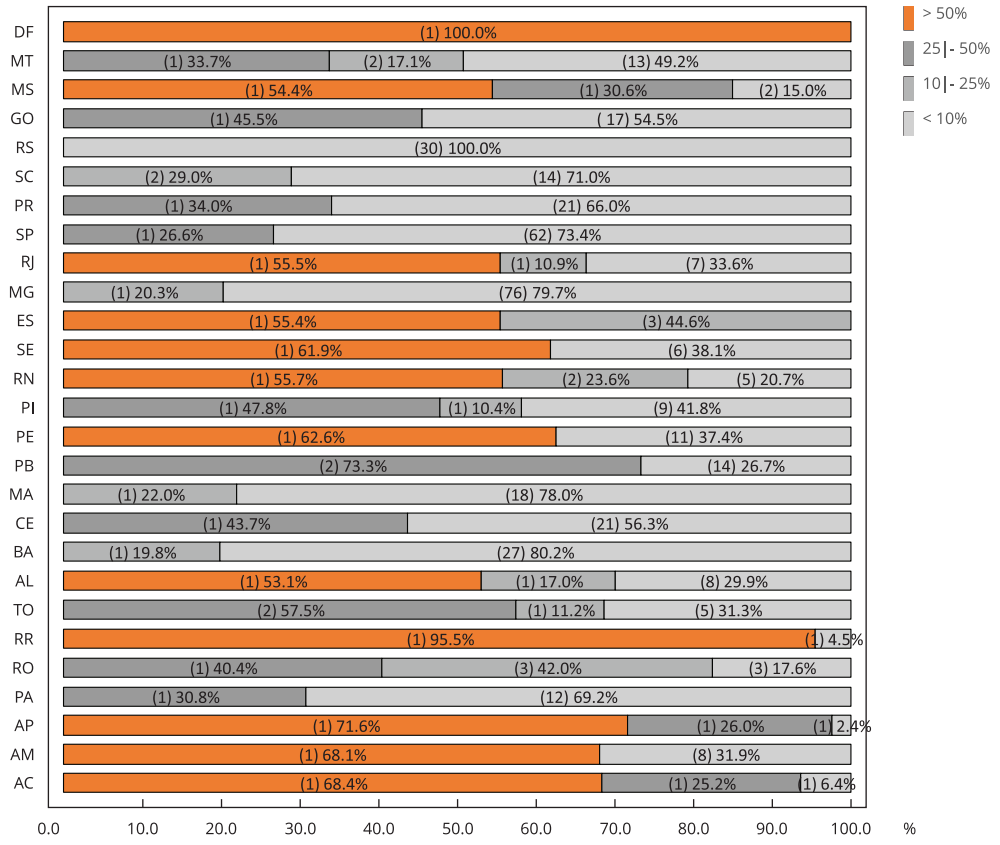
* The legend expresses, in four strata, each region's individual concentration. In the body of the figure, the presented proportions refer to the sum of concentrations per stratum.

care, slightly less concentrated, may be related to the existence and scope of small-size hospitals, which expanded in municipalities and, as a rule, are limited to births and clinical treatments [34,36].

Studies have shown that the scarcity of service offer and its high concentration in a small number of municipalities in health regions tend to exacerbate intergovernmental conflicts, as well as conflicts between public and private sectors, in the organization of health care [28]. The existence of conflicts results from a dispute over scarce resources (human and financial) and from the influence of the many providers in a single health region. In the case of regions where public federal, state and municipal providers predominate, the divergences are expressed in the dynamics of intergovernmental health policy relationships and, especially, in the negotiations established within the Regional Inter-Manager Commissions. In the regions where there is a greater diversity of health establishments, conflicts include the interaction between public and private in service provision [28].

Figure 6

Distribution of the number of health regions and their percentages * of middle-complexity hospital production in the states and the Federal District. Brazil, 2015-2016.



AC: Acre; AL: Alagoas; AM: Amazonas; AP: Amapá; BA: Bahia; CE: Ceará; DF: Distrito Federal; ES: Espírito Santo; GO: Goiás; MA: Maranhão; MG: Minas Gerais; MS: Mato Grosso do Sul; MT: Mato Grosso; PA: Pará; PB: Paraíba; PE: Pernambuco; PI: Piauí; PR: Paraná; RJ: Rio de Janeiro; RN: Rio Grande do Norte; RO: Rondônia; RR: Roraima; RS: Rio Grande do Sul; SC: Santa Catarina; SE: Sergipe; SP: São Paulo; TO: Tocantins.

Source: data extracted from the SUS Ambulatory Information System (SIA-SUS) and from the SUS Hospital Information System (SIH-SUS) (SUS Department of Informatics. http://www.datasus.gov.br).

* The legend expresses, in four strata, each region's individual concentration. In the body of the figure, the presented proportions refer to the sum of concentrations per stratum.

Other studies indicate that health regions marked by the concentration of production in a few private providers have governance arrangements that are less diverse and less conflicting [37]. This pattern reflects the coordinating and agglutinating power over regional policies and interests acquired by some companies, due to the resource concentration, scope and spatial reach of their actions [38].

The predominance of private (philanthropic and/or for profit) and municipal providers in most health regions and regional reference municipalities suggests a convergence between the processes of decentralization and mercantilization and the confluence of public and private interests in the provision of middle and high-complexity services in SUS. The participation of the private sector in the provision of public services and the fusion of public and private interests in health are not new, and they are conditioned by a long historical trajectory that shaped social security-funded health care

in Brazil [39]. With the implementation of SUS and the intensification of decentralization in the 1990s, this process took on a new form.

Decentralization enabled the expansion of public and private establishments in some municipalities that took on greater autonomy in managing federal financial transferences earmarked for middle and high-complexity care in SUS [40]. Starting in the 2000s, the regionalization process reinforced public-private partnerships and articulations involving governments and providers at the state and regional scales [41,42,43] in a new context of: expansion of federal and state investments [23]; diversification of management models in service provision (including new forms of outsourcing, such as through Social Organizations) [27]; and protagonism of some private providers (especially philanthropic providers in the hospital and diagnostic and therapeutic support segments) [37]. As a result of these processes, the interdependence between the public and private sectors in health care is increasingly significant in Brazil [44]. To this are added the attribution of countless public functions to private entities, the delegation of control over, and monitoring of, public actions to private or civil organizations and the strong imbrication of public and private funding in health policy [26].

Decentralization and regionalization have also had a contradictory effect on existing inequalities. Although these processes have led to advances in the expansion and improvement of access to primary health care, regional differences in the offer of middle and high-complexity services remain significant [34,35] and hinder the formation of health care networks [45].

The State-market relationship in SUS service provision expresses the increasingly more intense penetration of capital in all spatial scales, which tends to value and increase regional differences [7,46]. In health care, the socioeconomic profiles of the population, the density and integration of urban networks and the wealth of the different regions are preponderant factors in the context of the valorisation of capital [35]. However, in recent years, private establishments have increased their capacity to act regionally due to the re-scaling of philanthropic and for-profit providers. The accentuation of differences is the result of the reiterated spacial concentration of investments, which reinforces socioeconomic and regional inequalities [46].

Since the 1990s, public providers have increased their actions at the local scale, especially through municipal or municipally-managed establishments [47]. With the regionalization of the 2000s and 2010s, state governments broadened their functions, and establishments under state management once again started to expand [23], but, largely speaking, public providers predominate in regions with less market participation (or interest), such as part of the North and the rural Northeast.

Regional inequalities also influence the SUS regionalization process. Regionalization presupposes a de-concentration of production, with greater balance in terms of the negotiation power between the reference and the other municipalities, cooperation from the state entity and greater coordination between government levels [23]. However, inequality generates tensions and conflicts because there is a dispute over scarce resources, which hinders the establishment of a solidary relationship between the reference municipality and the other municipalities at the regional level. On the other hand, the municipalities' protagonism in middle and high-complexity provision in the region reinforces the concentration of power at the reference municipality and the local logic of organizing care networks. Added to this is the weight of private providers that act especially based on bilateral negotiations with each government entity, which does not necessarily strengthen the regional logic and public command over the organization of care networks [30]. In a context of State regulatory fragility [48], there is a concentration of influence power and broadening of the regional action scale of private providers.

This study suggests the complexity of regional SUS governance arrangements, which enables us to understand some of the main challenges facing the system's regionalization that were indicated by governments [49]: (1) the incipient integration of actions and services; (2) the difficulties for regulating the system; (3) inequalities in service offer and access; (4) dispute over scarce resources in the regions.

Lastly, some of the article's limitations should be mentioned. The choice to analyze SUS governance through service provision (legal sphere and spatial distribution of production) did not allow us to discuss other dimensions and aspects that are equally relevant for understanding the exercise of power within health policy. Additionally, the variable "legal sphere", used to categorize providers, is insufficient for identifying the hybrid forms of management of public and private establishments that currently exist within SUS [27]. We highlight that, starting in 2014, new power structures emerged as a consequence of changes in the economic dynamics of the health sector [50] and of rearticulations

between different private (especially philanthropic hospitals) and public organizations [51]. As a result, other studies with different approaches and focuses are needed to deepen health policy governance in Brazil.

These limitations do not compromise this article's contributions. The methodological approach we adopted enabled a creative use of the available secondary data, as well the summary and innovative presentation of regional governance arrangements that involve middle and high-complexity provision in SUS.

Conclusion

In Brazil, the SUS governance arrangements can be more or less diverse and unequal, when considering the provider composition and degrees of regional concentration of production in the middle and high-complexity segments in different spatial scales. Of special significance are many multilevel (federal, state and municipal), hybrid (public and private) and polarized (regional concentration) patterns of this service provision in the macro-regions, states/Federal District and health regions.

The degrees of regional concentration of production are related to SUS governance arrangements. The general trend we found is that of scarcity and high concentration with lower diversity of predominant provider composition in the higher complexity segments.

The study suggests that the convergence between decentralization and mercantilization in the country's State and health system reform processes favored the re-scaling of service provision, with an increase in the scale of participation of philanthropic and for-profit private providers and strengthening of reference municipalities.

The regional SUS governance arrangements are characterized by the diversity of public and private providers and by the unequal spatial distribution of service provision. These aspects challenge regionalization guided by the collective needs of the population, at different regional scales.

Contributors

L. D. Lima e M. V. Albuquerque were responsible for writing the *Introduction* and *Discussion* and participated in the data analysis and in writing the *Results* section. J. H. G. Scatena participated in writing the *Methods* and *Results* section and was responsible for data processing and analysis and for making the graphs. E. C. P. Melo contributed to writing the *Methods* section and to data analysis and to making the table. E. X. G. Oliveira participated in writing the *Methods* and *Results* sections and was responsible for data processing and analysis and for making the maps. M. S. Carvalho participated in writing the *Methods* section and in data processing and analysis. A. M. M. Pereira, R. A. D. Oliveira and N. L. Martinelli contributed to drafting different sections of the article. C. F. Oliveira participated in the literature review. All authors contributed to the article's conception and final review.

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Resumo

O estudo analisa os arranjos regionais de governança do Sistema Único de Saúde (SUS), segundo esfera jurídica dos prestadores e distribuição espacial da produção de serviços de média e alta complexidade no Brasil. Tais arranjos expressam o modo como a reforma do Estado e do sistema de saúde promoveram a redistribuição de funções entre entes governamentais e privados no território. Realizou-se estudo exploratório com base em dados secundários de abrangência nacional, do biênio 2015-2016. Por meio da análise de agrupamentos baseada na composição dos percentuais da produção dos principais prestadores, foram classificadas 438 regiões de saúde. Na assistência de média complexidade, predominou o prestador público municipal (ambulatorial) e o prestador privado filantrópico (hospitalar). Na alta complexidade, predominou o prestador filantrópico e lucrativo (ambulatorial e hospitalar). A produção de média complexidade foi registrada em todas as regiões de saúde, porém, em 12 estados, mais da metade dela está concentrada em apenas uma região de saúde. A produção de alta complexidade é concentrada nas regiões das capitais estaduais. Os arranjos de governança podem ser mais ou menos diversos e desiguais, se considerados os diferentes segmentos e níveis de concentração regional da produção de média e alta complexidade. O estudo sugere que a convergência entre descentralização e mercantilização favoreceu o reescalonamento da função de prestação de serviços, com ampliação da escala de atuação de prestadores privados e fortalecimento dos municípios polos. As características dos arranjos de governança desafiam a regionalização do SUS orientada pelas necessidades coletivas das populações.

Assitência à Saúde; Regionalização; Governança; Setor Privado; Política de Saúde

Resumen

El estudio analiza las modalidades regionales de gestión en el Sistema Único de Salud (SUS), según la categoría jurídica de los prestadores y la distribución espacial para la provisión de servicios de media y alta complejidad en Brasil. Tales modalidades expresan el modo mediante el cual la reforma del Estado y del sistema de salud promovieron la redistribución de funciones entre entes gubernamentales y privados en el territorio nacional. Se realizó un estudio exploratorio, basado en datos secundarios de alcance nacional, durante el bienio 2015-2016. Mediante un análisis de agrupamientos, basado en la composición de porcentajes relacionados con la provisión de servicios de los principales prestadores, se clasificaron 438 regiones de salud. En la asistencia de media complejidad, predominó el prestador público municipal (ambulatorio) y el prestador privado filantrópico (hospitalario). En la alta complejidad, predominó el prestador filantrópico y lucrativo (ambulatorio y hospitalario). La provisión de media complejidad se registró en todas las regiones de salud, sin embargo, en 12 estados, más de la mitad de la misma está concentrada en sólo una región de salud. La producción de alta complejidad está concentrada en las regiones de las capitales de los estados. Las modalidades de gestión pueden ser más o menos diversas y desiguales, si se consideran los diferentes segmentos y niveles de concentración regional en la provisión de servicios de media y alta complejidad. El estudio sugiere que la convergencia entre descentralización y mercantilización favoreció el reescalonamiento de la función de prestación de servicios, con una ampliación de la escala de actuación de prestadores privados y el fortalecimiento de los municipios más importantes. Las características de las modalidades de gestión desafían la regionalización del SUS, orientada por las necesidades colectivas de las poblaciones.

Prestación de Atención de Salud; Regionalización; Gobernanza; Sector Privado; Política de Salud

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