

Health policies and federative gaps in Brazil: an analysis of regional capacity of services delivery

José Mendes Ribeiro ¹
Marcelo Rasga Moreira ¹
Assis Mafort Ouverney ¹
Cosme Marcelo Furtado Passos da Silva ¹

Abstract *This paper analyzes Brazilian health regions according to their service delivery capacity from the debate on the crisis of cooperative federalism in the SUS that resulted from decentralizing process established in the 1988 Constitution. Service delivery capacity tracer indicators were selected by regions and statistical analyses evidenced greater regional capacity in hospital care and large asymmetries with regard to the availability of physicians, high complexity equipment and private insurance coverage. In conclusion, we argue that further solutions are required to strengthen governmental capacity to reduce regional inequalities through increased central coordination.*

Key words *Health regions, Service delivery, Federalism*

¹ Escola Nacional de Saúde Pública, Fiocruz. R. Leopoldo Bulhões 1480, Manguinhos. 21041-210 Rio de Janeiro RJ Brasil. ribeirojm@globo.com

Introduction

Decentralization of health care in the Unified Health System (SUS) is one of the main policy objectives expressed in governmental regulations and shared by most of the officers, leaders and specialists in the health sector. In international experience, the term decentralization reflects a variety of policies typical of each particular system. Its effects depend on specific contexts and pathways, and the lack of solid evidence of their advantages prevents them from becoming general guidelines. It is a fact, however, that decentralization processes of different scopes are observed in the main health systems. Such policies respond to rationalist expectations (planning for the use of scarce resources), devolution of powers, administrative deconcentration to smaller groups and strategies for reducing regional inequalities.

Analysis of the national literature shows high adherence to decentralization and regionalization. Such analyses differ in the outline of obstacles and policy orientations. Regionalization is seen as one of the solutions to curb the country's huge internal inequalities. There are no propositions towards a national centralized system as in some European countries. This is explained by the health reform of the 1980s, which dismantled the old Brazilian social insurance with centralized features. The maximum observed in terms of accepting the leading role of the federal government refers to policy-inducing functions, and even in mitigated conditions of centralization, many advocate the exclusive management of these funds by federative regional collegiates.

The SUS decentralization policy agenda is associated with municipalization and operational norms, familiar to leaders since the 1990s, and are diffuse solutions to promote equalization among the unequal. Incentives provided by the Ministry of Health (MS) budget represent to date the tool available to its leaders to induce some local cooperative action or adherence to care protocols.

In this context, Decree 7.508/2011¹ created the Public Action Organizational Contract (COAP) as a basis for regionalization. Positive expectations were generated by the direct presidential sanction and the fast adherence of the States of Ceará and Mato Grosso do Sul. However, inertia is now threatening to minimize COAP's agenda.

As demonstrated in a recent survey that guided the analysis carried out in this paper², according to a baseline drawn up in 2015, there was widespread initial adherence of municipalities

and states to the COAP for the stages of expression of interest and regional planning measures. However, the political process was increasingly developed in the states in a fragmented way and was interrupted when nearing commitments and contracts. Likewise, data obtained through a study with the municipal secretaries of the Bipartite Interagency Committees (CIB) show that the obstacles to the COAP agenda are mainly in the demand for additional financial resources by state and federal governments and the low participation of the party-political system and State and municipal executives in the process. This picture differs from the greater activism of the political system observed in the 1980s and 1990s.

Following this line of investigating regionalization's hardships, this paper aims to analyze the capacity of Health Regions (HR) to have the resources to enable regionalization and decentralization to sectoral politics. Hence, we performed an analytical review of the national debate on their theoretical implications, as well as an analysis of data collected on the installed capacity and the production of services aggregated by HR. We addressed client mobility through the migration of hospitalizations and services of Renal Replacement Therapy (RRT) in the SUS.

This study shows the strong regional inequality in spite of policies implemented since the 1990s. In this line of action, planning was unable to achieve the objectives of equalizing and reducing regional asymmetries. As a result, debate on decentralization of the SUS must be resumed.

Methodological aspects

We performed the analytical review on decentralization in the SUS from national journals found in the SciELO database (www.scielo.org). After analyzing all the published studies, we selected those most directly related to decentralization policies, care networks, regionalization, consortia and political hurdles. We established the trends of the national debate as per scholars from public and private institutions. The important health journal *Ciência e Saúde Coletiva* was the most prevalent in the dissemination of this sectoral agenda.

Data collected and analyzed refer to Major Regions (MR), Federal Units (UF) and Health Regions (HR). The analyzed variables – physicians, private insurance, equipment, therapeutic resources and hospitalizations – aim to account for the relationship between strategic markets and sectoral public policies. All indicators were

handled as tracers and facilitated the analysis of the fundamentals of public policy from the national administrative bases, as is usual in sectoral studies³.

HRs were the basic computation unit for the analysis of available health care resources. HRs are defined under the coordination of the MS by territorial criteria, availability of services and movement of individuals. Their definition follows SUS planning parameters and local agreements established by consensus between levels of government. HRs should secure funds required for care according to levels of complexity and, where there is no extreme scarcity, these funds are expected to meet most of their demand for services. This criterion is relevant, since, in case of supply-demand adequacy, the hypothesis about the success, albeit partial of the regionalization of the SUS would be strengthened.

Secondary data sources were those administered by the MS: Hospital Information System (SIH-SUS), Outpatient Information System (SIA-SUS), National Supplementary Health Agency (ANS) and National Register of Health Establishments (CNES).

Data were collected according to municipalities and then aggregated by HRs. Thus, the most disaggregated unit of analysis of totals, means and rates calculated here was the HR. This study is descriptive and analytical when exploring secondary data. Dialogue with the national political debate and consolidated theories about federalism also vests the analytical realm. Documentary sources were limited to the main norms related to SUS regionalization and accessed at SaúdeLegis/MS website (www.saude.gov.br).

The selection of indicators drew on the analysis of the national literature, from the experience of the research team, and was consolidated through workshops with managers and experts of the Interfederative Action Department (DAI), until recently linked to the Secretariat of Participatory Management (SGEP/MS) and now directly linked to the Executive Secretariat/MS. The challenge in this study design was to select the main tracers of regional cooperation in a plethora of direct and synthetic indicators used in SUS management. The selected regional capacity indicators were: (i) mean value of the total value of Hospitalization Authorizations (AIH) and total Renal Replacement Therapy (RRT) sessions of residents and nonresidents in the HRs (migration and non-migration) and that indicate the capacity to make local agreements of financial ceilings, care quotas and patient pathways; (ii) coverage

of physicians in the public and private sector and indicating the ability to receive HR users; (iii) coverage of private health insurance, which indicates the existence of health services markets in the HRs, with repercussions for the production chain; (iv) coverage of mammography, magnetic resonance and ultrasound services, indicating the ability to provide high complexity services, the existence of regional flows and the possibility of local cost and benefit agreements.

For the analysis of the production of services, we collected the AIH for 2013 and the RRT sessions for 2014, all through consultation to the MS website. In order to obtain the distribution of physicians and specialties and for MRI, ultrasound and mammography equipment by municipalities aggregated in HRs, a direct consultation with DATASUS was required for aggregations not available on the website for the year 2015. We obtained data on insurance coverage in 2015 directly from the website of the National Supplementary Health Agency (ANS) – www.ans.gov.br. For the statistical analysis, we used Stata SE software version 14.2 and massive data were collected and re-grouped according to HRs using the R software⁴.

Federalism and implications for SUS regionalization

Since the 1988 Constitution and the subsequent infra-constitutional legislation, the cooperative elements of Brazilian federalism are essential for the development of consensus democracy as will be addressed here. In the health sector, several federal government regulations emphasize these aspects incrementally, which aim to induce cooperation in the midst of defining responsibilities and attributions among federative entities. However, the relationship between Brazilian federalism and sectoral policies is ridden with controversies and the asymmetry between the participants in the federative pact is its mark and its starting point.

Modern federalism dates back to American independence and state and national conventions, which in 1789 transformed the fragile confederation system into a solid federative configuration. The classic foundations were debated from the trials published in the local press and compiled in order to highlight the positions of leaders and theorists who influenced the final constitutional document whose foundations are still in force⁵.

The model's matrix involves the separation of powers, the federative nature and the devel-

opment of control institutions over the concentration of powers known as checks and balances. This classic configuration of federalism composes the model defined by Dahl⁶ as Madisonian democracy, as opposed to populist democracy based on the rule of majorities. Analyzing the facilities of these two democratic models, Dahl proposes to combine decision-making mechanisms founded between majority rules in electoral periods and contradictory processes in the intermediate cycles, which he called polyarchical democracy.

For the purposes and the limits of this paper, polyarchies are deemed convergent to the standard of consensus democracy of Lijphart⁷, highlighted below, and that works as reference for the analysis of the crisis of the Brazilian cooperative federalism in the health sector.

Thus, elements of US federalism must be considered in what implies political decentralization at the state level, clear delimitation of attributions and responsibilities between entities and judicial review of federal conflicts. This pure form of federalism is not the only successful configuration of development, since centralized parliamentary systems in unitary countries (such as the United Kingdom) also represent solutions to reduce regional disparities through quite different institutions.

There is no definite empirical proof of the advantages of a pure form – concentration or deconcentration of powers – over the other, and the way in which “tyranny of majorities and minorities” is controlled can occur through successive elections or institutional counterweights⁶. The historical and institutional development of some influential countries, however, show that a series of hybrids, such as polyarchies, have developed from polar models, and studies seek to establish the best social results according to rules of concentration or deconcentration of political power. On a seesaw basis, centralized countries with majority regimes implement some reforms in the name of greater decentralization and vice versa.

In the well-known study, Lijphart⁷ compared democracies subject to routine (consensus-based) pacts as opposed to majority ones. Decentralized power systems may occur in unitary or federative countries, but in its typical forms, consensual democracy involves the existence of multipartite institutions inherited from neo-corporatism or regions endowed with distinct cultures within nations. In these cases, the majority rule does not command the main political solutions and, even with a slower decision-making process, is associ-

ated with better social protection and socioeconomic development. Western European arrangements of this type, with few exceptions, formed the basis of the post-war Welfare State.

With regard to social policies, Costa-Font and Greer⁸ point to the lack of conclusive empirical results on the benefits of pure decentralization. This stems from factors such as the unique national pathways that hinder the creation of adequate standards such as good policies guidelines in the normative sense. Territorial decentralization is observed in federative countries cohabiting with centralized policies and, in turn, unitary countries evidence decentralized policies. Among these extremities, a mosaic of institutional designs emerges and, among them, is the Brazilian case and its federal crisis in the health sector.

In the Brazilian case, these political agendas intertwine. Adherence of national health sector leaders to institutional designs of consensus-based democracy was expressed in the ideology of the health reform and its influence was reflected in the institutional design of the SUS. Political decentralization is repeatedly affirmed as the main organizing principle of the SUS⁹. The advantages of governance and agreement in the implementation of policies have been highlighted in recent literature as a model to be assessed in each case¹⁰. The participatory realms of democracy in the light of health policies, an important element of consensual democracy, have been analyzed around the organizational innovations represented by health councils¹¹ and their repercussions on the Brazilian context¹².

In Brazil, in general terms, the republic of 1889 was formalized according to federal and Madisonian principles. Vargas' New State emptied this model in favor of an authoritarian centralization that reached the very annulment of symbols and subnational functions and to the appointment of state interveners. The repercussions of this national trend favored hybrid institutional arrangements incapable of promoting an adequate overcoming of patrimonialism in favor of full universalist standards¹³. After the short redemocratization of the postwar period, the military dictatorship of 1964 reinforced political centralization, later revoked by radically opposing guidelines of the 1988 Constitution. Abrúcio¹⁴ analyzed the role of the National Constituent Assembly in implementing institutional models as opposed to those of the military regime and establishing greater administrative and fiscal decentralization as the policy implementation standard. In other words, these movements

showed the seesaw historical nature of the Brazilian political decentralization.

Debate on decentralization develops in the health sector according to this pathway and the political context of 1988.

Regionalization in the Brazilian debate

The analysis of the national debate, made here by an analytical review of the literature, shows a high convergence around decentralization of public sector policies, services and financial resources. Decentralization, regionalization and municipalization are addressed as associated processes. When decentralization is handled as outsourcing services, this consensus falls apart and many authors consider it as actions to reduce the role of the State in the economy. To outline this debate, decentralization and regionalization are treated here on a territorial or federative basis.

The conclusions can be summarized in five topics: (i) there is a strong consensus on the advantages of decentralization or regionalization and the need to comply with constitutional provisions; (ii) proposals are quite normative, although there is no evidence in favor of the advantages of decentralization over centralized systems; (iii) there are no proposals in favor of greater political centralization and federal coordination of the health system, as observed in several countries with comprehensive public systems; (iv) delay in the decentralization of SUS since the 1990s has been noted and, in the name of its strengthening, several policy orientations are made; and (v) more inductive policies of the MS are advocated or, conversely, greater emphasis on municipalization and delegation of powers to federative collegiates are required to curb persistent centralization.

A series of studies around these items reveal the complexity of the SUS political process. The most important aspects of this debate are discussed below.

The main studies address the facilitating aspects and obstacles to regionalization and their association with socioeconomic factors or development policies¹⁵⁻²¹. Investigations were made about the existence of determinants of municipalization, in which municipal party-political dynamics and legislative-executive dynamics showed no association with such processes¹⁵. In turn, studies¹⁶ outlined regional types associated with economic development, human development and health system capacity, showing clear

North-South macro-regional inequality and the existence of pockets of low economic development in the richest regions.

There were positive expectations in the 2000s regarding the induction of cooperative dynamics through representatives of federative entities in the form of a political pact. This type of inflection has been highlighted¹⁷, but adherence of the sub-national entities did not generate a strengthening of the regionalization due to the lack of capacity of the collegiates and unique state pathways.

Another element refers to social inequalities as hindrances to access to services. A detailed analysis has shown¹⁸ that these are strongly influenced by the social condition of individuals and their place of residence. Residents in the South and Southeast regions had greater access than in the other regions and the improvement in this item was higher in the more developed regions, which increased gaps between the large regions. Social inequalities in the South are very high, while declining in the North and Northeast, despite lower access to health services. Such variability compromises the construction of standards.

Viacava and Bellido¹⁹ set up historical series from 1998 to 2013, demonstrating that the national improvement of access indicators did not negate the fact that the North and Northeast regions had the worst self-evaluation of their health status, greater activity restriction and less use of public services by the respondents, despite the increase in coverage of health programs. Piola et al.²⁰ show that regional inequalities were little affected despite the general increase of nominal and proportional health expenditure, greater resources invested by the three federative spheres (consolidated and per capita) and increased proportional participation of UFs and municipalities.

This results from regionalization being dependent on dynamics outside the health sector. Vianna et al.¹⁶ argue that decentralization was not embedded in a development model, regional planning was not prioritized and decentralization followed the federative municipality-centered model, disregarding the state spheres and not leading to more cooperative health arrangements. Gadelha et al.²¹ resumes criticism of health regionalization policies in Brazil since the 1990s due to its subordination to the policies of monetary stabilization. Cordeiro²² also highlights exogenous factors as obstacles to decentralization attributable to a Latin American “neoliberal wave” that led to a mitigated implantation of the SUS. Thus, the decentralization deficits can be attributed to the conflict between a liberalizing

transnational economic project and another one of rights' universalization²³.

Tax aspects should be considered in relation to regional inequalities. Dain *et al.*²⁴ show that the 1988 protection model was not fully implemented in fiscal terms in the 1990s. The fiscal waiver for private insurance cases and the replacement of tax sources throughout the 1990s were detrimental to the health sector. Tax sources were replaced by contribution revenues to the detriment of the increase in the contribution of revenues to social security from the social contributions established or expanded in 1988. The very Provisional Contribution on Financial Transactions (CPMF) did not generate additional revenue for the MS. Lima²⁵ believes this derives from the distribution of tax competencies and is aggravated by the distribution of federal transfers according to installed capacity. This configuration shapes the dynamics of cooperation and conflict between federative stakeholders that would be unfavorable to subnational entities, generating expectations about the federal financing of the health policy. Trevisan and Junqueira²⁶ consider that inadequate financial resources, lack of definition of the administration responsible for compliance, the definition of the power to transfer resources to decentralized management and the reactions of the traditionally centralized federal bureaucracy are most relevant obstacles to decentralization.

Vilaça²⁷ proposes care networks as a response to the Brazilian health framework that is not in line with the international standards of epidemiological transition. A "triple burden of disease" combines infections, malnutrition and reproductive health with chronic diseases and the strong growth of external causes. When associated with the fragmented nature of the Brazilian health system, this profile has a negative impact on the establishment of networks and solutions would rely on setting political coalitions in favor of the expansion of the public system.

In the opposite direction to what prevails in the national literature on decentralization stand the experiences of consortia between municipalities. This debate reached its apogee in the 1990s and lost its centrality after its autarchic regulation in the form of public consortia²⁸ because of its linkage to administrative procedures similar to those of direct administration over its contractual realm. The advantages of cooperation by free association of municipalities for regional management as parastatal associations were in their greater autonomy for the recruitment of

professionals, laboratories, hospitals and diagnostic imaging. These associations are governed by mayors' councils and operated by health secretaries' councils, often in partnerships with local councils. They were studied as successful innovations in which political coalitions were shown to be sustainable^{29,30}. To a certain extent, regulation of consortiums met an institutional gap defined in the Organic Health Law. As Cordeiro²² pointed out, the complex agreements between unions, states and municipalities became complicated in the implementation of the SUS due to the establishment of many levels of autonomy – federal, state, inter-municipal consortia, municipalities and districts.

Despite these considerations, it should be emphasized that both in the specialized literature and recent legislation based on important normative provisions^{1,31}, the search for granting political survival to constitutional-based cooperative federalism is strong and representative. However, as Ribeiro and Moreira³² point out, political initiatives should consider that the current framework in the country reveals a clear crisis regarding the cooperative aspects of federalism in the Brazilian health sector.

In conclusion, the mentioned discursive convergence of the national literature can be summed up in the following items: (i) decentralization and regionalization are virtuous and fundamental objectives to achieve goals of the SUS; (ii) the problems observed are not inherent to the institutional design of the SUS, but rather to factors within the operation of the system (inter-federative relations, financing and institutional capacity) or exogenous (fiscal adjustments, reforms of the State apparatus); and (iii) the lack of proposals for sectoral reform toward central federal government role or centralized command through institutions of national character.

Analysis of health regions and local capacity

The cross-sectional study on HRs based on selected indicators for the year 2015 or around that year, had descriptive and analytical purposes. The descriptive aspects are important because of their aggregation from collection by municipalities and aggregation by HR and show the distributions that demonstrate the high-level dispersion, heterogeneity and inequality of resources. The exception is restricted to hospital care in the SUS, where user migration patterns are somewhat coherent according to the complexi-

ty of the cases and may reflect an advanced pattern of regional cooperation. In analytical terms, correlation studies and factor analysis show that inequalities between regions have asymmetric characteristics regarding health care resources when comparing the distributions of physicians and hospital admissions with the other resources of high complexity diagnosis and therapy.

The data show that, despite the positive correlations between the indicators, the great heterogeneity among the HRs represents an important difficulty for the definition of standards and requires that the analytical models include variables exogenous to the health sector and of socioeconomic character. This converges with what several studies cited here have pointed out^{15,16,19,21}.

Data obtained are consistent with the thesis of the failure of federative cooperation discussed here. These data and the theoretical-conceptual development stem from the said research on the implementation of COAP for the period 2013-2016².

In terms of virtuous systemic rationality, despite asymmetries in the distribution of resources in larger aggregations, Table 1 summarizes the AIH distributions calculated from the HRs and consolidated by UF. The dominant pattern is the non-migration of public system customers. Non-migration means that these clients were serviced in one of the 438 health regions. These results are reproduced for all MRs and for most HRs. In addition, the mean values of AIHs that migrated are markedly higher in all UFs. Thus, there is a stabilization where cases of greater complexity are attended at hubs.

Table 2 shows that data consolidated by ICD-10 chapters for the mean AIH values of migration out of HRs were always higher in all MRs and according to their chapters. This shows the regional capacity to meet, at least in part, its hospital demand and to distribute cases of greater complexity to other regions. This rationality in hospitalizations spreads throughout more than 80% of HRs. As will be seen later, in terms of regionalization, the binomial physicians-hospitals seem to work better than the other health resources studied, although the national distribution of hospital beds and diagnostic-therapeutic resources is also known to be asymmetric³.

The mean value of AIH represents the degree of complexity of the hospital services used, in an indirect form of case-mix. Figure 1 shows that the heterogeneity in terms of health care resources in each HR appears in a generalized way according to the distribution of the coefficients

of variation of the AIH mean values. There is a strong positive correlation between higher AIH mean values and higher coefficients of variation in all HRs, and this process is more intense in regions with higher resources, as is the case of the South and Southeast of the country.

In all HRs, the mean AIH values express very high coefficients of variation, which shows heterogeneity and imbalances within HRs. This is a serious challenge to outline regional profiles. This is due not only to aspects associated with development, but also to the availability of reference services within HRs. Somehow, this is expected in terms of regional balance and the fact that migration outside the HRs has a selective character suggests the existence of a regionalization logic.

Regarding RRT, which is another user supply and mobility tracer, data collected by HR show large gaps in the provision of these services in the public system regarding renal failure. Data analyzed by MR, UF and HR converge in the same direction, following their socioeconomic characteristics.

For 2014, 1,646,855 RRT sessions were registered outside the home health regions, which were distributed over 293 HRs and SUS total expenditure in this case was R\$ 299,799,304.37. On the other hand, 11,525,743 RRT sessions were registered within the home HR, which were distributed over 297 HRs, with SUS total expenditure of R\$ 2,084,029,418.00

Thus, 142 HRs did not register RRT sessions or the referrals of users with acceptance to other regions. There is a clear access barrier. It is expected that, due to the nature of renal failure and the indication of RRT, the user will seek care even in regions farther from his home. Although several small-sized municipalities may not have reported renal failure cases, data shown here suggest that, in 142 HRs (a scale above 20 million inhabitants), diagnosis and case referrals represent a gap of the public system.

Table 3 shows the summary measurements of the distribution of physicians and private health insurance. The regional differences measured by HR are important for both indicators, with larger coverage in the Southeast, followed by South and Midwest. North followed by Northeast are the regions with the lowest availability of these resources, especially when data are population-adjusted. It is important to note that there are physicians enrolled in the CNES and private plans registered at the ANS in all the existing 438 HRs. Even the HRs with lower coverage, such as the minimum observed for physicians in the Midwest (45) and

Table 1. Distribution of AIH by migration in health regions and by Federal Units, 2013

UF	Did not migrate	Did not migrate (total AIH)	Migrated (total AIH)	AIH not identified	Total AIH	Average values of non-migration AIH	Average values of migration AIH
AM	98,8	165.319	2.015	0	167.334	766,22	1.133,14
MS	97,2	161.341	4.724	1	166.066	963,07	2.750,39
RJ	94,9	638.697	34.007	4	672.708	1.018,77	1.991,63
RR	93,0	31.506	2.379	0	33.885	627,71	741,62
PA	92,8	463.006	35.990	3	498.999	626,84	1.401,96
MT	92,0	171.004	14.842	3	185.849	761,25	1.787,55
AC	91,9	47.523	4.213	0	51.736	628,64	885,62
DF	91,0	172.278	16.991	0	189.269	954,75	1.316,97
ES	90,9	197.344	19.790	2	217.136	1.036,90	1.709,73
MA	90,4	373.592	39.791	7	413.390	614,52	1.456,03
PR	90,2	695.615	75.149	17	770.781	1.182,75	2.635,70
RO	90,1	96.644	10.652	0	107.296	566,71	1.098,27
SC	89,4	377.020	44.756	0	421.776	1.217,07	2.552,11
BA	89,1	715.759	87.378	15	803.152	750,59	1.648,55
SP	87,4	2.160.758	309.994	320	2.471.072	1.105,08	2.411,10
RS	87,2	651.592	95.419	8	747.019	1.095,50	2.689,94
AP	86,7	33.131	5.084	0	38.215	618,18	712,12
MG	85,0	1.021.765	180.924	12	1.202.701	1.081,71	2.281,12
PI	84,1	186.307	35.081	11	221.399	631,67	1.372,01
GO	83,9	301.655	57.936	98	359.689	871,57	1.992,93
CE	83,8	392.879	75.910	0	468.789	837,11	1.950,64
TO	83,4	88.160	17.555	7	105.722	724,28	1.439,12
PE	79,6	437.949	112.266	3	550.218	1.025,60	1.745,39
AL	77,4	137.022	39.987	1	177.010	880,12	1.238,04
PB	77,2	157.805	46.647	2	204.454	840,08	1.363,82
RN	76,8	127.288	38.388	2	165.678	946,20	1.677,88
SE	62,6	56.196	33.605	0	89.801	801,86	1.218,75
Total	87,5	10.059.155	1.441.473	516	11.501.144	858,32	1.674,15

Source: MS/DATASUS/SIH.

for plans in the Southeast (500) attest to the possibility of organizing health services and sharing with the private sector. The huge differences between means and medians in all MRs and for both indicators reinforce the thesis of the high variability among HRs. This should be understood as a further challenge for the construction of HRs profiles.

In exploratory terms, analyses were performed to define HR profiles. Table 4 shows results of analyses performed among tracers with regard to the variable availability of physicians per inhabitant

and the relationship between the variables was measured through Spearman's Correlation Coefficient. It is noted that, in all cases, there are positive correlations of indicators of equipment, existence of private health insurance and complex hospitalizations. However, there are important variations between these correlations, and the ratio between the coefficient of medical plans per inhabitant and the availability of physicians per inhabitant is the strongest (87.6%). These associations should be seen on an exploratory basis since, although they were significant, some were weak.

Table 2. Distribution of mean values of AIH by migration to health regions and by major regions and ICD, Brazil, 2013.

ICD	Yes	No	Yes	No	Yes	No	Yes	No	Yes	No
I	1.693,93	722,03	1.600,75	591,23	2.391,22	1.224,67	1.350,39	517,29	2.561,37	1.488,64
II	2.056,96	1.378,84	2.544,38	1.756,31	2.220,62	1.680,97	1.616,48	1.264,56	2.446,31	1.628,78
III	804,95	447,47	848,04	433,60	3.125,52	561,32	568,71	396,37	1.442,00	566,96
IV	933,55	438,95	955,07	494,93	3.539,22	893,83	971,37	494,70	2.060,60	595,53
V	894,53	827,81	1.056,76	994,75	1.013,49	865,96	777,22	651,51	1.053,40	959,60
VI	1.512,44	1.283,75	1.556,96	1.054,75	1.675,78	1.164,94	1.690,94	945,58	2.003,22	1.446,19
VII	1.825,04	988,83	1.168,77	1.014,16	1.577,84	1.215,88	1.068,90	1.140,94	1.156,01	861,94
VIII	4.328,07	1.677,04	4.935,78	2.422,47	3.985,48	976,90	3.441,69	400,23	7.058,87	1.664,73
IX	4.293,62	1.892,29	3.075,71	1.423,63	4.787,01	2.152,83	2.903,12	1.228,37	4.722,48	1.934,43
X	1.530,38	875,68	1.886,26	799,81	1.876,75	953,25	1.371,77	690,41	1.680,92	1.019,46
XI	1.086,64	704,40	1.396,77	703,42	2.291,02	927,62	970,96	609,77	2.123,40	898,86
XII	817,91	635,57	753,25	543,74	794,33	551,64	728,42	484,61	708,83	528,83
XIII	3.481,72	1.596,73	1.527,90	1.062,33	3.337,00	2.195,48	1.656,79	898,38	2.462,89	1.498,41
XIV	1.399,86	515,90	1.328,78	581,53	3.220,19	744,12	977,45	423,34	2.577,35	692,19
XV	667,16	553,29	662,72	557,48	586,32	562,72	630,74	541,51	661,01	570,82
XVI	4.677,08	2.034,57	3.088,49	1.936,34	6.977,24	3.606,46	2.840,82	1.448,12	5.524,22	2.640,26
XVII	3.778,75	3.074,23	3.230,94	2.343,81	4.404,47	2.460,16	3.210,84	1.535,18	4.067,66	2.374,50
XVIII	1.117,69	624,59	927,83	656,63	1.472,78	985,78	1.297,94	727,43	1.062,28	726,95
XIX	1.556,46	911,08	1.325,55	935,14	2.168,80	1.226,77	1.128,04	751,20	1.931,75	1.085,73
XX	1.213,54	440,59	631,17	403,37	2.821,04	1.040,63	773,55	440,89	1.147,06	826,87
XXI	476,31	277,77	559,74	349,64	1.242,09	460,58	265,93	265,71	1.116,28	440,48
XXII	-	-	-	-	-	-	-	-	66,32	-

ICD chapters correspond broadly, here adapted in the name of conciseness, to the following diseases: I (infectious and parasitic); II (neoplasms); III (blood and immune disorders); IV (endocrine and metabolic); V (mental); VI (nervous system); VII (eyes); VIII (ears); IX (circulatory system); X (respiratory system); XI (digestive tract); XII (skin and subcutaneous); XIII (musculoskeletal system); XIV (genitourinary system); XV (pregnancy, childbirth and puerperium); XVI (perinatal); XVII (congenital malformations); XVIII (tests abnormal findings); XIX (injuries and poisonings); XX (external causes); XXI (general factors of health services); XXII (special codes).

Source: SIH/SUS.

In order to reduce dimensionality, we performed a factorial analysis and we observed that variances of the tracer group are not simply reducible to substitutive factors.

Despite the limits indicated, there is relevance in the positive and significant correlations between all indicators and explanations can be elaborated for these observations. The availability of physicians in HRs, especially in the less developed and farther away from large urban centers, can occur without the availability of high complexity diagnostic resources and only the complexity levels of hospital admissions, which form a predictable pair of resources in the HRs. What can be deduced from the analysis of these tracers is that HRs have high diversity of resour-

ces and their distribution is heterogeneous. If on the one hand, this speaks in favor of the need for greater political action to equalize the supply of services and their sharing in the HRs, on the other hand, it evidences the political hardships to compensate for the inequitable allocative profile of these markets.

Considering the positive correlations between the variables in Table 4, we performed a factorial analysis to verify the existence of factors that replace the indicators of health care resources in HRs for purposes of subsequent comparison with indicators of socioeconomic development. According to literature, these operate as variables that affect the HRs positions in terms of these resources. Variables included in the matrix

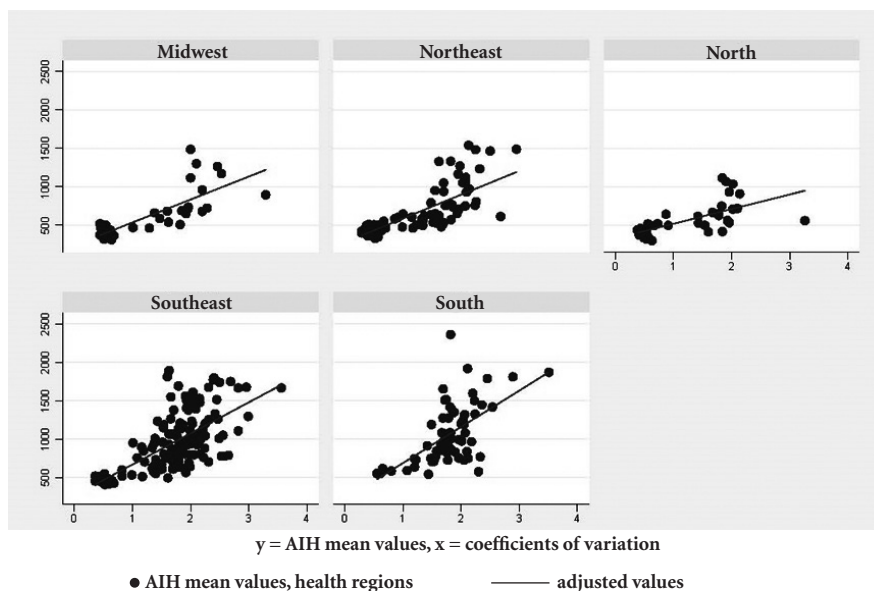


Figure 1. Diagrams of dispersion of AIH mean values and coefficients of variation in the Health Regions by major regions, Brazil, 2013.

Source: SIH/SUS/MS.

Table 3. Summary measurements for the number of physicians and private health insurance in HRs by major regions, Brazil, 2015.

Physicians*	North	Northeast	Southeast	South	Midwest	Brazil
Total	57.074	266.388	794.160	258.191	103.813	1.479.626
Mean	1.268,31	2.002,92	5.190,59	3.796,93	2.661,87	3.378,14
Median	457	700	1.865	1.923	683	1.186
Minimum	69	108	112	565	45	45
Maximum	12.503	35.720	139.554	34.774	19.280	139.554
Per million inhabitants	3.260,54	4.709,82	9.261,82	8.833,03	6.722,67	7.235,96
Private health insurance*	North	Northeast	Southeast	South	Midwest	Brazil
Total**	1.818.929	6.747.733	30.588.815	7.066.435	3.141.095	9.363.007
Mean	40.420,64	50.734,83	397.257,34	03.918,16	82.660,39	12.958,83
Median	7.220	6.725	50.977	40.069	18.053	23.093
Minimum	506	750	500	6.267	563	500
Maximum	548.818	1.101.750	30.588.815	1.389.922	938.043	6.470.086
Per 100 inhabitants	10,39	11,93	35,67	24,18	20,34	24,14
Population***	17.504.446	6.560.081	85.745.520	9.230.180	15.442.232	04.482.459

*Data calculated as per the 437 current Health Regions. **Totals do not include 11,368 for which there are no information on regions. ***Estimated population for 2015, IBGE.

Sources: CNES; ANS

Table 4. Correlations between the selected indicators and the availability of physicians per inhabitant in the HRs, Brazil, 2015.

Variables	Correlation Coefficient (Spearman)
Total mammography	0,6779
Total MRI	0,7356
Total US	0,3204
Plans coverage	0,8760

Sources: CNES/MS; SIH-SUS/MS

were the mean AIH values, proportional coverage of health plans and the number of physicians, mammography, MRI and conventional ultrasonography equipment, all of them per million inhabitants. Six factors were generated, the differences observed were significant and three of them showed positive values and considered according to the usual criteria (*kaiser*). Regarding the calculated eigenvalues, factor 1 is responsible for the highest matrix variance load (2.25888) and the highest total variance relative weight (1.0116). As for factor loads, only factor 1 resists the criterion above 0.5 in relation to the six variables included in the model. If we apply the stricter criterion of 0.7, we will notice that this factor represents only the physicians and AIH mean values variables. The table becomes clearer when analyzing the specificities (error), where (by the maximum limit rule at 0.5) both physicians and AIH means are accepted as represented by factor 1. This covers the fact that the criterion of factor loads are set at 50% or 70%.

Therefore, only factor 1 would be acceptable to explain matrix variance. However, its use would be restricted to the distribution of physicians and mean AIH, following the 80.5% correlation shown in Table 4. This leaves out of the factor private equipment and insurance, which would have to undergo a new factor analysis, compromising the explanatory capacity of the analysis.

As the results show, the heterogeneity (variances) is high and the development of models that are more comprehensive and alternative to those of health resources is required.

Final considerations

Decentralization of Brazilian federalism involves competition for tax and inductive resources, as

well as the imposition of barriers to access local services by neighbors or distant citizens. While there are many successful examples of regional cooperation, dynamics between cooperation and competition is one of the main failures in SUS implementation.

Cooperative federalism is a process that is contradictory and with no preset pathways. Cooperation between subnational and regional entities often takes place through a formalist adherence to a model that is politically appropriate. There is no evidence that cooperation has become a dominant pattern in Brazil, and the successful experiences of consortia, health districts and regional collegiates say more about model potentials than a sustained and widespread pattern. Diverse factors should be considered as compromising the official cooperative rhetoric. These include mayor- and governor-centered investment decision; low accountability of federative entities for the observed results; positive sum game for the Federal Government, states and municipalities by inertia in terms of health responsibility. SUS standards express a conception of responsibility where the reciprocal cooperation proclaimed hides direct and particular accountability.

Regional inequalities at all levels – major regions, federative units and health regions – are singled out by the specialized literature as a striking fact of our health care system. Data presented and analyzed in this paper corroborate these characteristics in relation to major regions and federal units and generate evidence to explain that inequality within HRs and between themselves is intense and shows greater complexity and interweaving of services.

SUS regionalization is clearer in relation to the provision of hospital services and the availability of hospitals seems to configure, along with that of physicians, the main sorting factor of the system in HRs. The movement of clientele migration out of own HRs by highest degree of complexity of cases represents the main positive evidence observed here in terms of regional access resulting from government planning. However, in terms of HRs, local and regional inequalities are convergent to that highlighted by specialized literature.

Contrary to the hypothesis of a mutual charging of health care resources, by which hospitalizations, the availability of physicians and high complexity equipment and greater coverage of private health insurance would be, according to distribution, strongly correlated and mutual-

ly reinforcing, the HR study shows that this does not occur, at least comprehensively, due to the deep asymmetries between HRs in states and in major regions.

Correlations between these variables are positive, but the level of association is diverse. Despite this, the factorial analysis was not satisfactory in seeking substitutive factors of the set of variables associated to resources and production of services. The best factor adequately explains only the variables total AIH mean value and the availability of physicians per million inhabitants of HRs. This was also the strongest correlation observed. When the variable physicians was put in evidence, its relationship with private insurance and with availability of equipment was shown to be weaker.

The higher level of complexity of hospital services and physicians represent the main aggregate factor of distribution of health care resour-

es. The availability of physicians is more associated with the distribution of private insurance and does not necessarily bring the other diagnostic resources of greater complexity. This fact is consistent with the observed experience that physicians often arrive in HRs and in the municipalities before the remaining care resources.

There is a difference between reducing inequalities via regionalization of the service network or direct incentives for regional equalization. Formally cooperative federalism is based only on its full or mutual non-accountability and in the form of a pact for non-mutual embarrassment. This suggests that some level of centralization is desirable or even urgent. The Brazilian model is one that follows the constitutional provisions and does not relinquish its universalist objectives. The bases of reducing inequalities in the country must be built on the contradictions of cooperative federalism.

Collaborations

Authors worked together on the design and outline of this paper; JM Ribeiro was responsible for writing this paper and analyzing and interpreting data; MR Moreira, AM Ouverney and CFP Silva were responsible for the critical review of the text.

Acknowledgements

We wish to thank the Department of Interfederative Articulation (DAI) – at the time of Research at the SGEPI/MS, and currently at the Executive Secretariat, Ministry of Health – its Directors and Coordinators for their assistance since 2013, especially Isabel Senra, for her support and dedication.

References

1. Brasil. Decreto nº 7.508, de 28 de junho de 2011. Regulamenta a Lei no 8.080, de 19 de setembro de 1990, para dispor sobre a organização do Sistema Único de Saúde - SUS, o planejamento da saúde, a assistência à saúde e a articulação interfederativa, e dá outras providências. *Diário Oficial da União* 2011; 29 jun.
2. Fiocruz. *Análise da Implementação Nacional do Contrato Organizativo da Ação Pública (COAP), 2013-2016* [relatório de pesquisa]. Rio de Janeiro: Fiocruz; 2016.
3. Ribeiro JM. Desenvolvimento do SUS e racionamento de serviços hospitalares. *Cien Saude Colet* 2009; 14(3):771-782.
4. R Core Team. *R: A language and environment for statistical computing*. Vienna: R Foundation for Statistical Computing; 2016.
5. Hamilton A, Madison J, Jay J. *The Federalist Papers*. New York: Signet Classics; 2003.
6. Dahl R. *Um Prefácio à Teoria Democrática*. Rio de Janeiro: Jorge Zahar; 1989.
7. Lijphart A. *Patterns of Democracy: government and performance in thirty-six countries*. New Haven: Yale University; 1999.
8. Costa-Font J, Greer SL, editors. *Federalism and decentralization in European health and social care*. London: Palgrave/Macmillan; 2013
9. Fleury S, Ouverney AM. *Gestão de Redes: A Estratégia de Regionalização da Política de Saúde*. Rio de Janeiro: Editora FGV; 2007.
10. Ribeiro JM, Alcoforado F. Mecanismos de governança e o desenho institucional da Secretaria de Saúde do Município do Rio de Janeiro (RJ), Brasil. *Cien Saude Colet* 2016; 21(5):1339-1349.
11. Moreira MR, Escorel S. Conselhos Municipais de Saúde do Brasil: um debate sobre a democratização da política de saúde nos vinte anos do SUS. *Cien Saude Colet* 2009; 14(3):795-805.
12. Moreira MR. Reflexões sobre democracia deliberativa: contribuições para os conselhos de saúde num contexto de crise política. *Saúde em debate* 2016; 40(n. especial):25-38.
13. Nunes E. *A Gramática Política do Brasil*. Rio de Janeiro: Zahar Editor; 1997.
14. Abrúcio FL. Para além da descentralização: os desafios da coordenação federativa no Brasil. In: Fleury S, organizador. *Democracia, Descentralização e Desenvolvimento: Brasil & Espanha*. Rio de Janeiro: FGV Editora; 2006. p. 77-125.
15. Arretche M, Marques E. Municipalização da saúde no Brasil: diferenças regionais, poder de voto e estratégias de governo. *Cien Saude Colet* 2002; 7(3):455-479.
16. Viana ALA, Lima LD, Ferreira MP. Condicionantes estruturais da regionalização na saúde: tipologia dos Colegiados de Gestão Regional. *Cien Saude Colet* 2010; 15(5):2317-2326.
17. Lima LD, Queiroz LFN, Machado CV, Viana ALA. Descentralização e regionalização: dinâmica e condicionantes da implantação do Pacto pela Saúde no Brasil. *Cien Saude Colet* 2012; 17(7):1903-1914.
18. Travassos C, Oliveira EXG, Viacava F. Desigualdades geográficas e sociais no acesso aos serviços de saúde no Brasil: 1998 e 2003. *Cien Saude Colet* 2006; 11(4):975-986.

19. Viacava F, Bellido JG. Condições de saúde, acesso a serviços e fontes de pagamento, segundo inquéritos domiciliares. *Cien Saude Colet* 2016; 21(2):351-370.
20. Piola SF, França JRM, Nunes A. Os efeitos da Emenda Constitucional 29 na alocação regional dos gastos públicos no Sistema Único de Saúde no Brasil. *Cien Saude Colet* 2016; 21(2):411-421.
21. Gadelha CAG, Machado CV, Lima LD, Baptista TWF. Saúde e territorialização na perspectiva do desenvolvimento. *Cien Saude Colet* 2011; 16(6):3003-3016.
22. Cordeiro H. Descentralização, universalidade e equidade nas reformas de saúde. *Cien Saude Colet* 2001; 6(2):319-328.
23. Ribeiro P. A descentralização da ação governamental no Brasil dos anos noventa: desafios do ambiente político-institucional. *Cien Saude Colet* 2009; 14(3):819-828.
24. Dain S, Faveret ACS, Cavalcanti CE, Carvalho D, Quadros WL. Avaliação dos impactos de reforma tributária sobre o financiamento da saúde. In: Negri B, Ferrato G, organizadores. *Radiografia da Saúde: 2001*. Campinas: Editora Unicamp; 2001. p. 233-288.
25. Lima LD. Conexões entre o federalismo fiscal e o financiamento da política de saúde no Brasil. *Cien Saude Colet* 2007; 12(2):511-522.
26. Trevisan LN, Junqueira LAP. Construindo o “pacto de gestão” no SUS: da descentralização tutelada à gestão de rede. *Cien Saude Colet* 2007; 12(4):893-902.
27. Vilaça EV. As redes de atenção à saúde. *Cien Saude Colet* 2010; 15(5):2297-2305.
28. Brasil. Lei 11.107, de 6 de abril de 2005. Dispõe sobre normas gerais de contratação de consórcios públicos e dá outras providências. *Diário Oficial da União* 2005; 7 abr.
29. Ribeiro JM, Costa NR. Regionalização da assistência à saúde no Brasil: os consórcios municipais no Sistema Único de Saúde (SUS). *Planejamento e Políticas Públicas* 2000; 22:173-220
30. Neves LA, Ribeiro JM. Consórcios de saúde: estudo de caso exitoso. *Cad Saude Publica* 2006; 22(10):2207-2217.
31. Brasil. Lei Complementar nº 141, de 13 de janeiro de 2012. Regulamenta o § 3º do art. 198 da Constituição Federal para dispor sobre os valores mínimos a serem aplicados anualmente pela União, Estados, Distrito Federal e Municípios em ações e serviços públicos de saúde; estabelece os critérios de rateio dos recursos de transferências para a saúde e as normas de fiscalização, avaliação e controle das despesas com saúde nas 3 (três) esferas de governo; revoga dispositivos das Leis nos 8.080, de 19 de setembro de 1990, e 8.689, de 27 de julho de 1993; e dá outras providências. *Diário Oficial da União* 2012; 16 jan.
32. Ribeiro JM, Moreira MR. A crise do federalismo cooperativo nas políticas de saúde no Brasil. *Saúde em debate* 2016; 40(n. especial):14-24.