The performance of the cities in the Health Pact in the scope of the federative relations of the Brazilian National Health System (SUS)[1]

O desempenho dos municípios no Pacto pela Saúde no âmbito das relações federativas do Sistema Único de Saúde

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Abstract

This study evaluates the results of the Health Pact, which seeks to regulate the SUS's federative relations, regarding the achievement of the goals and the compliance with the agreements made by the federated entities considering national priorities and the actual performance of the cities in comparative terms. Some indicators of the Health Pact were selected for the period of 2007-2011 and sought to answer the following questions: (1) Have the cities fulfilled what was agreed? How did this evolve in the period? (2) The effective performance of the cities has positively improved during the period? (3) What is the degree of inequality between cities in terms of performance? (4) Are the results associated with structural factors exogenous or endogenous to the health sector? Data from Datasus and Sispacto were used. Measures were developed to assess the degree of compliance with the agreed targets, to evaluate the actual performance of the cities and the degree of inequality between them. Regression models sought to gauge the influence of structural factors on this performance. Results show that the pact has not extended the cooperation between federated entities; there were positive developments in the achieving the goals, particularly in the indicators with punitive mechanisms; the performance varies between indicators and is mainly associated with the availability of financial resources.

Keywords: Federalism; Health Policy; Evaluation of Processes and Results.

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Resumo

Este artigo avalia os resultados do Pacto pela Saúde (que busca regular as relações federativas do SUS) em relação ao alcance das metas e ao cumprimento das pactuações feitas pelos entes federados a partir de prioridades nacionais, além doo desempenho efetivo dos municípios em termos comparativos. Foram selecionados alguns indicadores do pacto para o período de 2007 a 2011, buscando-se responder às perguntas: (1) os municípios cumpriram o que foi pactuado? Como isso evoluiu no período? (2) o desempenho efetivo dos municípios evoluiu positivamente durante o período? (3) qual o grau de desigualdade entre os municípios quanto ao desempenho? (4) os resultados estão associados a fatores estruturais exógenos ou endógenos ao setor saúde? Foram utilizados dados do Datasus e do Sispacto. Construíram-se medidas para aferição do grau de cumprimento das metas pactuadas e para a avaliação do desempenho efetivo dos municípios e do grau de desigualdade entre eles. Modelos de regressão buscaram aferir a influência de fatores estruturais sobre esse desempenho. Os resultados apontam que o pacto não ampliou a cooperação entre os entes federados. Houve, além disso, evolução positiva do cumprimento das metas, particularmente nos indicadores com mecanismos punitivos, e variação de desempenho entre indicadores, associado principalmente à disponibilidade de recursos financeiros.

Palavras-chave: Federalismo; Política de Saúde; Avaliação de Processos e Resultados.

The regulatory framework of the federal relations in the SUS

This article presents research results that sought to evaluate the Health Pact, a set of institutional reforms defined in 2006 and in force until 2011 (Brasil, 2006). The Pact marks a moment in the process of regulating the federal relations of the Brazilian National Health System (SUS), which has, among the challenges for its operation, specificities arising from the federative context in which it is inserted.

SUS was created as a federative pact based in a cooperation conception among government spheres. Since its implementation, there has been a constant evolution of the regulatory framework of federative relations. In order to face one of the central dilemmas of federalism (to concile autonomy and interdependence of federated entities), it has been tried to define mechanisms and instruments of regulation that promote cooperation and coordination, in order to guarantee uniformity of policy and universality and integrality of attention (Menicucci, 2014a, 2014b, Menicucci et al., 2008), besides creating incentives to transfer responsibilities and combat competitive and predatory relations between the Union, states and cities.

In this arrangement, the Union is responsible for standardization and general coordination; the federal government has control of the decision-making process, defines the format of cooperation and the allocation of transferred resources, while cities are executors and managers of this policy (Arretche, 2012; Menicucci, 2014b; Menicucci et al., 2008). The main mechanism of regulation, which defines the nature of intergovernmental relations, is the distribution of resources for system costing. While responsible for much of the funding – 44.7% in 2011 (Piola et al., 2013) – the federal government has in conditional transfers an important mechanism for aligning decisions of subnational governments with national priorities. Although the "fund for fund" transfer is the preferred mode of transfer, part of resources are transferred in the form of incentives for adherence to nationally defined programs or actions, even if agreed on the

Tripartite Inter-managers Committee (arena of agreement between the three federated entities).

In the 1990s, the focus of the regulation of federative relations fell on the process of decentralization. The assembled institutional apparatus succeeded in this objective, but failed to achieve integration among the federated entities through the regionalization of care, as provided for in the Constitution (Fortes, 2008; Levcovitz, Lima, Machado, 2001; Mendes, 1998; Menicucci et al. Al., 2008). On the contrary, the rules of decentralization, particularly those related to the transfer of resources, have made it difficult by overrating the role of the city as a service provider and undervalue the role of states as instances of organization of management, financing, supervision and control.

Secondly, the evolution of the regulatory framework expressed the attempt to implement the regionalization guideline, which, coupled with the hierarchy of asssistance by levels of care, required the articulation of managers to promote the integration of the service network that transcends the political-administrative areas of a city or a state. From 2001 on, norms and actions aimed at the regionalized organization of the health sector had as one of their objectives to correct the distortions of "autarchic municipalism" and to replace the attitude of intermunicipal competition for cooperation in order to overcome barriers and differences in access between citizens of different locations (Machado, 2009).

To order the process, planning instruments were established, such as the Regionalization Master Plan, Integrated Pactual Programming and the Investment Master Plan. Although they initiated a federative integration effort, they were ineffective in articulating regional networks, breaking with the fragmentation resulting from municipalization and building a genuine health system, which eventually led to the reformulation of the regulatory framework in 2006, with the Health Pact. This denomination expresses the nodal point of the federative question, particularly in the case of health care: the need for agreement among federated entities. As a mechanism of regional management, the Pact reiterates the previously and still ineffective instruments and establishes new arenas of institutionalized pacts (regional management boards) in order to solve the problems of collective action.

A third moment in the evolution of the regulatory framework of federal relations in SUS is marked by Presidential Decree no. 7.508/2011, which consolidates ongoing processes and seeks to ensure the commitment of federated entities to comprehensive health care, emphasizes the construction of federative pacts for the formation of resolutive attention networks and clarifies the responsibilities of federated entities through the Organizational Contract of Public Action. In addition to the decree, Law no. 12.666/2011 recognizes and institutionalizes the deliberative competence of the inter-managers committee (CIB and CIT) as federative coordination spaces and establishes a regional committee (CIR). These committes are now recognized not just as forums, but as decision marking bodies, formally assuming the need for federative articulation when changing their legal status.

However, if the rules circumscribe the game, they do not eliminate the players. The very dynamics of institutional rules aimed at overcoming difficulties in health care in territories that go beyond the political and administrative limits of the federated entities is an expression of the difficulties in the construction of regional networks. Studies have pointed out that the institutional arrangement has not guaranteed regionalization success (Menicucci, 2014a, 2014b, Menicucci et al., 2008). Even if the Union regulates and defines incentives for the alignment of federated entities with national guidelines, regionalization is affected by the context and behavior of regional and local actors. Some of the main provided instruments do not work for the orientation of regulation or of the flows within the health system, and regional spaces cannot meet the demand of their inhabitants. While they impact the action of regional levels of government (though sometimes in a formalistic way), national rules are not uniformly observed and do not guarantee the adherence of all federated entities. Evaluating some results of this process, specifically the Health Pact, is the intent of this article.

A Health Pact evaluation

A research with the main actors that participated in the formulation of the Pact, having as main locus the Tripartite Inter-managers Committee (CIT), allowed identifying the different points of view present in the federative arena, the motivations of the different actors, federal conflicts, divergences and collisions[2]. The initial focus of the proposal, originated in the Ministry of Health (MS), was in the definition of shared management mechanisms between federative entities within territories. Throughout its formulation process, and in the inability to resolve conflicts, the Pact lost that emphasis and focused on accountability for commitments and targets to be "agreed upon", while maintaining the objective of improving management, but not from a federative perspective, in a clear emptying of the original concept.

At the same time, there was a formal extension of its scope with the inclusion of two new dimensions, being formulated with three components: the Pact for Life, a commitment among managers around priorities with impact on the health situation; The Management Pact, to reinforce the strategy of "shared and solidary management"; and the Pact in Defense of SUS, to reinforce SUS as State policy and establish commitments for the consolidation of constitutional principles.

Even though in an often bureaucratic way, there was gradual adherence of the cities to the Pact, which reached the adhesion of 82.5% of them. But little progress has been made towards the organization of regionalized attention networks. As a federative program, the Pact did not extend cooperation between the federated entities and was extinguished only five years after its formulation.

More general evaluations of the Pact were carried out within the scope of management of SUS, but, in relation to the achievement of targets and compliance with agreements, there are no published analyses. This is the scope of this article, which aims to evaluate some measurable results of the Pact for Life and for Management Pact, which define health and management goals to be agreed and reached by the federated entities from national priorities, translated into indicators defined by the MS.

Based on the selection of some of these indicators for the 2007-2011 period, and considering the cities as the unit of analysis, we sought to answer the following four questions: (1) Have the cities complied with what was agreed, and how did the process evolve in the period of the Pact? (2) Did the effective performance of cities evolve positively in the period? (3) What is the degree of inequality among cities in relation to their performance? (4) Are the results associated with structural factors exogenous to the health sector (socioeconomic conditions and financing capacity), or endogenous, but with low management interference such as installed capacity to provide services?

To answer the first two questions, we selected indicators of the Pact for Life and Management Pact, using secondary data, obtained from the Department of Information Technology of the Brazilian National Health System (Datasus) and the Information System of the Pact for Health (Sispacto). For the selection, two criteria were adopted: (1) permanence of the indicator throughout the period to allow diachronic analysis, since the indicators variedannually, either by program accommodations or changes in priorities (on average, the number of indicators was 48, with an annual variation of 40 to 54); indicators that changed names, but the formula remained the same, were selected; (2) missing data below 30%, to guarantee robustness to the analysis (Viegas et al., 2007).

The application of the two criteria led to the definition of ten indicators applicable to all cities and one restricted to the Legal Amazon (malaria), and the second criterion was the one that most impacted the selection. Chart 1 lists the indicators, their abbreviations, polarity (meaning of the best indicator result) and classification in indicators of processes and results. Process indicators refer

2 MENICUCCI, T. M. G.; COSTA, L. A.; MACHADO, J. A. Pacto pela saúde: aproximações e colisões na arena federativa. *Ciência & Saúde Coletiva*, Rio de Janeiro, in press. Available from: <https://goo.gl/lGHwqp> Access on: April 26th, 2017.

to the activities developed to achieve the planned objectives; the result indicators are demonstrations of the consequent effects of the interventions performed (Bittar, 2001; Donabedian, 1994; Martins; Blais; Leite, 2004). The selected indicators were used both to assess the achievement of agreed targets and to evaluate the performance of cities.

Chart 1 – Selected Indicators of the Health Pact, Brazil, 2007-2011

No.	Abreviation	Indicator	Sources	Polarity	Nature
1	Prenatal	Proportion of live born babies of mothers with four or seven or more prenatal visits*	Sinasc	Higher	Process/ Result
2	Tetravalent	Vaccination coverage with tetravalent DTP+Hib vaccine in children under one year of age	PNI/Sinasc	Higher	Process
3	CNES	Regular CNES database feed rate	CNES	Higher	Process
4	Cytopathological	Ratio between cervix cytopathological examinations in the age group of 25 to 59 years and the target population	Siscolo/IBGE	Higher	Process
5.a	Infant mortality	Infant mortality rate (cities with 80 thousand inhabitants or more)	SIM/Sinasc	Lower	Result
5.b	Infant mortality	Absolute number of deaths of children under one year of age (cities with less than 80 thousand inhabitants)	YES	Lower	Result
6.a	Neonatal mortality	Neonatal mortality rate (cities with 80 thousand inhabitants or more)	SIM/Sinasc	Lower	Result
6.b	Neonatal mortality	Absolute number of deaths of resident children under 28 days of age (cities with less than 80 thousand inhabitants)	YES	Lower	Result
7	Diabetes	Rate of hospitalization for SUS for diabetes mellitus and its complications in the population aged 30 to 59 years	SIH/SUS – IBGE	Lower	Result
8	EC29	Percentage of own revenue applied in health – EC 29/2000	Siops	Higher	Process
9	ESF	Proportion of the population enrolled in the Family Health Strategy	Siab/IBGE	Higher	Process
10	CVA	SUS hospitalization rate for cerebrovascular accident in the population aged 30 to 59 years	SIH/SUS – IBGE	Lower	Result
11	Malaria	Annual parasite malaria index (only for cities in the Legal Amazon)	Sivep-Malária/ SINAM/ IBGE	Lower	Result

Source: Datasus, 2013[3].

* In the 2007-2009period, the target was four consultations and, as of 2010, there were seven consultations. The indicator was calculated considering the target of each year, according to the current regulations.

3 For technical details of the indicators, see <http://tabnet.datasus.gov.br/cgi/pacto/ 2010/Nota_Tecnica_Indicadores.pdf> or <http://portalweb04.saude.gov.br/sispacto/Instrutivo_Indicadores_ 2011.pdf>.

The first question is answered in the next section; the others, in the following section, in which the effective performance of cities in relation to health care and situation is evaluated, identifying the inequalities between them and relating this performance to structural factors that may affect the results. The description of the specific methodology is done in each section. The last section presents some conclusions.

Evolution of compliance with agreements

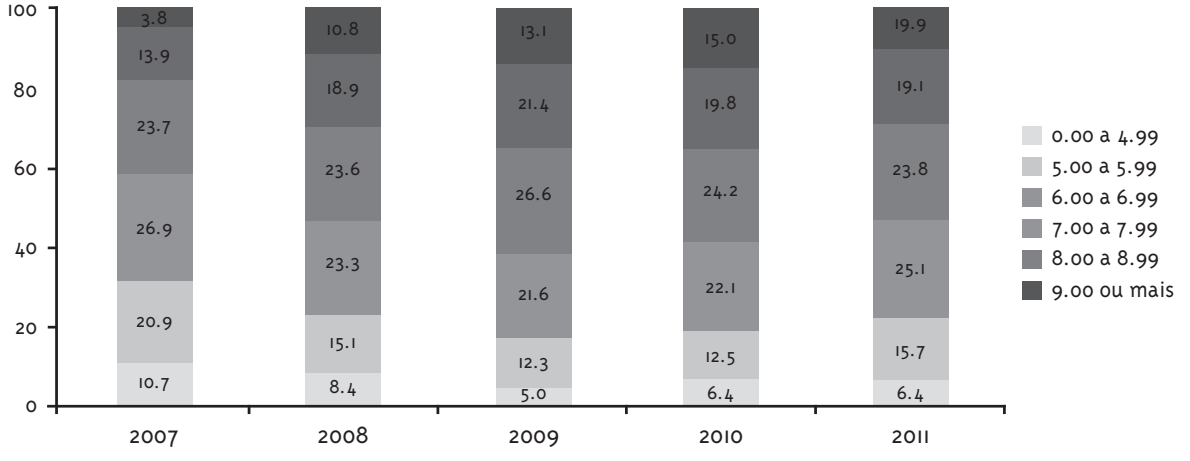
To analyze the fulfilment of the pact, the percentage of compliance with the targets for each indicator was calculated according to the formula:

$$\text{Compliance (\%)} = \frac{\text{reached value}}{\text{target}} \times 100$$

When the indicator was of the "lower, the better" type, the results were reversed. For the agreed targets, data from the Sispacto were used, and the values reached by the cities were extracted from Datasus. The data declared by the cities themselves and that presented a discrepancy in relation to Datasus were disregarded. Because they did not present a normal distribution, data were normalized from the normalized interquartile range, which reconstructs maximum and minimum limits from the median plus or minus one-half times the difference between the first and the third quartiles in each indicator. Thus, the data were homogenized with the exclusion of extreme values.

To group similar conditions and simplify the presentation of the data, values from 0.00 to 1.00 were assigned according to the percentage achievement intervals of the goals: up to 59.9% = 0.00; From 60% to 69.9% = 0.25; 70% to 79.9% = 0.50; From 80% to 89% = 0.75; 90% or more = 1.00. The values attributed to each indicator were added, generating for each city a final note of maximum value 10 (except for 711 cities belonging to the Legal Amazon, which may reach note 11). This note expresses, briefly, the degree of compliance of the agreement in a given year. Graph 1 shows the percentage of cities in banknote ranges, with scores lower than five were grouped in the range of 0 to 4.99 due to low frequency.

Graph 1 – Percentage of cities by note range and year, Brazil, 2007-2011



The compliance profile of the agreement changes over the years. The highest scores (above eight) show a positive evolution (albeit with a significant decrease in the last year of the series) simultaneously with the decrease of the lowest ones (less than six). Intermediate groups (between six and eight), although showing fluctuations, return, in 2011, to the same level of 2007.

These results suggest that the Pact appears to have had relevant effects. The establishment of

goals and their subsequent evaluation may have affected the behavior of the cities, which gradually presented higher grades. In 2007, only 18% of cities scored higher than 8; in 2010, this percentage increased to about 35%; only in 2011 (29%), when there is a general deterioration in meeting the targets, there is a slight decline. This result does not necessarily mean that there has been an improvement in health care provided nor in the health of the inhabitants, but it may indicate improvement in the capacity to define the goals themselves, based on a better knowledge of the capacities of each city.

It can be assumed that the MS had some success in the objective of gradually inscribing in the municipal agendas the knowledge of nationally defined priorities, since an ever smaller proportion of cities obtained lower scores (less than six) over the period: from 32% in 2007 to 19% in 2010, with a slight worsening in 2011 (22%). One hypothesis would be that the Pact systematized a periodic monitoring and evaluation process that, to a certain extent, constrained the subnational federated entities that had to learn minimally about the indicators themselves. However, the effects seem to be partial, since approximately half of the cities presented stable behavior in the period, remaining with intermediate scores.

Global results hide important differences between indicators. Figure 1 summarizes the evolution of the percentages of cities that obtained value 1.00 (90% or more of meeting the target), that is, those that reached the agreed targets. Each indicator has its own evolution, with no pattern among them.

Two factors allow the elaboration of hypotheses to explain the greater fulfillment of the goals in some indicators. The first is the existence of legal and normative incentives whose noncompliance can generate strong penalties for the federated entities. This explains the results in the indicators of resource utilization according to Constitutional Amendment Number 29 (above 95% of cities met the goal in all years) and data from the National Register of Health Establishments (CNES) - in a growing escalation, 100% of cities met the targets in 2011. In the first case, because the constitutional amendment that defined the minimum percentages to be applied in health had been in force since 2000, establishing the percentage of 15% of own resources for the cities. In the case of CNES feeding, the incentive comes from Administrative Rule MS/GM no. 373/2002 and its amendments, which established the immediate suspension of the MS's monthly financial transfers for the cities that fail to comply with the obligation to feed the national databases for two consecutive months or three alternate months, "fund for fund". This means that subnational entities can suffer a financial penalty for non-compliance.

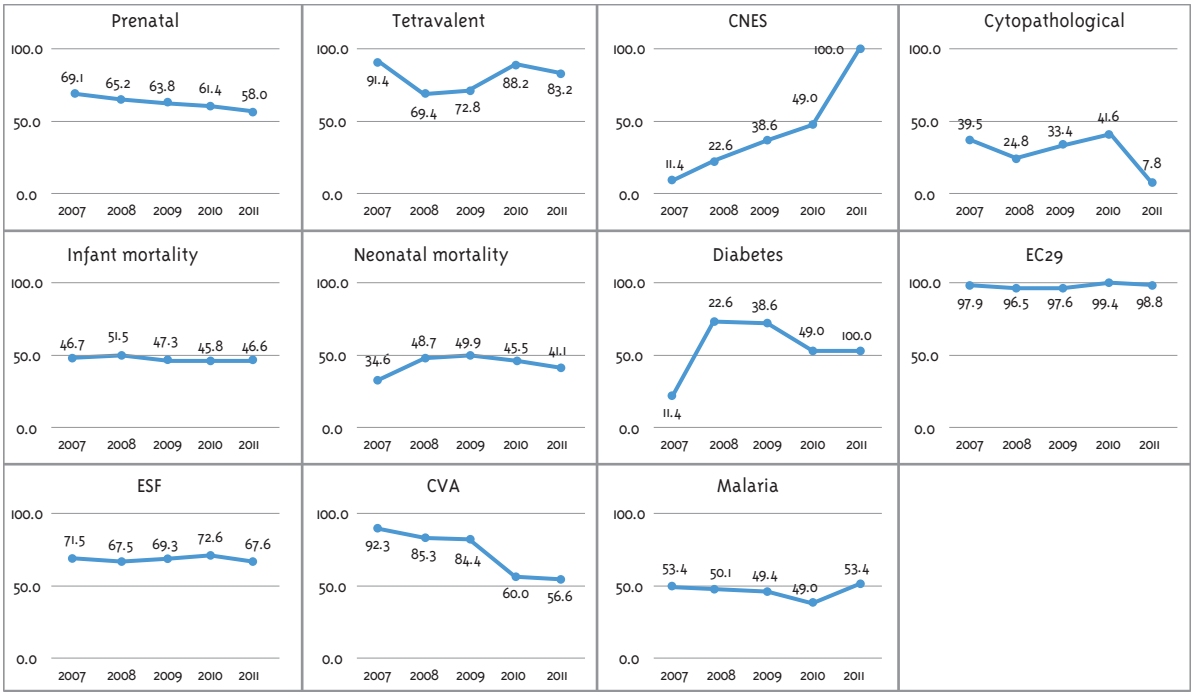
This hypothesis, however, cannot explain the results that were achieved in the other indicators. In these cases, a second hypothesis would be the greater facilitator to meet targets when they depend only on the individual efforts of each city and are independent of the cooperation of other federated entities or the performance of other independent actors, such as service providers. If the dependency is greater, the proportion of cities that meet the agreed goals decreases. In this sense, indicators such as tetravalent vaccination coverage and coverage of the Family Health Strategy (ESF), although presenting significant percentages of compliance with the goals, varying between 80% and 70% of the cities, respectively, have lower results than other indicators, such as EC29 and CNES. Possibly, the worst relative result is due, in the first case, to the dependence of the population's willingness to be vaccinated and, secondly, to the need to be able to fix health professionals, something more difficult in distant areas (Menicucci, 2014b).

Some indicators are more dependent on the cooperative functioning of the service network available to the SUS (own or contracted) and, of course, the cooperation of the municipal managers involved. This appears to be the case for neonatal mortality indicators (approximately 45% of cities meet the target each year), hospitalization for CVA (approximately 60%), hospitalization for complications of diabetes (approximately 50%) and prenatal visits (approximately 60%). Finally, the more complex indicators depend on factors

external to the health sector. Examples include infant mortality rate and malaria control, indicators that are associated with living conditions in general and influenced by various elements, such as public policies in other areas (education, basic sanitation) and deforestation of the Amazon Forest, respectively. Atypical case was the "ratio of cytopathological examinations," which did not show a uniform behavior, with a large drop in the last year analyzed (a bad result, because it is an examination for the prevention of female cancer).

To some extent, the alternative hypothesis also helps to explain the compliance indicators of EC29 and CNES feeding. In the first case, municipal management needs only its own effort to meet the goal: political disposition, regular control of municipal finances, and minimal administrative capacity are sufficient to ensure good performance without relying on another federated entity or service provider. In the case of CNES, it is enough to organize the process of sending the files to the MS, although this does not necessarily mean quality of information.

Figure 1 – Percentage of cities, per year, that obtained a value of 1.00* in each indicator separately, Brazil, 2007-2011



*The city receives the value of 1.00 when it reaches 90% or more of achievement of the agreed goal.

Cities performance in the 2007-2011 period

In this section, the focus of the analysis shifts from compliance with the agreements to the actual results achieved in the Pact indicators. This performance is analyzed both in the diachronic perspective (evolution of the city) and comparatively (among cities), aiming to answer the questions: (1) Did the performance of cities evolve positively during the validity of the Pact? (2) What is the degree of inequality between them? (3) Are the results associated with structural factors exogenous or endogenous to the health sector?

To do so, two measures were constructed. The first compares the performance of the city over the period, taking as a parameter the national targets established for the last year of the series (2011). From this performance, cities were classified into four positions: (1) performance below 75% of the national target; (2) performance between 75% and 100% (exclusive) of the national target; (3) performance between 100% (inclusive) and 125% of the national target; (4) performance equal to or greater than 125% of the national target.

For infant and neonatal mortality, whose goals are to reduce by a percentage the value reached in the previous year, the World Health Organization parameter was used: values less than 10 deaths per thousand live births for cities with 80 thousand inhabitants or more. For those with less than 80 thousand inhabitants, in which the indicator considers the number of deaths per year, there being no parameter of what is desirable, it was considered the variation of 1 death to define the performance bands.

As a second measure, to analyze the inequality between cities, the Gini coefficient was calculated from the values observed in the indicators. The Gini is a measure of inequality of any distribution, including health (Schneider, 2002), although it is more commonly used to measure income inequality[4].

Finally, in order to identify possible explanatory factors, the performance of cities was related to structural factors, exogenous or endogenous to the health sector, that affect the capacity to provide services and, therefore, on the performance of cities, and do not depend on the direct action of managers. These factors were organized into two groups of indicators: (1) *indicators of installed capacity* (Datasus, CNES, IBGE): total beds per thousand inhabitants (monthly average), SUS beds per thousand inhabitants Monthly average), total physicians per thousand inhabitants (monthly average), SUS physicians per thousand inhabitants (monthly average); (2) *financial indicators* (Datasus, Siops): Municipal GDP per capita, tax revenues and constitutional transfers per capita, total health expenditure per capita, percentage of own health expenditure and own expenses in health per inhabitant.

Due to the multicollinearity (strong correlation between explanatory variables), three of these factors were excluded from the analysis: total beds and physicians per thousand inhabitants and own health expenses per inhabitant. The multiple linear regression method was adopted, with municipal performance as the dependent variable and, as explanatory variables, the structural factors.

Results show that the performance was quite varied between indicators and between cities. Most of indicators presented a slightly positive evolution, as shown in Table 1.

Table 1 – Cities performance based on national targets for 2011, per year, according to indicators, Brazil, 2007-2011

Indicator	Intervals	2007	2008	2009	2010	2011
Prenatal	0 to 48.95	15.3	16.3	16.7	30.4	25.7
	48.95 to 65.27	17.8	22.9	16.5	35.5	32.6
	65.28 até 81.59	28.8	21.8	29	13.8	21.7
	Greater than or equal to 81.60	38.1	39	37.9	20.3	20
	Average value of the indicator	***71.7***	***71.6***	***71.4***	***60.8***	***63.0***
Tetravalent	0 to 71.24	0	3.1	2.2	2	5.2
	71.24 to 94.99	18.4	28.6	23	27.6	27.9
	95.00 to 118.75	50.9	47.1	50.9	49.2	44.7
	Greater than or equal to 118.75	30.7	21.2	23.8	21.2	22.2
	Average value of the indicator	***111.2***	***104.2***	***106.7***	***104.7***	***103.8***

continues...

4 Arretche (2016), for example,compares inequalities between cities in relation to the results of social policies, and Soares (2006) measures inequalities in education.

Table 1 – Continuation

Indicator	Intervals	2007	2008	2009	2010	2011
CNES	0 to 74.99	79	63.1	48.3	39.5	0
	75.00 to 99.99	9.5	24.1	26.7	23.8	0
	100.00 to 124.99	11.5	12.8	25	36.7	100
	Greater than or equal to 125.00	0	0	0	0	0
	Average value of the indicator	***29.6***	***46.2***	***57.9***	***69.0***	***100***
Cytopathological	0 to 0.16	30.2	33	25.5	29.3	61
	0.17 to 0.22	20.3	23.6	22.4	24.9	21.5
	0.23 to 0.28	18.9	20.5	22.1	20.9	11.3
	Greater than or equal to 0.29	30.6	22.9	30	24.8	6.2
	Average value of the indicator	***0.2***	***0.2***	***0.2***	***0.2***	***0.1***
Infant mortality**	Greater than or equal to 12.50	68.4	64.8	62.3	55.5	52.1
	10.00 to 12.49	21.1	23.3	21.8	26.1	29.5
	7.50 to 9.99	7.7	9.6	14.4	14.6	14.2
	0 to 7.49	2.8	2.3	1.4	3.9	4.2
	Average value of the indicator	***3.9***	***3.8***	***3.6***	***3.4***	***3.4***
Infant death*	Greater than or equal to 3.00	46.8	46.1	43.5	40.9	41.5
	2	13.8	13.3	13.2	14.8	13.5
	1	17.8	18.8	19.6	19.3	19.7
	0	21.6	21.9	23.7	25	25.3
Neonatal mortality**	Greater than or equal to 12.50	25.4	22.4	18.4	17.4	16.4
	10.00 to 12.49	23.9	21.2	24.6	22.4	19.5
	7.50 to 9.99	30.5	34.3	33.7	34.7	34.5
	0 to 7.49	20.2	22.1	23.2	25.5	29.5
	Average value of the indicator	***2.8***	***2.5***	***2.5***	***2.3***	***2.3***
Neonatal death*	Greater than or equal to 3.00	33	31.9	30.9	28.9	28.8
	2	13.2	13.5	12.8	12.5	13
	1	20.3	20.6	20.8	20.7	21
	0	27.3	27.8	29.2	31.4	30.7
Diabetes	Greater than or equal to 7.14	46.5	42.4	45.8	45.9	44.9
	5.71 to 7.13	7.6	7.9	7.8	7.5	8
	4.28 to 5.70	8	8.3	8.2	7.8	7.7
	0 to 4.27	37.9	41.4	38.2	38.8	39.3
	Average value of the indicator	***8.3***	***7.7***	***8.1***	***8.3***	***8.0***
EC29	0 to 11.24	0.3	0	0	0	0
	11.25 to 14.99	0.6	0.8	0.2	0.4	0.6
	15.00 to 18.74	52.1	48.3	43.4	43.2	48.9
	Greater than or equal to 18.75	46.5	50	56.1	56	49.7
	Average value of the indicator	***19.2***	***19.5***	***20.0***	***20.0***	***19.5***

continues...

Table 1 – Continuation

Indicator	Intervals	2007	2008	2009	2010	2011
ESF	0 to 42.74	18.9	17.3	16	15	15.4
	42.75 to 56.99	6.9	6.6	6.1	6	6.1
	57.00 to 71.24	8.1	8.1	8.5	8.1	7.9
	Greater than or equal to 71.25	66.1	68	69.5	70.9	70.6
	Average value of the indicator	***79.3***	***79.6***	***81.3***	***83.7***	***82.1***
CVA	Greater than or equal to 5.89	50.8	44.7	49.7	49.4	49.5
	4.71 to 5.88	8.5	9	8.8	9.1	9.2
	3.51 to 4.70	7.8	7.9	7.7	8.7	8.4
	0 to 3.52	32.8	38.3	33.7	32.8	32.8
	Average value of the indicator	***7.0***	***6.0***	***6.7***	***6.6***	***6.5***
Malaria	Greater than or equal to 15.39	18.9	16.1	16	14.8	12.6
	12.31 to 15.38	2.1	1.7	1.3	1.4	1.9
	9.23 to 12.30	1.7	2.1	1.9	2.1	2.9
	0 to 9.22	77.3	80.2	80.8	81.7	82.6
	Average value of the indicator	***3.2***	***2.0***	***2.1***	***1.7***	***0.8***

Source: Brasil (2009), Datasus and research data.
*Refers to cities with less than 80 thousand inhabitants.
**Only for cities with more than 80 thousand inhabitants.

The CNES case calls attention to the surprising improvement: in 2011, all cities reached the national target, although at the moment of implementation of the Pact this proportion was only 11.5%. This evolution is explained by the possibility of sanction and confirms the general rule that, through positive or negative incentives, the Union can affect the behavior of the federated entities; in this case, inducing cities to produce information that contributes to the management of the health system.

In the other indicators, the performance was worse or irregular in the period in most of the cities. It is curious that in the case of other process indicators, performance fluctuates significantly in the period or significantly worsens in the last two years or in the last year of the series: the tetravalent coverage falls from the percentage of more than 80% of the cities meeting or exceeding the national target in 2007 to 66.9% in 2011. It should be noted, however, that more than 20% of cities exceed the 100% target, which can be explained both by the universal nature of the SUS, which allows the dispersion of vaccination for various reasons (travel, availability of the service), and due to the fact that most of the cities are small, making the application of few doses more strongly impact the indicator, given the low denominator. In prenatal care, there is a significant worsening from 2010, when 66% of the cities reach below the national goal, rising to 58% the following year. This fall can be explained by the change in the indicator that from 2010 onwards considers seven queries and not four more. Regarding the performance of cytopathological tests, the performance in the two bands below the national goal goes from 50% to more than 80% of the cities in 2011.

Indicators measuring infant mortality point to negative results, taking into account the parameters considered: even with a significant improvement in the proportion of cities with a rate equal to or above the national target, more than half still had low performance at the end of the period, and approximately 80% were below WHO parameters considered appropriate. A little more favorable situation was verified in relation to the infant death, with about 40% of the cities in the upper performance bands.

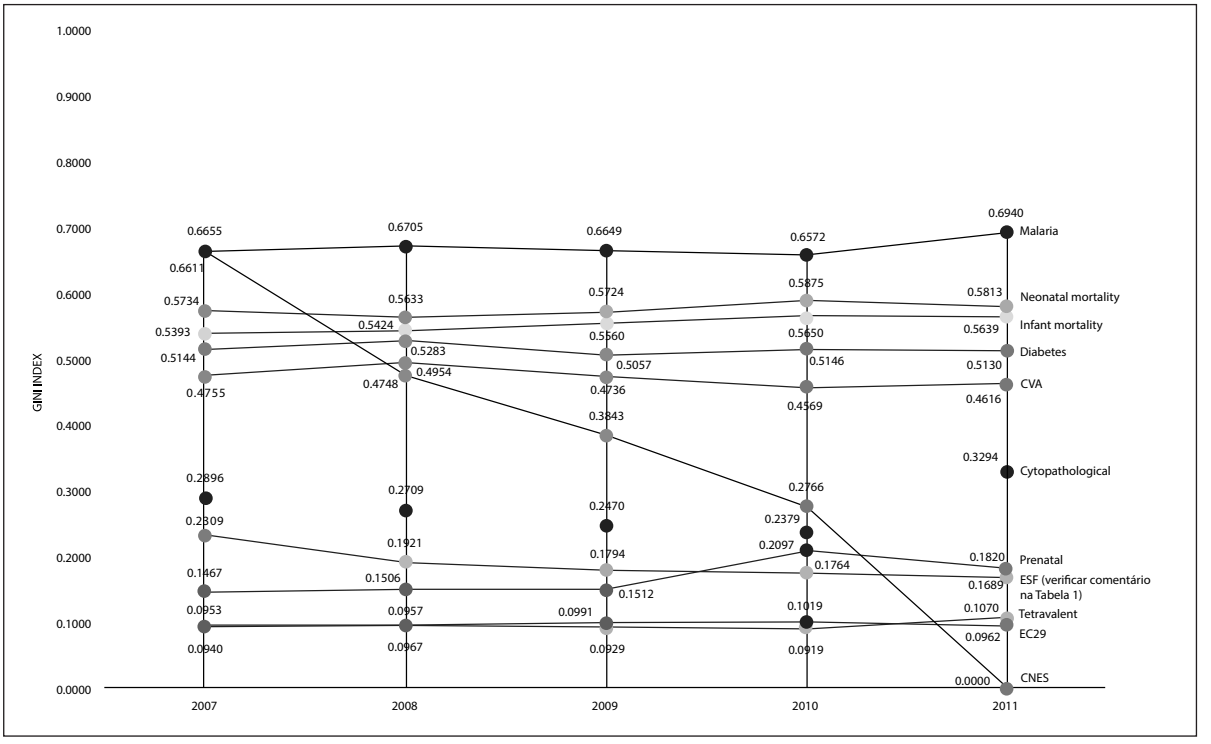
Neonatal mortality shows a gradual improvement, and in 2011, 64% of cities presented rates equal to or above the national target. In this case, the outcome is significantly affected by the performance of the health system, while infant mortality reflects more general

conditions of life outside the system. The results suggest effective improvement of performance in most cities, but still far from a desirable situation.

In the indicators that measure hospitalization rates for diabetes mellitus and its complications or for CVA, the results are similar and with little variation. Although there is a significant percentage of cities with performance equal to or above the national target (more than 40%), the highest concentration is in the lowest performance range and these results remain constant throughout the period. Although it is beyond the scope of this study to evaluate the indicators of the Pact, it is worth emphasizing the controversies about them. The hospitalizations for these reasons are usually used as indicators of access and quality of primary care, which, if ineffective, can lead to hospitalization due to aggravation of chronic diseases (Alfradique et al., 2009). However, the opposite may occur, and the greater coverage by the FHT can facilitate necessary hospitalizations in regions lacking health services, generating demand for hospital services (Mafra, 2011; Oliveira; Travassos; Carvalho, 2004).

The second step was to identify the degree of inequality among cities from the Gini coefficient. Regarding performance in selected indicators of the Pact for Health, there was, in general, some stability in the inequality index, except for the CNES, which reached zero in 2011. In the indicator for cytopathological exams, there was an increase in inequality in the period of approximately 13%, as shown in Graph 2.

Graph 2 – Gini index of the performance of cities in selected indicators of the Health Pact, Brazil, 2007-2011



The highest inequality is observed in the annual parasite malaria index for the cities of the Legal Amazon, with Gini above 0.60 during the whole period, followed by rates of infant and neonatal mortality, hospitalizations for diabetes (above 0.50), and hospitalizations for CVA (greater than 0.45). In other indicators, inequality among cities was below 0.20.

The next step was to identify if there is a relation between the structural factors selected and the performance of the cities. To do so, the multiple linear regression method was adopted, having as a

dependent variable municipal performance indicators[5] and, as explanatory variables, the structural factors, related to the installed and financial capacity[6]. A first model used a synthetic performance indicator in the form of an index ranging from 0 to 100, being the result of the arithmetic mean of all indicators. Other models considered separately each performance indicator.

The results of the first regression model, using the synthetic index (mean of the performance indicators), indicate that all the independent variables considered are highly significant to explain the performance of cities (Table 2). The revenue from constitutional taxes and transfers, the percentage of own health expenditures and total health expenditure, are, in descending order, the factors with greater explanatory power, according to the standardized beta analysis. This indicates that the availability of financial, general and specific health resources is the dimension that impacts the performance with greater intensity.

Factors related to installed capacity (availability of hospital beds and doctors) had a negative and lower relation with performance, which may help explain the low explanatory power of the model (R^2=0.2565). This suggests that other factors not considered, such as political guidelines, demand for care, and the regional dynamics of health care also affect the performance of cities.

Table 2 – Models of linear regression with synthetic indicator of municipal performance in the Life Pact and Management Pact as dependent variable, Brazil, 2007-2011[7]

Category	Independent variables	Model 1 (Coefficient)	Model 2 (Beta Padron.)
	Constant	35.42***	
		(0.415)	
(a) installed capacity	SUS Beds per thousand inhabitants (monthly average)	-0.348***	-0.047283
		(0.0481)	
	SUS Doctors per thousand inhabitants (monthly average)	-1.571***	-0.1496155
		(0.0702)	
(b) financial	Municipal GDP per capita	0.211***	0.0366323
		(0.0528)	
	Tax revenue and constitutional transfers per inhabitant	0.00483***	0.2348596
		(0.000299)	
	Total expenditure on health per capita	0.0180***	0.199344
		(0.00117)	
	Percentage of own expenses in health	0.670***	0.2143802
		(0.0208)	
	Observations	22.119	22.119
	R^2	0.2567	0.2567
	adjusted R^2	0.2565	0.2565

Obs: Robust standard errors in parentheses.
* Significant at the 90% level – for two-tailed tests.
** Significant at the 95% level.
** Significant at the 99% level.
Household weight information was used to estimate the statistics in this table. A VIF test was performed after estimation of the models and values above 10 were not found, which shows that there is no multicollinearity among the variables.

5 The indicators used refer to the performance of the cities in prenatal, tetravalent, CNES, cytopathologic, infant mortality, infant death, neonatal mortality, neonatal death, diabetes, EC29, ESF, CVA and malaria, having as reference the national targets for 2011.

6 Indicators considered: SUS beds per thousand inhabitants (monthly average), SUS physicians per thousand inhabitants (monthly average), municipal GDP per capita, tax revenues and constitutional transfers per inhabitant, total health expenditure per inhabitant, and percentage of own expenses in health.

7 In addition to the traditional model, a model with the standardized coefficients was elaborated, which allows comparing the impact of the variables on the performance of the cities.

Table 3 – Models of linear regression with municipal performance indicators in the Life Pact and Management Pact as dependent variables, Brazil, 2007-2011[8]

Independent variables	Performance indicators (dependent variables)					
	Prenatal		Tetravalent		CNES	
	Mod. 3 (Coef.)	Mod. 4 (Beta P.)	Mod. 5 (Coef.)	Mod. 6 (Beta P.)	Mod. 7 (Coef.)	Mod. 8 (Beta P.)
Constant	5.538*** (80.20)	-	24.094*** (8.254)	-	4.309*** (152.6)	-
SUS Beds per thousand inhabitants (monthly average)	13.60 (9.296)	0.010674	2.078** (956.8)	0.0164749	-405.4*** (17.69)	-0.1578959
SUS Doctors per thousand inhabitants (monthly average)	332.7*** (13.56)	0.1827481	-3.653*** (1.396)	-0.0202806	871.3*** (25.80)	0.2376081
Municipal GDP per capita	74.33*** (10.21)	0.0745833	-833,8 (1.051)	-0.0084564	-377.9*** (19.42)	-0.1882651
Tax revenue and constitutional transfers per inhabitant	1.169*** (0.0579)	0.3277319	-7.474 (5.956)	-0.0211752	-3.684*** (0.110)	-0.5127751
Total expenditure on health per capita	-3.975*** (0.226)	-0.2544002	48.37** (23.21)	0.0312891	15.35*** (0.429)	0.4875893
Percentage of own expenses in health	36.92*** (4.029)	0.0681013	-661,1 (414.6)	-0.0123253	-27.83*** (7.664)	-0.0254834
Observations – R^2 – R^2 Adjusted	22.119 – 0.076 – 0.0761		22.119 – 0.001 – 0.0004		22.119 – 0.176 – 0.1758	
Variables	Cytopathological		Child mortality		Neonatal mortality	
	Mod. 9 (Coef.)	Mod. 10 (Beta P.)	Mod. 11 (Coef.)	Mod. 12 (Beta P.)	Mod. 13 (Coef.)	Mod. 14 (Beta P.)
Constant	15.21*** (0.411)	-	673.3*** (13.48)	-	455.9*** (9.882)	-
SUS Beds per thousand inhabitants (monthly average)	0.256*** (0.0475)	0.0395491	-28.44*** (1.562)	-0.1146535	-19.32*** (1.146)	-0.1077785
SUS Doctors per thousand inhabitants (monthly average)	-0.313*** (0.0693)	-0.0338667	108.5*** (2.278)	0.3061707	79.33*** (1.671)	0.3098398
Municipal GDP per capita	0.304*** (0.0521)	0.0601514	-24.22*** (1.716)	-0.1248721	-16.26*** (1.258)	-0.1160529
Tax revenue and constitutional transfers per inhabitant	0.00217*** (0.000296)	0.1201103	-0.439*** (0.00972)	-0.631951	-0.301*** (0.00713)	-0.5991063
Total expenditure on health per capita	0.00819*** (0.00115)	0.1032978	0.723*** (0.0379)	0.2376743	0.480*** (0.0278)	0.2183593
Percentage of own expenses in health	0.0990*** (0.0206)	0.0359456	-8.855*** (0.677)	-0.0839178	-5.978*** (0.496)	-0.0784136
Observations – R^2 – R^2 Adjusted	22.018 – 0.066 – 0.0657		22.119 – 0.312 – 0.3115		22.119 – 0.291 – 0.2907	

continues...

8 For each of the indicators, the traditional model was elaborated and the other one with the standardized coefficients, which allows to compare the impact of the variables on the performance of the cities.

Table 3 – Continuation

Variables	Diabetes		EC29		ESF	
	Mod. 15 (Coef.)	Mod. 16 (Beta P.)	Mod. 17 (Coef.)	Mod. 18 (Beta P.)	Mod. 19 (Coef.)	Mod. 20 (Beta P.)
Constant	805.1*** (29.80)	-	162.0*** (1.911)	-	8.454*** (109.1)	-
SUS Beds per thousand inhabitants (monthly average)	92.04*** (3.454)	0.1951551	-0.877*** (0.221)	-0.0040705	229.6*** (12.65)	0.1279892
SUS Doctors per thousand inhabitants (monthly average)	62.10*** (5.038)	0.0921818	2.059*** (0.323)	0.0066891	-806.5*** (18.45)	-0.3147747
Municipal GDP per capita	16.61*** (3.794)	0.0450459	-1.141*** (0.243)	-0.00677	141.5*** (13.89)	0.1009031
Tax revenue and constitutional transfers per inhabitant	-0.0258 (0.0215)	-0.0195242	0.00950*** (0.00138)	0.0157535	-0.859*** (0.0788)	-0.1711001
Total expenditure on health per capita	-0.603*** (0.0838)	-0.1042739	-0.0202*** (0.00537)	-0.0076635	8.454*** (0.307)	0.3844444
Percentage of own expenses in health	-2.194 (1.497)	-0.0109346	90.91*** (0.0960)	0.9917125	-70.69*** (5.482)	-0.0926485
Observations – R^2 – R^2 Adjusted	22.119 – 0.069 – 0.0685		22.119 – 0.982 – 0.9817		22.119 – 0.136 – 0.1362	

Variables	CVA		Malaria	
	Mod. 21 (Coef.)	Mod. 22 (Beta P.)	Mod. 23 (Coef.)	Mod. 24 (Beta P.)
Constant	568.2*** (22.54)	-	6.032e+06*** (131.678)	-
SUS Beds per thousand inhabitants (monthly average)	8.254*** (2.612)	0.0236568	-153.192*** (15.264)	-0.0711803
SUS Doctors per thousand inhabitants (monthly average)	73.93*** (3.810)	0.148341	921.213*** (22.264)	0.299657
Municipal GDP per capita	-3.211 (2.869)	-0.01177	-228.111*** (16.764)	-0.1355557
Tax revenue and constitutional transfers per inhabitant	0.0456*** (0.0163)	0.0467029	3.037*** (95.02)	0.5042745
Total expenditure on health per capita	-0.458*** (0.0634)	-0.1070298	-8.794*** (370.3)	-0.3332959
Percentage of own expenses in health	2.961*** (1.132)	0.0199548	64.021*** (6.615)	0.0699368
Observations – R^2 – R^2 Adjusted	22.119 – 0.027 – 0.0263		22.119 – 0.127 – 0.1265	

Obs: Robust standard errors in parentheses.

* Significant at the 90% level – for two-tailed tests.

** Significant at the 95% level.

** Significant at the 99% level.

Household weight information was used to estimate the statistics in this table. A VIF test was performed after estimation of the models and values above 10 were not found, which shows that there is no multicollinearity among the variables.

In relation to the second set of regression models, which consider each performance indicator separately (Table 3), the independent variables were significant to explain, in most cases, the results achieved by cities, although with variations between the indicators. The availability of physicians to SUS and total health expenditure were significant in explaining all performance indicators. However, the indicator of tetravalent vaccination coverage is not explained by the municipal GDP, by the revenues and by the percentage of own expenses – which is justified by the fact that the vaccines are financed by the Ministry of Health. The number of hospital beds for SUS is significant for all performance indicators, except, as expected, for the prenatal indicator, which does not require this resource.

However, the explanatory power of the models as a whole is limited, except for compliance with EC29, which presents obvious overlap with the explanatory factor "percentage of own health expenditures" (R^2=0.982). Even so, some results are significant. Income from taxes and constitutional transfers are significant in explaining the best performance in prenatal care and, especially, the malaria index (coefficients of 0.327,719 and 0.504,277, respectively). The latter, however, is negatively affected by health expenditure, confirming the notion that the incidence of malaria is affected by general living conditions and, in turn, by the financial resources available to the city (exogenous to the health sector), but not by the specific health expenditure (process indicator), which expresses the costs of care and does not necessarily affect the incidence of malaria.

Infant and neonatal mortalities are strongly and negatively affected by the city's income (-0.631951 and -0.5991063), which highlights the importance of living conditions for these indicators (an exogenous factor to the the health sector). The availability of doctors is also relevant for the two indicators (0.3098398 and 0.3098398, respectively), suggesting an association between the reduction of infant and neonatal mortality and the existence of professionals to perform the required medical follow-up and treatment, whether in the prenatal care and parturition of pregnant women, or for the care of infants in their first year of life.

Final remarks

The institutional reform initially proposed in the process of formulating the Pact for Health focused on the definition of management mechanisms to advance shared solidarity among federal entities. The inability to resolve conflicts led to the reduction of the Pact to a proposal for management by results from the definition of individual and non-cooperative goals. Although allegedly federative, it can be said that the Pact did not extend cooperation between the federated entities.

From the perspective of the assumption by the cities of health obligations, there was a positive evolution of the fulfillment of the targets agreed during the Pact, except for 2011, when the results suffered a considerable drop, not possible to be explained in the scope of this research. This positive evolution, however, does not hide that most of the cities did not reach the goals agreed by them, although these results differ considerably between different indicators. The greater scope of the goals is related to the existence of legal and normative incentives and sanctions imposed by the Constitution or by the MS, or even by the degree of autonomy of the city to comply with the agreement, when there is no dependence on other federated entities or actors in the Attention to health.

Meeting the agreements or goals does not mean having a satisfactory performance in terms of ensuring adequate attention. Comparing the performance of cities with national targets and international parameters, there was a great disparity between indicators. There was an improvement in compliance with EC29, CNES's feeding, coverage by the FHT (all process indicators) and the reduction of malaria in the Legal Amazon. Conversely, there was worsening in the indicators of tetravalent, prenatal and cytopathologic exams. The performance of the majority is not positive in relation to infant mortality, which expresses living conditions, but is better in the case of neonatal mortality, which is greatly affected by health system performance and availability of resources. Also in relation to performance, it is possible to

observe improvement in most indicators in which the performance of the city is autonomous, that is, it does not depend on the cooperation of others, or is reinforced by the negative or positive incentives of national and federal government rules (EC29, CNES, malaria, ESF, vaccine coverage).

The attempt to identify structural factors capable of being associated with performance signaled the influence of the availability of financial resources on the performance of cities, which seems to be more associated with the general availability of financial resources than with health expenditures. The resources that indicate the capacity to provide services (availability of hospital beds and doctors) seem to have a much lower impact on performance, suggesting that spending in other sectors, provided by higher municipal revenues, can have significant effects on health.

However, even though the performance is not satisfactory in most cities, and despite the differences in relation to available resources, inequality between them, expressed by Gini, is insignificant in most indicators, which demonstrates the impact of national and of the Union's distributive power over municipal performance, particularly regarding financial resources.

This study has the limitation of working with the indicators defined by the Pact for Health from the priorities of the national health policy and may be insufficient to evaluate performance, considering also that the selection reduced their number. The selected indicators, however, meet the objective of making a diachronic analysis, in the unprecedented effort to evaluate the Pact for Health throughout its lifetime, comparing goals agreed with the goals reached by all Brazilian cities. The study goes further by seeking to use the same indicators to evaluate the results that to some extent indicate the performance of cities. But several variables affect performance and intergovernmental relations such as inequality of size, modes of transportation available, loco-regional logistics or management skills, among others. This may be an important research agenda for the analysis of health performance and federative relations. The inferences and hypotheses made from quantitative indicators also suggest the need for exploring them in in-depth qualitative studies.

Despite these limitations, the study shows that the Pact for Health seems to have contributed to the formation of a national agenda of priorities, to increase the knowledge of the cities about their own capacities and the monitoring of their performance. On the other hand, the Pact seems to have had little repercussion on the performance of cities, particularly when it depends on federative or intermunicipal cooperation (rates of hospitalization for CVA or diabetes and cytopathological examinations) or factors exogenous to the health sector (Infant mortality rate). In these indicators the performance was not favorable in most of the cities, possibly as a consequence of the permanence of a model guided by an individual and non-collaborative agreement.

The Pact, in short, had little or no effect to induce cooperation. Its extinction in 2011 points to its gradual emptying as a public policy. Obtaining cooperation among federated entities continues to be the challenge in the process of implementing the constitutional right to health. To build a true pact between managers of the three levels of government and between society in general, which are responsible for financing the health system, still remains as the horizon of necessity.

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Authors' contribution

Menicucci conceived and coordinated the research project, being the main person responsible for writing the article. Marques participated in the general definition of the research, including the choice of indicators, and collaborated with the data production and article writing. Silveira was responsible for the statistical analysis of the data. All authors contributed to the interpretation of the data.

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