

A portrait of Brazilian primary care: municipal expenditure and infrastructure in Brazilian municipalities

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Abstract *The paper presents the relationship between the allocation of financial resources and the type of local basic health infrastructure in an initial sample of 5,570 Brazilian municipalities. This is an explanatory research using multiple correspondence analysis and quantile regression between expenditure/control variables and the type of structure of PHC Units. The correspondence between the type and the representative variables of expenditure shows that inferior typologies are related to lower per capita expenditure in these variables, and vice versa. Quantile regression showed a positive relationship with the type of infrastructure in the two cycles evaluated. There is evidence that expenditure variables are positively related to infrastructure, which allows us to understand that allocating more resources leads to better infrastructure. Results point to the need to improve the governance of financial resources for health, as municipalities with lower socioeconomic indicators have an infrastructure in the lower categories. We can conclude that there are multiple actors, and the various criteria for allocating and decentralizing resources bring about difficulties of coordination and integration between the entities, restricting the appropriate prioritization in the distribution of resources.*

Key words *Primary health care, Health expenditures, Health infrastructure, Governance*

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Introduction

The establishment of the Unified Health System (SUS) in the 1990s led primary health care (PHC) to play an essential role in the Brazilian universal health system. In recent years, even with all the progress in health, the operation of these services is still not satisfactory, due to regional inequalities and wasted resources in the provision of services, underutilization of hospital beds and the inefficient expenditure of public resources¹. In this sense, local health management plays a central and strategic role in anticipating problem-solving, as health is also an inducer for the development of a nation. It is an essential right, primarily financed by public resources. Thus, when thinking about the allocation of resources, we should observe whether it is efficient and effective, since the provision of this type of service is the gateway to the Brazilian Unified Health System (SUS), by emphasizing the provision of services by a model guided by demand as a cost-reducing and health action comprehensive factor².

PHC is a priority within the health system since PHC Units (UBS) can be the primary health equipment at the local level, solving up to 85% of community health problems³. Thus, one of the ways to carry out this type of analysis is to relate the composition of local essential health equipment to the allocated resources.

The allocation of public resources has been the target of academic and budgetary concerns in many countries due to higher health expenditure, including Brazil. The Pan American Health Organization⁴ affirmed that health expenditure represented 3% of world GDP in 1948, hiking to 8.7% of GDP in 2004^{4,5}.

Therefore, it is crucial to know whether decentralized resources reflect the infrastructure made available to users. Although it seems evident that a higher spending level leads to more considerable investments in infrastructure, this relationship is not necessarily apparent in developing countries^{6,7}. If, on the one hand, there is a significant correlation between the increased primary care expenditure and better access to health⁶, on the other hand, countries that have not yet reached maturity in terms of governance of public resources do not show a strong correlation in this aspect, due to the existence of other factors that interfere with the management of the health system⁷.

Under this approach, this paper presents results of a national survey carried out between 2016 and 2019, entitled *Retrato da atenção bási-*

ca no Brasil (Portrait of Brazilian Primary Care), from the perspective of budgetary governance. In particular, the relationship between the behavior of the allocation of public financial resources in health and the type of the local basic health infrastructure in Brazilian municipalities is analyzed. The formulated guiding hypothesis says that the higher per capita expenditure of financial resources leads to a better infrastructure of local health equipment.

It is interesting to note the different interpretations of the scope and scope of primary care in different countries, which have led to the use of different terms for the way of organizing health service systems. We chose here to keep the terms initially used in each work cited. However, in this paper, the term primary care is used because of the documents used by the Ministry of Health in the PMAQ.

It is observed that the quality of governance of public resources is essential for the development⁸ of a nation, especially in countries with scarce resources and poor public policy management results, such as Brazil, given the evidence that budget institutions substantially interfere in areas such as PHC. This explains the higher or lower level of public expenditure effectiveness in providing better social conditions.

A study⁹ that estimated the effect of expenditure on PHC performance and economic efficiency has shown that PHC performs better than other levels of care (medium and high complexity) in Brazilian municipalities, from which we can conclude that there is a positive relationship between PHC expenditure and performance. However, large regional disparities are observed concerning PHC expenditure and performance in Brazil⁹.

A study carried out in 2007¹⁰ based on categories of São Paulo municipalities presented an analysis of health expenditure with own resources per inhabitant, SUS transfers per inhabitant, type of SUS structure, and PHC effort index. In this study, the municipalities with the highest PHC effort index were those with the highest amount of expenditure with own resources per inhabitant and that had simpler health care structures, which indicates that they invest predominantly in health promotion and prevention actions¹⁰.

Regarding infrastructure, we should mention studies that establish a type of health infrastructure in Brazilian municipalities¹¹, and others that address health infrastructure¹²⁻¹⁴. These works analyzed the distribution and quality of basic

health infrastructure available in specific regions, but none of them established a relationship between the type of infrastructure and public expenditure.

Thus, higher public expenditure alone is not enough to improve the results in health services¹⁵, as it is challenging to find consistent relationships between increased spending and results that show the relevance of allocating more resources to low-income individuals. Thus, the infrastructure of health facilities is a crucial component of a health system, which should not be underestimated¹⁶.

There is also a study that analyzed health expenditures from 2001 to 2006, concerning the per capita GDP percentage and showed that Brazil spends more on health than any other neighboring country with higher income levels¹⁷. However, according to the authors, the analysis of the health indicators of the Brazilian population compared to other countries revealed worse indicators¹⁷. It generated the false impression that the country was investing sufficiently in health, vis-à-vis its economic possibilities. Such results, observed in Table 1, did not change substantially from 2014 to 2017. Using another health outcome indicator (death between 15 and 60 years), Brazil does not differ much from other countries concerning total per capita expenditure and GDP percentage. While some countries have improved their resource allocations, proportionally to GDP, Brazil spends more than Uruguay, Chile, and Colombia, for example. However, the mortality rate in Brazil remains much worse than in other countries.

The World Bank¹⁵ had already pointed in the same direction: when comparing expenditure and health indicators, such as life expectancy, infant mortality, and maternal mortality, Brazil shows a mean level of performance among middle-income countries and in Latin America. Some countries (Table 1) perform better than others with similar levels of spending and economic development, which suggests that additional factors may influence the effectiveness of public health expenditure – such as policies targeting the needs of the most impoverished population – and the best quality of spending, which could generate improved health outcomes. A noteworthy aspect is that higher values of health expenditure at high complexity levels may have a negligible impact on general health indicators¹⁸.

Materials and methods

Regarding the allocation of resources, publicly available data were used, which address expenses with public health actions and services (ASPS), managed by the Ministry of Health (MS), through SIOPS/DATASUS, for 5,570 municipalities classified by Financial Implementation per Block (financial years 2007 through 2017), Economic Classification of Expenditure (from 2002 to 2017) and Sub-function of Expenditure (from 2002 to 2017) as provided in the booklet of the National Council of Health Secretaries.

The infrastructure database consists of data on UBS, made available by the PMAQ, which is the National Program for the Improvement of Access and Quality of Primary Care of the Ministry of Health (MS), referring to the first evaluative cycle (2012), totaling 38,812 UBS, in 5,543 municipalities¹¹, and the second evaluative cycle (2014), totaling 24,997 UBS in 5,072 municipalities.

In the analysis of the composition of local basic health equipment, a classification was established for the health infrastructure provided, which is its type¹¹, originated from the PMAQ, referring to the first and second cycle, made available by DAB/MS. Five classifications were adopted in the definition of the type: (1) **failed**, which represents the lack of a health service structure. These UBS do not meet minimum requirements for the provision of care¹¹; (2) **rudimentary**, which evidences an essential shortage of teams, the number of professionals, available services and equipment, and supplies. These UBS do not even provide care to the mother and child group, nor could they be considered providers of selective primary care¹¹; (3) **restricted**, characterized by insufficient equipment and health staff. They are UBS that mainly require investments in general infrastructure and the provision of oral health services¹¹; (4) **regular**, which are UBS with family health and oral health teams that would achieve the benchmark with a low investment to improve the infrastructure of equipment and supplies. As they have difficulty accessing the internet, they may require investments in telecommunications¹¹; (5) **benchmark**, which are UBS with elementary conditions for operation and scope of actions in PHC. They work five or more days a week, in 2-3 shifts, and provide medical, nursing, and dentistry visits¹¹.

The budgetary/financial data on the allocation of resources were monetarily updated by the IPCA (Broad Consumer Price Index, measured

Table 1. Comparison of per capita GDP between countries, health expenditure, and performance, from 2001 to 2006 and 2014 to 2017.

Country	Per capita GDP in dollars, in GDPPC (2004)	Total per capita health expenditure, public and private, in GDPPC (2004)	Total health expenditure, public and private, as % of GDP (2004)	Probability of a child dying < 5 years / 1,000 live births (2005)
Argentina	12,530	1,274	9.6	16
Brazil	7,940	1,520	8.8	33
Chile	10,610	720	6.1	10
Costa Rica	9,220	592	6.6	12
Uruguay	9,030	784	8.2	15
Canada	30,760	3,173	9.8	6
United Kingdom	31,430	2,560	8.1	6

Country	Population, in thousands (2016)	Per capita GDP, in dollars, in GDPPC (2017)	Total per capita health expenditure, public and private, in GDPPC (2014)	Total health expenditure, public and private, as % of GDP (2014)	Probability of a man/woman dying between 15 and 60 years/1,000 (2016)
Argentina	43,000	20,270	1,137	9.6	143/80
Brazil	207,000	15,160	1,318	8.3	194/91
Chile	17,000	23,670	1,749	7.8	114/60
Colombia	48,000	14,170	962	7.2	182/92
Costa Rica	4,857	16,100	1,389	9.3	126/66
Uruguay	3,444	21,870	1,792	8.26	149/79
Canada	36,000	46,070	4,641	10.4	76/49
United Kingdom	65,000	42,560	3,377	9.1	81/52
USA	322,000	60,200	9,403	17.1	142/86

Source: Prepared by authors, based on the World Bank and Ferraz e Vieira¹⁷, from the World Bank Atlas.

by the IBGE), 2017 base year. Concerning the analysis of expenditure, per capita values were calculated for each annual amount in the municipalities, as per data from the local population, made available by IBGE, from 2002 to 2017. The per capita (*_cpt*) values were calculated by dividing the amount allocated annually in each municipality by the existing population in each year (census or IBGE estimate). The variables were arranged in three blocks: the economic category, sub-function, and expenditure block (Chart 1). Then, the chi-square test was performed to clarify whether the distribution of variables by category was random or whether a pattern determined by interdependence between the variables occurred.

First, a correspondence analysis (AC)¹⁹⁻²¹ was performed by pairs of variables, in which the graphs with the best representativeness were analyzed, that is, the best correspondence between pairs of the categories of variables, which was

consolidated in variable category correspondence tables. This analysis was used to complement the evidence that cannot be verified in the multiple regression analysis since the assumptions of this type of technique are more thorough than those of that one.

Then, a quantile regression (QR) analysis²²⁻²⁴ was adopted to identify relationships between the independent variables (expenditure) and the UBS type (UBS score), from the definition of the type and the composition of the expenses allocated in PHC, to verify how each variable of expenses affects the type of UBS. Other control variables were also used, such as the municipal human development index, the health performance index, and the per capita GDP.

We observed that the QR does not require the assumption of homoscedastic errors and can be used when the distribution of errors is heteroscedastic. It is still a robust technique with the pres-

Chart 1. Expenditure variables.

Groups	Variable code	Variable content
Economic category	desp_pess_enc_cpt	<i>Per capita staff expenditure</i>
	odc_cpt	<i>Per capita other current expenditure</i>
	desp_cap_cpt	<i>Per capita capital expenditure</i>
	invest_cpt	<i>Per capita investment</i>
	desp_geral_cpt	<i>Per capita general expenditure</i>
Sub-function	liq_sub_adm_cpt	<i>Per capita administrative sub-functions</i>
	liq_sub_vinc_cpt	<i>Per capita linked sub-functions</i>
	liq_atbas_cpt	<i>Per capita primary health care expenditure</i>
	liq_desp_tot_cpt	<i>Total per capita expenditure</i>
Expenditure block	atbas_fed_cpt	<i>Per capita federal primary health care expenditure</i>
	atbas_est_cpt	<i>Per capita state primary health care expenditure</i>
	atbas_rprop_cpt	<i>Per capita municipal primary health care expenditure</i>
	atbas_tot_cpt	<i>Total per capita primary health care expenditure</i>
	tot_fed_cpt	<i>Total per capita federal expenditure</i>
	tot_est_cpt	<i>Total per capita state expenditure</i>
	tot_rprop_cpt	<i>Total per capita municipal expenditure</i>
	tot_tot_cpt	<i>Total per capita expenditure</i>

Source: Prepared by authors.

ence of outliers, and also has a representation of linear programming, which facilitates the estimation of parameters²²⁻²⁴. Furthermore, the dependent variable *escore_final* has a non-normal distribution (negative asymmetry), which makes the quantile regression technique the most appropriate technique when working with non-normal data and the presence of heteroscedasticity²²⁻²⁴.

Five regression models were tested using the Stata 13.0 software, dividing the independent variables by type of expenditure classification (budget and health). The economic model category (RQ1) allows verifying the comparative effect of each type of expenditure, for example, if staff expenses have more influence on the type than current expenses in general. The sub-function model (RQ2) allows observing the effect of a specific sub-function, for example, whether the PHC expenditure influence more the type than the medium and high complexity care expenditure. The expenditure blocks' model (RQ3, RQ4, and RQ5) allows verifying which sphere has expenditure with the most significant impact on the type, for example. Jarque-Bera tests for normality residuals, the VIF test (variance inflation factor), for multicollinearity between independent variables, and the correlation test between variables, were also performed for each model.

Results and discussion

The results showed that most UBS – PMAQ participants – are classified in types 4 (51.2% in cycle 1 and 76.8% in cycle 2), that is, they are considered regular, which means that these UBS have family health and oral health teams that would achieve the benchmark⁵¹¹ with improved infrastructure, which shows that more than 75% of UBS have small deficiencies, which leaves out verifying the relationship of this type with expenditure and its status in the country.

However, in Table 2, the occurrence of an essential change in the classification of UBS is highlighted: type 3 (restricted), which has insufficient equipment and health teams, decreased from 26.7% to 17.1%, while type 4 (regular), which is equipped with family health and oral health teams and would achieve the benchmark with improved infrastructure, increased from 51.79% to 76.8%. This type classification trend reflects greater availability of equipment and health teams, not available in type 3 (restricted). It is essential to show how the UBS types 1 (failed), and 2 (rudimentary) are distributed in cycles 1 and 2, taking into account the states of the federation, considering the geographic regions of the country.

The results corroborate other studies, even with different methods, in the sense that the allocation of more resources alone is not enough^{25,26}. The analysis of annual per capita municipal expenditure showed municipalities that allocate amounts below R\$ 50.00 and others that allocate amounts above R\$ 3,500.00. The analysis of the mean expenditure per state and the mean scores showed that the state with the highest mean PHC expenditure does not always have the highest mean final score, as in the case of Pará, Pernambuco, Paraná and São Paulo (Table 2), which shows the comparison of the mean expenditure allocated in PHC by municipality and the final score, for cycle 2. The mean of Pará scores is close to São Paulo, while the mean of Pernambuco is even higher, although the amount allocated by those states does not reach one-third of the mean amount allocated in São Paulo's municipalities, showing that one should consider some governance-related aspects.

As in the PHC infrastructure and the distribution of resources, the mandates defined by the 1988 Constitution for the perfect coordination and integration of health systems are not complied with, as recommended by budgetary governance²⁷⁻²⁹. We observed that PHC does not facilitate universal access to the diversified scope of services, in a coordinated and continuous fashion, through the efficient application of resources and the provision of high-quality care, which

contribute to equity in health³⁰, as PHC equipped with type 1 and type 2 UBS is unable to coordinate the health services of the region and solve the issues of the enrolled population.

Figure 1 shows the type of infrastructure by distributing the mean scores of the municipalities by state, which indicates that the North region, with the largest geographic area and spatially dispersed population, has the worst socioeconomic indexes, with the worst mean score per state (less than 0.85), while the Midwest and South regions have the best means per state (greater than 0.85).

From the infrastructure results, the relationship between the structure of expenditure (expense variables) and the type of the local basic health infrastructure (UBS) is characterized through the correspondence analysis (CA) between the variables and the quantile regression (QR) analysis.

The analysis of the evidence with the population variable revealed a homogeneous behavior of the observed data, for cycle 1 (2012) and cycle 2 (2014), allowing us to affirm that municipalities with smaller population spend more resources per capita on PHC, have higher federal per capita PHC expenditure, and higher per capita PHC expenditure with municipal resources. On the other hand, they have lower total federal per capita expenditure. In the control variables, there is evidence of lower GDP, MHDI, income Gini index, and preventable deaths from 5 to 74 years.

Chart 2. Trend of the Primary Health Care Unit Type, PHC Expenditure, and Type – Brazil.

Trend of the Primary Health Care Unit type					
Type	Score	Cycle 1		Cycle 2	
		Number of UBS	%	Number of UBS	%
1 - Failed	< 0.250	1,690	4.35	445	1.8
2 - Rudimentary	≥ 0.250 and < 0.5	3,639	9.38	138	0.6
3 - Restricted	≥ 0.5 and < 0.75	10,364	26.70	4,200	17.1
4 - Regular	≥ 0.75 and < 1.0	20,102	51.79	18,816	76.8
5 - Benchmark	= 1.0	3,017	7.77	900	3.7
Total		38,812	100.0	24,499	100.0

Final score of PHC expenditure and type		
State	PHC expenditure (per capita annual mean, in R\$)	Final score (mean)
Pará	207	0.83
Roraima	219	0.66
Pernambuco	233	0.88
Paraná	571	0.85
São Paulo	722	0.84

Source: Research data, 2019.

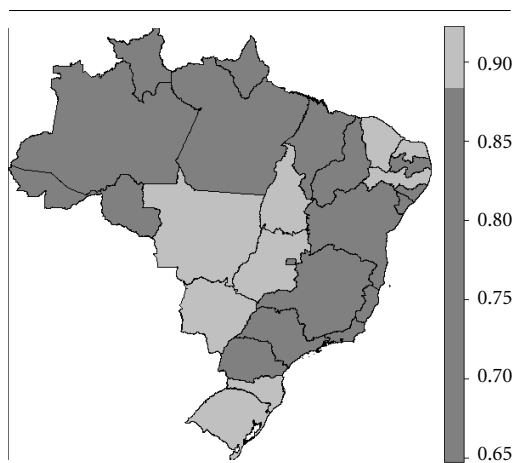


Figure 1. Distribution of the type by mean score of UBS per state (cycle 2).

Note: The color scale on the right represents the mean UBS scores of the municipalities by state.

Source: Research data, 2019.

However, in cycle 1 (2012), no relationship was identified between the type and the population of the municipality.

Regarding the results with the type variable, the analysis of evidence revealed a uniform behavior, however, in a smaller proportion of observed variables, when comparing cycle 1 (2012) with cycle 2 (2014); namely, the municipalities with inferior types have lower federal per capita PHC expenditure, lower total per capita health expenditure, and lower total federal per capita health expenditure.

However, the following relationships only occurred in cycle 1: lower per capita health expenditure with own resources and lower per capita staff and charges expenditure. Control variables show lower GDP and MHDI rates in cycle 1.

When discussing the results presented through the correspondence analysis, we note a convergence to the guiding hypothesis, in which the higher per capita expenditure of financial resources leads to a better infrastructure of local health equipment. The convergence of results with the hypothesis is corroborated by the correspondence between the type and the variables representing health expenditure in the municipalities (federal PHC expenditure, total federal health expenditure, and total health expendi-

ture), which show that failed (1) and rudimentary (2) types are related to lower per capita expenditure.

Regarding the behavior of expenditure concerning the population size, total federal per capita health expenditure is lower in smaller municipalities, which is explained by the predominance of PHC in these municipalities. As for the type, municipalities with failed (1) and rudimentary (2) types have lower federal PHC expenditure, an aspect that must be brought to the attention of the federal government, responsible for strategic actions, especially when there is a need to combat regional inequalities and poverty, as defined in the current Constitution.

The results evidenced by the variable total municipal expenditure (own resources) are consistent with those shown in a previous study¹⁰, as the municipalities with the highest effort index in PHC had the highest amount of expenditure on own resources per inhabitant and corresponded to those with simpler health care structures, which indicates investment predominantly in health promotion and prevention actions. To a certain extent, they corroborate the literature by advocating that public services reach the more vulnerable. The question is, how can governments ensure equitable distribution of the benefits of public services to those who need them? Thus, two factors play an essential role: 1 – when an investment is made in **primary services**, such as primary health care and primary education, the number of impoverished beneficiaries increases considerably; and 2 – when an investment is used to provide higher levels of service, such as high complexity health care, the number of poor people who benefit declines. The distribution of expenditure at the primary level is much less uneven³¹.

The situation is different when looking at the allocation of resources and infrastructure, as regions with lower socioeconomic conditions also have a lower infrastructure. In CF/88³², article 196, health is inscribed as a right for all and a duty of the State, which must be “ensured through social and economic policies aimed at reducing the risk of disease and other problems, and universal and equal to actions and services for their promotion, protection, and recovery”. Thus, the rights to health and social justice are social rights guaranteed in the Magna Carta, a subjective public right, and an unquestionable duty of the State³³.

However, the main issue is not a lack of resources or an insufficient increase of public ex-

penditure, as it is hard to find consistent relationships between increased spending and results that show the importance of allocating more resources to low-income individuals¹⁵.

Research shows that health systems in low-income countries with a strong focus on PHC tend to be more pro-poor, equitable, and accessible. At the operational level, most studies comparing services that can be delivered, such as in PHC or specialized ones, show that the use of primary care physicians reduces costs and increases user satisfaction, without adverse effects on the quality of care or in user results⁷. While seemingly contradictory, findings depend on the context and conditions in which they are analyzed, for example, whether in countries with a weak or high level of development, or countries with good or weak public governance structure.

When combining the results of the correspondence analysis with the results on expenditure and infrastructure in the quantile regression, we found that municipalities in regions with lower economic and social indices receive fewer resources per capita and have, proportionally, more units in the failed (1), rudimentary (2) and restricted (3) types, which reflects, even more, in socioeconomic inequalities.

Therefore, the positive relationship between expenses and the type of infrastructure was evidenced through the correspondence analysis. However, there is another relevant issue: verifying how this relationship occurs in the municipalities, considering the objectives defined in CF/88.

The analysis using quantile regression established the relationship between variables that represent expenditure and the type of local basic health infrastructure. The meaning of each relationship, magnitude, and significance was verified, with an estimation of the coefficients for the 0.10, 0.50, and 0.95 quantiles.

In this step, results were obtained for each quantile of interest, by providing information on changes in the distribution of the dependent variable, which facilitated the interpretation of the results for a set of asymmetric data, such as the *score_final* variable, with the possibility of analyzing the relation in central regions of the distribution (through the median) and the tails of the conditional distribution, which are here type 1, 2 and 5²²⁻²⁴. The effects of the representative variables of expenditure on the final score were analyzed.

The results for each variable were summarized by quantile to facilitate the understanding of the effects of spending variables on the type,

excluding non-significant results (p-value above 10%). Table 3 shows that expenditure, in general, positively affects the type, with a result similar to that of CA, since all coefficients with significance (p-value less than 10%) showed a positive sign. The guiding hypothesis is convergent with the results presented for current expenses, administrative expenses, federal PHC expenditure, total federal health expenditure, and total health expenditure variables, considering the variables with significant coefficients (p-value less than 10%) in the 0.50 quantile, in both cycles.

Thus, positive evidence is found between the variables of expenditure and infrastructure, which converges with the understanding that the allocation of more resources leads to the best infrastructure. However, Brazil has regional and social disparities, which are reflected in health policies, especially in PHC, when it is observed that, in the North and Northeast regions, there are more significant proportions of structures in the failed (1), rudimentary (2) and restricted (3) types.

It was also found that the variables related to expenditure are related to infrastructure, but in developing countries, where budget institutions are deficient, the increased expenditure alone does not warrant improved results^{6,7,15}. Other studies show that, in countries with good governance and where budget institutions are well-defined or implemented show great possibilities for expenditure to be directly related to results^{8,15,18}.

The results of this investigation corroborate other studies^{17,18}, when they found that, even allocating more resources than other countries, Brazil has indicators of worse results in health policies, which converges with the opinion of authors who advocate that budget governance can exercise a fundamental role in improving management and, consequently, in the better allocation of resources in health, especially in the PHC infrastructure.

It should also be noted that this infrastructure does not fail to reflect the allocation of resources: some municipalities allocate less than R\$ 50.00 per capita per year in PHC, while others allocate more than R\$ 3,500.00. In 2014, the mean amount allocated by municipalities in Pará was R\$ 217.00, in Goiás R\$ 752.00, and São Paulo R\$ 722.00.

Analysis of the behavior of control variables

In summary, it became evident that, in cycle 1, the size of the population is negatively associ-

Chart 3. Impacts of expenditure and control variables on the infrastructure type of PHC Units – Brazil.

Group	Variable	Impact of expenditure variables on the type						Impact of control variables on the type						Variable meaning		
		2012			2014			2012			2014					
		Q0.10	Q0.50	Q0.95	Q0.10	Q0.50	Q0.95	Q0.10	Q0.50	Q0.95	Q0.10	Q0.50	Q0.95			
Economic category	desp_pess_enc_cpt	(+)	(+)													Per capita staff expenditure
	odc_cpt	(+)	(+)		(+)	(+)						(+)	(+)			Per capita other current expenditure
	invest_cpt					(+)	(+)					(+)	(+)			Per capita investment
Sub-function	liq_sub_adm_cpt	(+)	(+)	(+)	(+)	(+)	(+)	(+)				(+)	(+)			Per capita administrative sub-functions
	liq_sub_vinc_cpt	(+)	(+)	(+)								(+)	(+)			Per capita linked sub-functions
	liq_atbas_cpt							(+)	(+)					(-)		Per capita PHC expenditure
PHC expenditure blocks	atbas_fed_cpt	(+)	(+)		(+)	(+)										Per capita federal PHC expenditure
	atbas_est_cpt						(+)	(+)								Per capita state PHC expenditure
	atbas_rprop_cpt								(+)	(+)						Per capita municipal PHC expenditure
Total expenditure blocks	tot_fed_cpt	(+)	(+)	(+)	(+)	(+)	(+)	(+)								Total per capita federal expenditure
	tot_est_cpt															Total per capita state expenditure
	tot_rprop_cpt															Total per capita municipal expenditure
Total expenditure	desp_geral_cpt	(+)	(+)						(+)	(+)						Per capita general expenditure

Note: The coefficients without signal identification were not significant.

Source: Research data, 2019.

ated with the type, the health performance index is positively associated with the type, and the rate of preventable deaths from 0 to 4 years is positively associated with the type. In contrast, the index of preventable deaths from 5 to 74 years is negatively associated (Table 3). It is noteworthy that the GDP and the income Gini index did not have clear results when analyzed concerning the type.

When verifying that the health performance index is positively related to the type, it is noted that health performance follows the logic of resource allocation, that is, better infrastructure and performance is found where more resources are allocated. It is also evident that the MHDI is positively related to the type, reflecting the same logic as the health performance index, that is, more resources are allocated where the MHDI is better, which also leads to better infrastructure. While mortality rates were expected to be negatively related to the type, we cannot establish a relationship, because these results depend on other care levels.

It should be noted that Article 17 of Complementary Law No. 141/2012³⁴ determines that the apportionment of the Federal resources linked to public health actions and services (ASPS) and transferred to states, the Federal District and municipalities must observe the health needs of the population, the epidemiological, demographic, socioeconomic, spatial dimensions, and the capacity to provide ASPS, in order to meet the objectives of item II of § 3 of art. 198 of CF/88³², in order to gradually reduce regional disparities.

Studies show that PHC programs designed to improve the health of disadvantaged populations in less developed countries have managed to narrow health gaps between socially deprived and most socially favored populations³⁵, which highlights the need for a health policy aimed at improving the infrastructure conditions of PHC, prioritizing federal budget expenditure in regions with high socioeconomic inequalities.

Conclusions

From an explanatory perspective, this paper related variables through CA and QR, showing that “the higher per capita expenditure of financial resources leads to better infrastructure”.

Regarding the type of basic local health infrastructure in Brazilian municipalities, we found that most UBS are classified in the regular type (4) (51.2% in cycle 1, and 76.8% in cycle 2), as these UBS have family health and oral health teams that, with improved infrastructure, would reach the benchmark (5).

The correspondence between the type and the representative variables of expenditure – federal PHC expenditure, total federal health expenditure, and total health expenditure – show that lower types are related to lower per capita expenditure on these variables, and vice versa.

Similarly, the QR results tend to converge with the guiding hypothesis for variables current expenses, administrative expenses, federal PHC expenditure, total federal expenditure, and total health expenditure, considering the variables with coefficients with a significance of at least 10%, in the 0.50 quantile, in both cycles.

The evidence that expenditure variables are positively related to infrastructure allows us to understand that allocating more resources leads to better infrastructure. However, Brazil has high regional and social disparities, which is also reflected in health policies, especially in PHC: failed (1), rudimentary (2), and restricted (3) types are found in the North and Northeast regions.

Once again, the need to improve the governance of health resources is reinforced here, as evidenced by the fact that regions with lower socioeconomic conditions (lower per capita GDP and MHDI) also have lower PHC infrastructure.

Thus, we observed that the MHDI is positively related to the type, reflecting the same logic of the health performance index, allocating more resources where the MHDI is better. As a result, it is crucial to highlight research that shows PHC programs aimed at improving health in disadvantaged populations in less developed countries, which have managed to narrow health gaps between socially deprived and socially most favored populations.

However, it appears that, although allocating more resources than other countries, Brazil has worse result indicators than countries allocating fewer resources in health policies, which converges with the position of the advocates of budget governance, which can play a fundamental role in improving management, and achieve better allocation of health resources.

Collaborators

HK Kashiwakura: responsible for all quantitative tests, organized the entire research's database and wrote the text. AO Gonçalves: led the process of research and organized the entire text for the elaboration of this article. RR Azevedo: checked all the quantitative tests and made the necessary adjustments, and also revised the entire article. A Nunes: defined together with the authors the discussions of the results and conclusions of the article. CAT Silva: adapted the methodological content in the article.

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