

Analysis of practical prices in the acquisition of medicines by the health consortia compared to municipal institutions in the period from 2017 to 2018

Análise de preços praticados nas aquisições de medicamentos pelos consórcios de saúde em comparação com as instituições municipais para o período de 2017 a 2018

José Roberto Peters¹, Marcelo Chaves de Castro¹, Ivanessa Thaianne do Nascimento Cavalcanti¹

DOI: 10.21115/JBES.v14.n1.(Suppl.1):38-51

Keywords:

Unified Health System, Health Price Bank, Health Consortia, Pharmaceutical Economics, drug prices

Palavras-chave:

Sistema Único de Saúde, Banco de Preços em Saúde, Consórcios de Saúde, Economia Farmacêutica, preço de medicamentos

ABSTRACT

Objective: To identify whether the drug purchases made by the Health Consortia were more efficient, in economic terms, than the purchases made individually by the Municipal Institutions, for the years 2017 and 2018. **Methods:** Descriptive analysis of the sample, using the trend measures central, economic analysis and calculation of the economic percentage. **Results:** The values obtained showed efficiency in consortium purchases, reflected in the greater quantity acquired and the lower price practiced, for most of the items analyzed in the reference period. **Conclusions:** Purchases by Health Consortia provided more savings compared to purchases made by Municipal Institutions, proving to be an option to obtain economic resources for health.

RESUMO

Objetivo: Identificar se as aquisições de medicamentos realizadas pelos Consórcios de Saúde foram mais eficientes, em termos econômicos, que as compras realizadas individualmente pelas Instituições Municipais, para os anos de 2017 e 2018. **Métodos:** Análise descritiva da amostra, empregando as medidas de tendência central, análise econômica e cálculo do percentual econômico. **Resultados:** Os valores obtidos mostraram eficiência nas compras dos consórcios, refletidos na maior quantidade adquirida e no menor preço praticado, para a maioria dos itens analisados no período de referência. **Conclusões:** As compras pelos Consórcios de Saúde proporcionaram mais economia em comparação com as compras realizadas pelas Instituições Municipais, mostrando-se como uma opção para obter economicidade dos recursos destinados à saúde.

Received on: 03/02/2020. Approved for publication on: 02/08/2021

1. Coordination of Monitoring and Qualification of Health Price Management, Department of Health Economics, Investments, and Development, Executive Secretariat, Ministry of Health, Brasília, DF, Brazil.

Institution where the study was conducted: Coordination of Monitoring and Qualification of Health Price Management, Department of Health Economics, Investments, and Development, Executive Secretariat, Ministry of Health, Brasília, DF, Brazil.

Information on grants received as funding, equipment, or medicines: Research carried out with no financial support, equipment, or medicines.

Medical Congress: This study is unprecedented, resulting from research carried out in the Health Price Database.

Corresponding author: José Roberto Peters. Ministry of Health, esplanade of ministries, 3rd floor, Brasília, DF, Brazil.

CEP: 70.058-900. Telephone number: (61) 3315-3990/3315-3991. Email: jose.peters@saude.gov.br

Introduction

The Public Health Sector faces numerous management and operational challenges that have been intensified since the decentralization process of the Brazilian Unified Health System (SUS). Among these challenges stand out the difficulties with limited financial and human resources, problems accessing and incorporating technologies, and lack of adequate physical infrastructure. In this scenario, the municipalities were left responsible for acquiring a considerable part of essential drugs, tied to a system of limited budgets, and increasing drug costs (Rename, 2019).

For solving or at least relieving such challenges, the concept of efficiency in public administrations is used. According to the literature on the subject, there are several criteria to be considered for the proper conduct of public contracts, namely: attributes inherent to the contracting, strategic aspects, legal, managerial, and essential aspects related to the finalistic result of purchases (Costa & Earth, 2019).

For achieving the approach intended in this paper, the focus will be on attributes, which involves the quality of the acquired object and the acquisitions cost-effectiveness, in aspects of a strategic nature, namely: use of the Government's purchasing power and the scope of the public purpose of the purchase. Efficiency is associated with cost-effectiveness criteria and can be obtained in management, operation, use of resources, and administrative and financial activities. Being efficient in the acquisition of products with assured quality and appropriate quantities at a reasonable price makes the cost-effectiveness of public resources viable and, in the specific case of drug acquisition, increases the effectiveness of pharmaceutical care within the scope of the SUS, which implies the achievement of the public purpose of the purchase.

Furthermore, when considering the market structure of the pharmaceutical sector, it is essential to think about acquisition arrangements that involve the criterion of the use of the Government's purchasing power. In a more specific approach, which refers to the universe of items to be acquired, Luiza *et al.* (1999) claim that the quality of an item can be measured basically by two dimensions: i) efficacy, effectiveness, and suitability and ii) defining the required level of quality demand. The first dimension is achieved with the proper selection and standardization of items, and the second dimension with the use of standardized descriptions in the acquisition processes.

Therefore, in the Health Sector, quality can be defined through the standardization of item descriptions. The Cataloging Unit for Health Use Materials (Material Catalogue – CATMAT, in Portuguese), linked to the Ministry of Health (MS, in Portuguese), is responsible for cataloging and standardizing the description of such items. Through standardization, it is possible to observe the specificities of each item and com-

pare it with all items with the same description, contributing to the purchasing processes carried out by health institutions.

Cost reduction can be achieved through more dynamic acquisition processes that initially involve the accurate description of items by preparing catalogs and, later, the availability of prices set in their respective acquisitions. In public health, purchases can be carried out individually by each institution or in conjunction with other institutions. The collective purchases of several institutions are called consortia (buyer pool). In the Health Sector, they are commonly called Health Consortia.

Health Institutions that partner to purchase items seek lower prices than the set ones for individual purchases. The acquisition modality via consortia is an option to reduce operating costs and drug prices (Amaral & Blatt, 2011). It can reduce the incidence of shortages in health units (Fiuza *et al.*, 2020).

In this direction, there is the hypothesis that collective purchases have advantages and may represent an option for Municipal Institutions to use their resources more efficiently and cost-effectively. Health care has high costs and is a great challenge for managers and public policymakers. Much of the costs come from drug purchases, and resorting to ways that help to reduce costs, equalizing the maximization of health benefits and access to drugs, is becoming increasingly relevant (Araújo, 2015).

Consortia are a possibility to achieve such a purpose. Alliances between health entities aim to establish interconnections to share risks, knowledge, and skills, hoping to obtain competitive advantages, economies of scale, improved efficiency, and synergy (Ferreira, 2000).

However, consortia can be inefficient. A large volume purchased does not always reflect lower prices (it occurs mainly at emergency periods and economic imbalance times, a situation in which demand is greater than the market's responsiveness). For some specific items, the negotiated price does not depend on the quantity to be purchased (e.g., items with current patent registrations, off-label items – without registration with regulatory agencies – and those produced by only one manufacturer – characteristic of monopolistic structures). Partnerships between good and bad payers can reduce the scale effect (asymmetric information between economic agents); loss of management superiority by consortia institutions, and delays in the resolution of obstacles due to the lack or delay of the central coordination of consortia (Fiuza *et al.*, 2017; Picolini *et al.*, 2016; Ferreira, 2000).

After this overview, it is possible to highlight the purpose of this study. It is intended to identify whether the public acquisitions of the Health Consortia are efficient. Therefore, purchasing drugs recorded in the Health Price Database (HPD) system will compare joint purchases to individual purchases by Municipal Health Institutions during 2017 and 2018. In

a detailed sample analysis, the most acquired items in the reporting period and the most active manufacturers will be identified.

The HPD is a system of the Ministry of Health that operates in compliance with the standards implemented by CAT-MAT. Several health institutions and consortia are registered with the HPD, and periodically purchased items with their respective quantities are inserted, along with the type and mode of purchase, manufacturers and suppliers, purchase date, and other information allowing the observation and detailed analysis of those acquisitions.

The study is justified by the need to understand the functioning of a part of the pharmaceutical industry to point out more efficient operational ways that optimize public resources in the Health Sector and contribute to purchasing drugs at lower prices and with guaranteed quality.

Methods

A cross-sectional descriptive study was carried out with secondary data. The analyzed database came from the HPD system covering the years 2017 and 2018. All the Health Consortia and Municipal Institutions¹ recording their purchases², and only drugs presenting more than ten records in both shopping options were selected to compose the sample.

Outliers were eliminated to avoid data scattering. Thus, the sample consisted of items that met the selection and screening criteria, totaling 7,399 elements (purchase records).

For the descriptive analysis, measures of central tendency were used (mean value, weighted mean value, and median value). For the economic analysis, the variation between the prices recorded at purchases from Health Consortia and Municipal Institutions was estimated, using the price regulated by the Medicines Market Regulation Chamber (CMED, in Portuguese) as a reference.

The calculation of saving percentage between the lowest observed price (average unit purchase price) and the regulated price (Maximum Sales Prices to the Government – PMVG, in Portuguese) by the CMED [Medicines Market Regulation Chamber] was used, according to the methodology developed by the Pan American Health Organization (PAHO) in partnership with the Ministry of Health, adapted by Mastroianni et al. (2017):

[Equation 1]

$$\text{Saving Percentage} = \left[1 - \frac{\text{average unit purchase price}}{\text{PMVG CMED}} \right] \times 100$$

1 In the HPD, there are registered institutions at the federal, state, municipal, and private levels. For this study, it was decided to look only at municipal-level institutions.

2 Every purchase record presents the information: purchased items, supply unit, manufacturer, supplier, purchasing institution, purchased quantity, unit price, and other information pertinent to those items. Each item has a standardized BR code.

Results

The sample has 7,399 information for the 24 selected items³. All items are registered with the Brazilian Health Regulatory Agency (Anvisa), 23 items are included in the National List of Essential Medicines (Rename) and compose the list of drugs provided at SUS Primary Care. Only levomepromazine (BR0268129) is not on the Rename.

Of all records, 474 (6.4%) refer to purchases from 17 Health Consortia⁴, and 6,925 (93.6%) are from 710 Municipal Institutions⁵. The economic volume handled in the sample was around R\$ 514 million, with 53.4% (R\$ 275 million) coming from the Health Consortia. Table 1 shows the distribution of the Health Consortia and Municipal Institutions by Federative Unit.

The quantitative list of manufacturers and suppliers who operationalized the sample items was composed of 71 manufacturers and 422 suppliers who produced and marketed the items studied. It was noticed that the network of suppliers had a greater volume and was better distributed across all country regions than the network of manufacturers. For the market structure of manufacturers by item, only 12 of these manufacturers (16.9%) accounted for most of the market. Table 2 shows the manufacturers that are responsible for 91.0% of the sample resources.

Table 3 shows the market leaders for each sample item. The manufacturer Prati Donaduzzi (CNPJ 73.856.593/0001-66) is the market leader for four items and has a turnover of over R\$ 92 million. Cristália (CNPJ 44.734.671/0001-51) is the market leader for seven items with a turnover of around R\$ 86.6 million.

To analyze the individual behavior of each item, comparing the unit values paid by the Health Consortia and by the Municipal Institutions, the mean, weighted and median values, shown in Table 4, were used.

It is observed that the purchases made by the Health Consortia had lower unit values for most items than the purchases made by the Municipal Institutions. It is 19 times for the mean value, 18 times for the weighted mean value, and 20 times for the median value. Only one case in which the price paid by Health Consortia and Municipal Institutions showed equal values. Municipal Institutions showed better variation in five items for mean value, six items for weighted mean value, and three cases for median value.

Table 5 simulates the use of the Lowest Unit Value to estimate the savings that could have been made if this value had been used. The "Lowest Unit Value" is the smallest value, selected from the mean, weighted and median values. This

3 Please see Appendix 1 for a listing of items composing the sample.

4 Please see Appendix 2 for Health Consortia.

5 Please see Appendix 3 for Municipal Institutions.

Table 1. Municipal Institutions and Health Consortia, by Federative Unit, 2017 and 2018

Federative Region	Municipal Institutions	%	Population	%	Resources (R\$)	%
Southeast	259	36.5	31,469,155	58.9	146,043,913,96	61.0
Northeast	199	28.0	9,346,381	17.5	33,197,279,24	13.9
South	193	27.2	9,994,545	18.7	46,891,179,25	19.6
Central-West	33	4.6	838,822	1.6	4,650,376,73	1.9
North	26	3.7	1,776,950	3.3	8,675,951,40	3.6
Total	710	100.0	53,425,853	100.0	239,548,700,58	100.0 (46.6)
Federative Region	Health Consortia	%	Population	%	Resources (R\$)	%
South	11	64.7	13,905,010	75.6	162,482,613,09	59.1
Southeast	04	23.5	3,753,646	20.4	75,900,409,24	27.6
Northeast	02	11.8	743,352	4.0	36,507,250,15	13.3
Total	17	100.0	18,402,008	100.0	274,890,272,48	100.0 (53.4)
Grand Total					514,348,973,06	(100.0)

Source: Prepared by authors, 2020.

Table 2. Main manufacturers, by Federative Unit, 2017 and 2018

Manufacturer	Company	Municipality	FU	Turnover value	%	Cumulative
%	Prati, Donaduzzi	Toledo	PR	R\$ 99,206,181.97	19.3	19.3
44.734.671/0001-51	Cristália	Itapira	SP	R\$ 88,838,719.53	17.3	36.6
17.159.229/0001-76	Laboratório Teuto	Anápolis	GO	R\$ 79,146,210.14	15.4	51.9
61.068.755/0001-12	Sanval	São Paulo	SP	R\$ 41,484,968.75	8.1	60.0
33.078.528/0001-32	Torrent	Barueri	SP	R\$ 36,901,557.30	7.2	67.2
19.570.720/0001-10	Hipolabor	Sabará	MG	R\$ 29,217,554.69	5.7	72.9
57.507.378/0003-65	EMS Hortolândia	Hortolândia	SP	R\$ 25,230,838.93	4.9	77.8
61.286.647/0001-16	Sandoz	Cambé	PR	R\$ 21,540,936.33	4.2	82.0
03.485.572/0001-04	Geolab	Anápolis	GO	R\$ 13,335,768.20	2.6	84.6
00.394.502/0071-57	Comando da Marinha	Rio de Janeiro	RJ	R\$ 12,155,090.40	2.4	86.9
04.099.395/0001-82	Santisa	Bauru	SP	R\$ 11,296,661.43	2.2	89.1
17.875.154/0001-20	Medquímica	Juiz de Fora	MG	R\$ 9,724,142.48	1.9	91.0
Other manufacturers				R\$ 46,270,342.91	9.0	100.0
Total				R\$ 514,348,973.06	100.0	

Source: Prepared by authors, 2020.

Table 3. Manufacturers leading the market by item, 2017 and 2018

BR Code	Market-Leading Manufacturer	Company	Turnover Value	Market Share
BR0267509	73.856.593/0001-66	Prati, Donaduzzi	R\$ 4,187,440.29	99.7%
BR0267517	73.856.593/0001-66	Prati, Donaduzzi	R\$ 61,481,426.41	96.8%
BR0267632	73.856.593/0001-66	Prati, Donaduzzi	R\$ 8,581,344.72	89.2%
BR0267663	73.856.593/0001-66	Prati, Donaduzzi	R\$ 18,672,859.34	51.0%
BR0267197	44.734.671/0001-51	Cristália	R\$ 37,183,987.90	57.7%
BR0267635	44.734.671/0001-51	Cristália	R\$ 5,389,677.21	76.9%
BR0267638	44.734.671/0001-51	Cristália	R\$ 4,580,782.68	51.6%
BR0267670	44.734.671/0001-51	Cristália	R\$ 1,878,631.12	80.7%
BR0267768	44.734.671/0001-51	Cristália	R\$ 9,211,525.21	90.5%

BR Code	Market-Leading Manufacturer	Company	Turnover Value	Market Share
BR0268129	44.734.671/0001-51	Cristália	R\$ 19,162,333.72	97.1%
BR0270140	44.734.671/0001-51	Cristália	R\$ 9,194,514.06	74.0%
BR0267618	17.159.229/0001-76	Laboratório Teuto	R\$ 70,988,254.87	71.1%
BR0270130	17.159.229/0001-76	Laboratório Teuto	R\$ 1,987,613.34	54.3%
BR0267613	61.068.755/0001-12	Sanval	R\$ 14,840,778.75	45.8%
BR0267564	33.078.528/0001-32	Torrent	R\$ 15,854,563.70	92.6%
BR0267566	33.078.528/0001-32	Torrent	R\$ 9,458,247.95	72.6%
BR0267567	33.078.528/0001-32	Torrent	R\$ 2,255,505.57	50.3%
BR0267503	19.570.720/0001-10	Hipolabor	R\$ 13,549,119.78	38.4%
BR0267565	57.507.378/0003-65	EMS Hortolândia	R\$ 15,176,489.30	59.2%
BR0271217	61.286.647/0001-16	Sandoz	R\$ 21,306,118.63	79.7%
BR0267194	04.099.395/0001-82	Santisa	R\$ 429,203.98	60.2%
BR0267140	17.875.154/0001-20	Medquímica	R\$ 7.790,867,88	55.4%
BR0267735	02.433.631/0001-20	Aspen	R\$ 745.941,51	40.6%
BR0292196	17.174.657/0001-78	Hypofarma	R\$ 358,409.46	61.9%

Source: Prepared by authors, 2020.

Table 4. Variation between unit values paid by Health Consortia and Municipal Institutions, 2017 and 2018

BR Code	Mean Value			Weighted Mean Value			Median Value		
	HC	IM	Variation	HC	IM	Variation	HC	IM	Variation
BR0267140	R\$ 0.45	R\$ 0.57	HC 26.80%	R\$ 0.44	R\$ 0.50	HC 13.20%	R\$ 0.44	R\$ 0.52	HC 16.30%
BR0267194	R\$ 0.52	R\$ 0.62	HC 20.30%	R\$ 0.50	R\$ 0.61	HC 17.80%	R\$ 0.50	R\$ 0.60	HC 16.70%
BR0267197	R\$ 0.48	R\$ 0.52	HC 7.70%	R\$ 0.45	R\$ 0.43	MI 6.00%	R\$ 0.50	R\$ 0.50	= 0.00%
BR0267503	R\$ 0.36	R\$ 0.42	HC 18.70%	R\$ 0.36	R\$ 0.39	HC 7.90%	R\$ 0.36	R\$ 0.40	HC 10.00%
BR0267509	R\$ 0.13	R\$ 0.15	HC 20.50%	R\$ 0.13	R\$ 0.12	MI 0.90%	R\$ 0.12	R\$ 0.14	HC 14.30%
BR0267517	R\$ 0.30	R\$ 0.39	HC 27.80%	R\$ 0.31	R\$ 0.33	HC 7.30%	R\$ 0.30	R\$ 0.38	HC 21.30%
BR0267564	R\$ 0.89	R\$ 0.13	MI 85.70%	R\$ 0.81	R\$ 0.12	MI 85.30%	R\$ 0.90	R\$ 0.12	MI 86.20%
BR0267565	R\$ 0.74	R\$ 0.63	MI 15.40%	R\$ 0.65	R\$ 0.67	HC 3.20%	R\$ 0.74	R\$ 0.70	MI 5.40%
BR0267566	R\$ 0.69	R\$ 0.62	MI 9.40%	R\$ 0.67	R\$ 0.71	HC 5.30%	R\$ 0.68	R\$ 0.70	HC 2.90%
BR0267567	R\$ 0.13	R\$ 0.17	HC 27.90%	R\$ 0.13	R\$ 0.14	HC 12.10%	R\$ 0.13	R\$ 0.15	HC 13.30%
BR0267613	R\$ 0.14	R\$ 0.23	HC 68.50%	R\$ 0.15	R\$ 0.22	HC 32.10%	R\$ 0.13	R\$ 0.20	HC 35.00%
BR0267618	R\$ 0.68	R\$ 0.65	MI 3.10%	R\$ 0.67	R\$ 0.66	MI 2.10%	R\$ 0.66	R\$ 0.69	HC 4.30%
BR0267632	R\$ 0.18	R\$ 0.22	HC 22.80%	R\$ 0.17	R\$ 0.19	HC 7.40%	R\$ 0.17	R\$ 0.20	HC 16.00%
BR0267635	R\$ 0.17	R\$ 0.21	HC 19.40%	R\$ 0.18	R\$ 0.19	HC 4.00%	R\$ 0.17	R\$ 0.20	HC 15.00%
BR0267638	R\$ 0.16	R\$ 0.20	HC 20.20%	R\$ 0.17	R\$ 0.18	HC 6.60%	R\$ 0.16	R\$ 0.18	HC 11.80%
BR0267663	R\$ 0.24	R\$ 0.33	HC 41.40%	R\$ 0.22	R\$ 0.30	HC 25.10%	R\$ 0.23	R\$ 0.30	HC 23.30%
BR0267670	R\$ 0.11	R\$ 0.13	HC 23.30%	R\$ 0.11	R\$ 0.12	HC 10.50%	R\$ 0.10	R\$ 0.12	HC 13.30%
BR0267735	R\$ 0.36	R\$ 0.40	HC 10.30%	R\$ 0.40	R\$ 0.38	MI 5.50%	R\$ 0.35	R\$ 0.38	HC 8.90%
BR0267768	R\$ 0.79	R\$ 0.13	MI 83.00%	R\$ 0.79	R\$ 0.12	MI 84.50%	R\$ 0.80	R\$ 0.12	MI 84.90%
BR0268129	R\$ 0.66	R\$ 0.77	HC 16.30%	R\$ 0.67	R\$ 0.69	HC 3.70%	R\$ 0.63	R\$ 0.72	HC 12.40%
BR0270130	R\$ 0.59	R\$ 0.73	HC 22.90%	R\$ 0.62	R\$ 0.74	HC 16.30%	R\$ 0.60	R\$ 0.75	HC 20.00%
BR0270140	R\$ 0.13	R\$ 0.18	HC 37.60%	R\$ 0.14	R\$ 0.16	HC 13.30%	R\$ 0.13	R\$ 0.17	HC 22.40%
BR0271217	R\$ 0.83	R\$ 0.99	HC 20.00%	R\$ 0.79	R\$ 0.93	HC 15.60%	R\$ 0.81	R\$ 0.96	HC 16.20%
BR0292196	R\$ 0.88	R\$ 1.25	HC 41.30%	R\$ 0.79	R\$ 1.13	HC 29.60%	R\$ 0.89	R\$ 1.17	HC 23.50%

Source: Prepared by authors, 2020.

study considered the “optimal value” to generate the greatest savings.

The lowest calculated unit values were selected to estimate the reduction in monetary volume that could have been practiced. It was identified that there would be a decrease in the financial expenditure of approximately R\$ 54.6 million, reflecting a savings of 10.6% on the resources used.

Across the entire sample, the average quantity⁶ acquired by the Health Consortia was more significant than that done by Municipal Institutions. It may have contributed to the consortia’s acquisitions showing lower average prices for most of the items analyzed. Therefore, it can be pointed out that the

Health Consortia had greater purchasing power and more significant savings in financial resources.

Only three items showed divergent results. Items coded BR0267564 and BR0267768 showed lower mean, weighted and median values for the acquisitions of Municipal Institutions. And the code item BR0267565 presented mean and median values below the values found for the consortia⁷.

It was found that, on average, the arithmetic mean of the consortia’s acquisitions is 12.4% below that presented for the Municipal Institutions. The weighted mean (4.3%) and the median (9.1%) are always favorable to consortia.

Table 6, for the saving percentages of means and median, shows that, e.g., for item BR0267140, the arithmetic mean

6 The average quantity is calculated by the ratio between the total amount purchased by the number of consortia (Average Number of Consortia) or by the number of municipal institutions (Average Quantity of Municipalities).

7 The most used study to identify the causes of this fact is not within the scope of this study.

Table 5. Simulation of using the Lowest Unit Value for the quantity purchased

Item	Quantity	Extraction Resources	Lowest Unit Value	Origin	Quantity x Lowest Unit Value	Savings
BR0267140	29,904,443	R\$ 14,054,505.34	R\$ 0.44	Median Consortium	R\$ 13,157,954.92	-6.4%
BR0267194	1,267,287	R\$ 712,654.67	R\$ 0.50	Median Consortium	R\$ 633,643.50	-11.1%
BR0267197	146,988,625	R\$ 64,424,689.75	R\$ 0.43	Weighted Mean Municipality	R\$ 63,205,108.75	-1.9%
BR0267503	93,386,787	R\$ 35,249,790.62	R\$ 0.36	Mean Consortium	R\$ 33,619,243.32	-4.6%
BR0267509	33,823,167	R\$ 4,200,884.59	R\$ 0.12	Median Consortium	R\$ 4,058,780.04	-3.4%
BR0267517	195,357,899	R\$ 63,527,084.01	R\$ 0.30	Median Consortium	R\$ 58,607,369.70	-7.7%
BR0267564	43,357,058	R\$ 17,123,175.33	R\$ 0.12	Weighted Mean Municipality	R\$ 5,202,846.96	-69.6%
BR0267565	39,097,585	R\$ 25,634,326.41	R\$ 0.63	Mean Municipality	R\$ 24,631,478.55	-3.9%
BR0267566	18,958,992	R\$ 13,033,338.61	R\$ 0.62	Mean Municipality	R\$ 11,754,575.04	-9.8%
BR0267567	33,246,605	R\$ 4,486,611.43	R\$ 0.13	Wheighted Mean Consortium	R\$ 4,322,058.65	-3.7%
BR0267613	190,575,885	R\$ 32,388,512.85	R\$ 0.13	Median Consortium	R\$ 24,774,865.05	-23.5%
BR0267618	149,339,600	R\$ 99,880,534.30	R\$ 0.65	Mean Municipality	R\$ 97,070,740.00	-2.8%
BR0267632	52,845,494	R\$ 9,621,034.80	R\$ 0.17	Median Consortium	R\$ 8,983,733.98	-6.6%
BR0267635	38,225,799	R\$ 7,007,873.71	R\$ 0.17	Median Consortium	R\$ 6,498,385.83	-7.3%
BR0267638	50,747,916	R\$ 8,869,839.58	R\$ 0.16	Median Consortium	R\$ 8,119,666.56	-8.5%
BR0267663	137,476,465	R\$ 36,646,580.67	R\$ 0.22	Wheighted Mean Consortium	R\$ 30,244,822.30	-17.5%
BR0267670	21,043,912	R\$ 2,327,069.28	R\$ 0.10	Median Consortium	R\$ 2,104,391.20	-9.6%
BR0267735	4,763,034	R\$ 1,838,736.81	R\$ 0.35	Median Consortium	R\$ 1,667,061.90	-9.3%
BR0267768	19,441,732	R\$ 10,179,774.37	R\$ 0.12	Median Municipality	R\$ 2,333,007.84	-77.1%
BR0268129	29,088,954	R\$ 19,733,781.40	R\$ 0.63	Median Consortium	R\$ 18,326,041.02	-7.1%
BR0270130	5,636,357	R\$ 3,662,586.34	R\$ 0.59	Mean Consortium	R\$ 3,325,450.63	-9.2%
BR0270140	84,404,595	R\$ 12,423,483.34	R\$ 0.13	Median Consortium	R\$ 10,972,597.35	-11.7%
BR0271217	32,504,373	R\$ 26,743,253.58	R\$ 0.79	Wheighted Mean Consortium	R\$ 25,678,454.67	-4.0%
BR0292196	577,366	R\$ 578,851.28	R\$ 0.79	Wheighted Mean Consortium	R\$ 456,119.14	-21.2%
Total		R\$ 514,348,973.06			R\$ 459,748,396.90	-10.6%

Source: Prepared by authors, 2020.

(R\$ 0.45) of the Health Consortia is 26.8% below the arithmetic mean (R\$ 0.57) of Municipal Institutions.

To check that unit prices set were compatible with CMED's prices, a comparison was carried out between the Lowest Unit Value of the Health Consortia and that of the Municipal Institutions, with the average of the regulated price. The CMED value is the average of the PMVG values without taxes for 2017 and 2018, shown in Table 7.

Comparing the prices set in public acquisitions with the CMED price is a way of observing the market. The regulated price is the maximum price allowed for drug sale among manufacturing and supplier companies and pharmacies, drugstores, and public institutions.

The "variation" column shows values resulting from Equation 1, previously shown, and establishes the difference between the "Lowest Unit Value" and the price regulated by the CMED. Positive variation results indicate that, on av-

erage, the price set was lower than the regulated price and, therefore, the negative variation values indicate the opposite. Thus, it is expected that the mean unit values set are positive to show more significant savings in the use of resources, pointing to a better scenario. For example, for item BR0267140, the observed variation indicates that the Lowest Unit Value is 86.4% lower than the regulated value. In item BR0267194, the Lowest Unit Value is 25.0% higher than the regulated price.

When comparing the unit prices set to the average regulated value, it was observed that 15 items had their prices below the regulated value. Of these, 11 referred to the prices set by the Health Consortia. However, for nine items with higher prices than the regulated ones, seven were also prices set by the Health Consortia. Even so, the prices of the Health Consortia were, in most of them, lower than the regulated price, showing their relevance in negotiations.

Table 6. Saving Percentage between the prices set and regulated ones, 2017 and 2018

Item	Health Consortia			Municipal Institutions			Means		
	Mean	Weighted	Median	Mean	Weighted	Median	Mean	Weighted	Median
BR0267140	R\$ 0.45	R\$ 0.44	R\$ 0.44	R\$ 0.57	R\$ 0.50	R\$ 0.52	26.8%	15.3%	19.5%
BR0267194	R\$ 0.52	R\$ 0.50	R\$ 0.50	R\$ 0.62	R\$ 0.61	R\$ 0.60	20.3%	21.6%	20.0%
BR0267197	R\$ 0.48	R\$ 0.45	R\$ 0.50	R\$ 0.52	R\$ 0.43	R\$ 0.50	7.7%	-6.0%	0.0%
BR0267503	R\$ 0.36	R\$ 0.36	R\$ 0.36	R\$ 0.42	R\$ 0.39	R\$ 0.40	18.7%	8.5%	11.1%
BR0267509	R\$ 0.13	R\$ 0.13	R\$ 0.12	R\$ 0.15	R\$ 0.12	R\$ 0.14	20.5%	-0.9%	16.7%
BR0267517	R\$ 0.30	R\$ 0.31	R\$ 0.30	R\$ 0.39	R\$ 0.33	R\$ 0.38	27.8%	7.8%	27.0%
BR0267564	R\$ 0.89	R\$ 0.81	R\$ 0.90	R\$ 0.13	R\$ 0.12	R\$ 0.12	-85.7%	-85.3%	-86.2%
BR0267565	R\$ 0.74	R\$ 0.65	R\$ 0.74	R\$ 0.63	R\$ 0.67	R\$ 0.70	-15.4%	3.3%	-5.4%
BR0267566	R\$ 0.69	R\$ 0.67	R\$ 0.68	R\$ 0.62	R\$ 0.71	R\$ 0.70	-9.4%	5.6%	2.9%
BR0267567	R\$ 0.13	R\$ 0.13	R\$ 0.13	R\$ 0.17	R\$ 0.14	R\$ 0.15	27.9%	13.8%	15.4%
BR0267613	R\$ 0.14	R\$ 0.15	R\$ 0.13	R\$ 0.23	R\$ 0.22	R\$ 0.20	68.5%	47.3%	53.8%
BR0267618	R\$ 0.68	R\$ 0.67	R\$ 0.66	R\$ 0.65	R\$ 0.66	R\$ 0.69	-3.1%	-2.1%	4.5%
BR0267632	R\$ 0.18	R\$ 0.17	R\$ 0.17	R\$ 0.22	R\$ 0.19	R\$ 0.20	22.8%	8.0%	19.0%
BR0267635	R\$ 0.17	R\$ 0.18	R\$ 0.17	R\$ 0.21	R\$ 0.19	R\$ 0.20	19.4%	4.2%	17.6%
BR0267638	R\$ 0.16	R\$ 0.17	R\$ 0.16	R\$ 0.20	R\$ 0.18	R\$ 0.18	20.2%	7.0%	13.4%
BR0267663	R\$ 0.24	R\$ 0.22	R\$ 0.23	R\$ 0.33	R\$ 0.30	R\$ 0.30	41.4%	33.5%	30.4%
BR0267670	R\$ 0.11	R\$ 0.11	R\$ 0.10	R\$ 0.13	R\$ 0.12	R\$ 0.12	23.3%	11.7%	15.4%
BR0267735	R\$ 0.36	R\$ 0.40	R\$ 0.35	R\$ 0.40	R\$ 0.38	R\$ 0.38	10.3%	-5.5%	9.7%
BR0267768	R\$ 0.79	R\$ 0.79	R\$ 0.80	R\$ 0.13	R\$ 0.12	R\$ 0.12	-83.0%	-84.5%	-84.9%
BR0268129	R\$ 0.66	R\$ 0.67	R\$ 0.63	R\$ 0.77	R\$ 0.69	R\$ 0.72	16.3%	3.8%	14.1%
BR0270130	R\$ 0.59	R\$ 0.62	R\$ 0.60	R\$ 0.73	R\$ 0.74	R\$ 0.75	22.9%	19.4%	25.0%
BR0270140	R\$ 0.13	R\$ 0.14	R\$ 0.13	R\$ 0.18	R\$ 0.16	R\$ 0.17	37.6%	15.3%	28.8%
BR0271217	R\$ 0.83	R\$ 0.79	R\$ 0.81	R\$ 0.99	R\$ 0.93	R\$ 0.96	20.0%	18.5%	19.4%
BR0292196	R\$ 0.88	R\$ 0.79	R\$ 0.89	R\$ 1.25	R\$ 1.13	R\$ 1.17	41.3%	42.0%	30.8%
Average							12.4%	4.3%	9.1%

Source: Prepared by authors, 2020.

Table 7. Saving Percentage, 2017 and 2018

Item	Lowest Unit Value	Origin	CMED	Variation
BR0267140	R\$ 0.44	Median Consortium	R\$ 3.24	86.4%
BR0267194	R\$ 0.50	Median Consortium	R\$ 0.40	-25.0%
BR0267197	R\$ 0.43	Weighted Mean Municipality	R\$ 0.09	-377.8%
BR0267503	R\$ 0.36	Mean Consortium	R\$ 0.18	-100.0%
BR0267509	R\$ 0.12	Median Consortium	R\$ 0.33	63.6%
BR0267517	R\$ 0.30	Median Consortium	R\$ 0.25	-20.0%
BR0267564	R\$ 0.12	Weighted Mean Municipality	R\$ 1.12	89.3%
BR0267565	R\$ 0.63	Mean Municipality	R\$ 1.02	38.2%
BR0267566	R\$ 0.62	Mean Municipality	R\$ 0.87	28.7%
BR0267567	R\$ 0.13	Weighted Mean Consortium	R\$ 1.19	89.1%
BR0267613	R\$ 0.13	Median Consortium	R\$ 0.25	48.0%
BR0267618	R\$ 0.65	Mean Municipality	R\$ 0.28	-132.1%
BR0267632	R\$ 0.17	Median Consortium	R\$ 1.65	89.7%
BR0267635	R\$ 0.17	Median Consortium	R\$ 0.14	-21.4%
BR0267638	R\$ 0.16	Median Consortium	R\$ 0.20	20.0%
BR0267663	R\$ 0.22	Weighted Mean Consortium	R\$ 0.19	-15.8%
BR0267670	R\$ 0.10	Median Consortium	R\$ 0.09	-11.1%
BR0267735	R\$ 0.35	Median Consortium	R\$ 0.95	63.2%
BR0267768	R\$ 0.12	Median Municipality	R\$ 0.24	50.0%
BR0268129	R\$ 0.63	Median Consortium	R\$ 0.51	-23.5%
BR0270130	R\$ 0.59	Mean Consortium	R\$ 0.79	25.3%
BR0270140	R\$ 0.13	Median Consortium	R\$ 0.16	18.8%
BR0271217	R\$ 0.79	Weighted Mean Consortium	R\$ 2.90	72.8%
BR0292196	R\$ 0.79	Weighted Mean Consortium	R\$ 3.21	75.4%

Source: Prepared by authors, 2020.

In the analysis of the origin of prices, it was noticed that for 18 times, the lowest values were identified in purchases by Health Consortia. According to the saving percentage, it was observed that purchases through collective purchases tend to generate lower expenses than individual purchases.

Conclusion

The Health Sector has very particular characteristics, and the pharmaceutical industry emphasizes specific economic features of this sector, especially about the market structure. In the drug market, there are many items and a considerable range of manufacturers and suppliers. However, when this market is analyzed from the perspective of therapeutic classes and substances produced, it reveals a high degree of concentration, which justifies the need for public managers to evaluate acquisition arrangements that lead to advantageous negotiations for the SUS.

Anvisa regulates this market and establishes the maximum marketing price for drugs – CMED price. The description for standardizing purchases is carried out in CATMAT/MS. And the

HPD system presents a part of this market, as it is intended for recording and consulting information on purchases of health items carried out by public and private institutions.

In turn, institutions that purchase health items can operate in individual or collective purchase processes. Regardless of the type of purchase, all public drug procurement processes must comply with the lowest price requirement. Therefore, in public purchases, the combination of standardization of items and the lowest price is used.

This study has observed the difference in the price set by public health institutions that made purchases via Health Consortia compared to unit values paid by institutions that made individual purchases. For composing the sample, the data available in the HPD system for 2017 and 2018 were used.

The items studied were standardized and registered with Anvisa and have been informed by the purchasing institutions. The sample selection consisted of 24 items, totaling 7,399 records reported by 17 Health Consortia and 710 Municipal Institutions. The sample features 71 manufacturers and 422 suppliers.

As a result, it was noticed that purchases through Health Consortia were relevant in obtaining lower prices. It may be due to the greater bargaining power presented by the consortia, especially the large volume of items traded. The studied consortia operate in the South, Southeast, and Northeast regions and have negotiated more than 741 million items, with a turnover of approximately R\$ 275 million.

According to estimates on the lowest value set, there would have been 10,6% savings on financial resources if it had been carried out, representing a reduction of about R\$ 55 million in the public treasury. Such savings could have been used for purchasing more drugs or incrementing the sector's activities.

When analyzing the saving percentage, it was noticed that the variation was more efficient in Health Consortia's purchases. And, when reviewing the values established by the CMED, most items are within the limit defined for the purchase of drugs.

Economic evaluations using quantitative and qualitative indicators are relevant for maintaining the quality of public health services. Even if the analysis is of a small sample, it can be used as an indicator for monitoring the reasonableness and efficiency of public expenditures towards government principles (Mastroianni *et al.*, 2017).

The collected results follow what had already been identified by studies discussing the topic, i.e., joint purchases tend to be an effective means of reducing costs in health systems. Acquisitions by joining the Health Consortia allowed some savings in the use of resources and a more regular drug supply, also contributing to smaller municipalities, with lower purchasing power and incipient administrative infrastructure to participate in this composition, achieving the same benefits as other participants (Amaral & Blatt, 2011). As stated by Fiuza *et al.* (2020), the consortia concentrate the negotiation and can generate a centralized organization to operationalize the acquisition processes for the benefit of its members.

Silva & Lima (2017) claim that consortia are responsible for providing cost reduction and avoiding drug shortages, so the participation of municipalities in consortia can be one reason that facilitates more the structuring of the acquisition phases, even influencing the availability of various items.

However, mediating purchases only by price is not enough. It is necessary to combine strategies to rationalize stocks, logistics, and management support to obtain quality in the segment. Other factors can also contribute to reducing drug costs, such as: making scheduled purchases and generic drugs; know the supplier; know the product; establish clear rules with suppliers and comply with them; and constitute a purchasing system in which buyers are easily identified (Picolini *et al.*, 2016; Luiza *et al.*, 1999).

Furthermore, economic efficiency reflects only a nuance of the actual complexity of the segment. Other ways can be

applied in the search to solve problems across the sector, such as the standardization of inputs and drugs, the incorporation of treatment protocols, and the rational use of resources, in addition to building contractual relationships between suppliers and buyers (Luiza *et al.*, 1999; Ferraes & Cordoni Jr, 2007).

Given the analysis carried out, some limitations of the study that can be further developed had been observed, such as the time frame expansion; extension of the sample size; analysis of purchases recorded by other government levels: state and federal; comparison with an international price; study focused on standardized items in specific treatment protocols; among other aspects that can be included to expand knowledge about the Health Sector.

Finally, the topic presented is relevant. The results found can be used as a benchmark in the definition of government strategies, mainly to improve Pharmaceutical Assistance management. It is a segment that operates values and directly reflects on the well-being of society.

References

- Amaral SMS, Blatt CR. Consórcio intermunicipal para a aquisição de medicamentos: impacto no desabastecimento e no custo. *Rev Saúde Pública*. 2011;45(4):799-801.
- Anvisa – Agência Nacional de Vigilância Sanitária. Anuário Estatístico do Mercado Farmacêutico. Sistema de Acompanhamento do Mercado de Medicamentos – SAMMED [Internet]. 2019. 41p. Available from: <http://portal.anvisa.gov.br>.
- Araújo DV. Preço de medicamentos na América Latina: desafios para definição de preço de referência na região. *Estudo de caso: Mercosul*. *J Bras Econ Saúde*. 2015;7(2):86-90.
- BPS – Banco de Preços em Saúde [Internet]. Bases Anuais Compiladas do BPS; 1997-2019. Available from: <http://www.saude.gov.br/gestao-do-sus/economia-da-saude/banco-de-precos-em-saude/bases-aneais-compiladas>.
- BPS – Banco de Preços em Saúde [Internet]. Economia da Saúde: Ministério da Saúde; 2013-2020. Available from: <http://www.saude.gov.br/gestao-do-sus/economia-da-saude/banco-de-precos-em-saude>.
- CATMAT – Catálogo de Materiais [Internet]. Economia da Saúde: Ministério da Saúde; 2020. Available from: <https://www.saude.gov.br/gestao-do-sus/economia-da-saude/banco-de-precos-em-saude/catalogo-de-materiais-catmat>.
- CMED – Câmara de Regulação do Mercado de Medicamentos [Internet]. Agência Nacional de Vigilância Sanitária (Anvisa). Medicamentos. 2018. Available from: <https://www.gov.br/anvisa/pt-br/assuntos/medicamentos/cmed>.
- Costa CCM, Terra ACP. Compras públicas: para além da economicidade. Brasília: Enap; 2019.
- Ferraes AMB, Cordoni Jr L. Consórcio de medicamentos no Paraná: análise de cobertura e custos. *Rev Adm Pública*. 2007;41(3):475-86.
- Ferreira JHG. Alianças estratégicas em Hospitais Privados: estudo de caso com oito hospitais (tese de doutorado). São Paulo: Faculdade de Saúde Pública, Universidade de São Paulo; 2000.
- Fiuza EPS, Santos FVL, Lopes VR, Medeiros BA, Santos FB. Revisão do arranjo das compras públicas a partir de um contexto de crise. Diretoria de Estudos e Políticas Setoriais de Inovação e Infraestrutura (Diset). Brasília: Ipea; 2020.

- IBGE – Instituto Brasileiro de Geografia e Estatística [Internet]. Estatísticas Sociais, População. 2020. Available from: <http://ibge.gov.br/estatisticas/sociais/populacao.html>.
- Luiza VL, Osorio-de-Castro CGS, Nunes JM. Aquisição de medicamentos no setor público: o binômio qualidade – custo. *Cad Saúde Pública*. 1999;15(4):769-76.
- Mastroianni PC, Oliveira ARA, Nadai TR, Lucchetta, RC. Indicadores para avaliação econômica da aquisição hospitalar de medicamentos. *J Bras Econ Saúde*. 2017;9(2):177-84.
- MS – Ministério da Saúde [Internet]. Sistema Único de Saúde (SUS). 2020. Available from: <http://saude.gov.br>.
- Opas – Organização Pan-Americana da Saúde [Internet]. Documentos técnicos e científicos. 2020. Available from: <https://www.paho.org/pt/brasil>.
- Picolini VM, Alvarenga JFR, Fila JB, Mastroianni PC. Análise de percentual econômico dos medicamentos adquiridos por via de ações judiciais. *J Bras Econ Saúde*. 2016;8(2):125-31.
- Rename – Relação Nacional de Medicamentos Essenciais. 2020. [recurso eletrônico]/Ministério da Saúde, Secretaria de Ciência, Tecnologia, Inovação e Insumos Estratégicos em Saúde, Departamento de Assistência Farmacêutica e Insumos Estratégicos. Brasília: Ministério da Saúde; 2019. 217p. Available from: <http://portalms.saude.gov.br/assistencia-farmaceutica/medicamentos-rewrite>.
- Silva SN, Lima MG. Assistência Farmacêutica na saúde mental: um diagnóstico dos Centros de Atenção Psicossocial. *Ciênc Saúde Coletiva*. 2017;22(6):2025-36.

Appendices

Appendix 1. Description of items for Health Consortia, Municipal Institutions and Total Purchases, 2017 and 2018

Item		Health Consortia (HC)			Municipal Institutions (MI)			Total Purchases (HC + MI)		
BR Code	Description	HC	Records	Quantity	MI	Records	Quantity	HC + MI	Records	Quantity
BR0267140	Azithromycin, 500 mg – Tablet	13	23	14,482,595	322	391	15,421,848	335	414	29,904,443
BR0267194	Diazepam, 5 mg/mL, Injectable Solution – 2.00 mL vial	12	19	579,044	238	281	688,243	250	300	1,267,287
BR0267197	Diazepam, 10 mg – Tablet	13	23	61,132,303	260	315	85,856,322	273	338	146,988,625
BR0267503	Folic Acid, 5 mg – Tablet	13	21	43,844,045	300	374	49,542,742	313	395	93,386,787
BR0267509	Allopurinol, 300 mg – Tablet	11	18	8,373,580	234	293	25,449,587	245	311	33,823,167
BR0267517	Atenolol, 50 mg – Tablet	12	19	74,698,620	373	471	120,659,279	385	490	195,357,899
BR0267564	Carvedilol, 12.5 mg – Tablet	09	13	17,399,150	190	234	25,957,908	199	247	43,357,058
BR0267565	Carvedilol, 6.25 mg – Tablet	10	16	32,217,324	75	81	6,880,261	85	97	39,097,585
BR0267566	Carvedilol, 3.125 mg – Tablet	10	13	9,984,745	122	139	8,974,247	132	152	18,958,992
BR0267567	Carvedilol, 25 mg – Tablet	12	19	14,234,603	196	242	19,012,002	208	261	33,246,605
BR0267613	Captopril, 25 mg – Tablet	12	21	131,988,575	202	233	58,587,310	214	254	190,575,885
BR0267618	Carbamazepine, 200 mg – Tablet	12	21	95,792,759	186	212	53,546,841	198	233	149,339,600
BR0267632	Ciprofloxacin hydrochloride, 500 mg – Tablet	14	21	17,204,036	396	506	35,641,458	410	527	52,845,494
BR0267635	Chlorpromazine, 25 mg – Tablet	14	23	18,725,442	295	366	19,500,357	309	389	38,225,799
BR0267638	Chlorpromazine, 100 mg – Tablet	15	22	28,606,097	286	358	22,141,819	301	380	50,747,916
BR0267663	Furosemide, 40 mg – Tablet	12	20	59,063,375	234	272	78,413,090	246	292	137,476,465
BR0267670	Haloperidol, 1 mg – Tablet	11	14	12,213,830	248	302	8,830,082	259	316	21,043,912
BR0267735	Ranitidine Hydrochloride, 25 mg/mL, Injectable Solution – 2.00 mL vial	12	19	2,087,862	275	323	2,675,172	287	342	4,763,034
BR0267768	Promethazine Hydrochloride, 25 mg – Tablet	12	18	11,635,740	186	202	7,805,992	198	220	19,441,732
BR0268129	Levomepromazine, 100 mg – Tablet	13	26	13,867,165	278	353	15,221,789	291	379	29,088,954
BR0270130	Levodopa combined with Carbidopa, 250 mg + 25 mg – Tablet	12	21	4,121,080	96	104	1,515,277	108	125	5,636,357

Item		Health Consortia (HC)			Municipal Institutions (MI)			Total Purchases (HC + MI)		
BR Code	Description	HC	Records	Quantity	MI	Records	Quantity	HC + MI	Records	Quantity
BR0270140	Biperiden, 2 mg – Tablet	15	22	44,569,025	343	440	39,835,570	358	462	84,404,595
BR0271217	Amoxicillin combined with Potassium Clavulanate, 500 mg + 125 mg – Tablet	14	22	24,212,711	143	166	8,291,662	157	188	32,504,373
BR0292196	Haloperidol, 5 mg/mL, Injectable Solution – 1.00 mL vial	13	20	215,590	239	267	361,776	252	287	577,366
Total	24 items	296	474	741,249,296	5,717	6,925	710,810,634	6,013	7,399	1,452,059,930

Source: Prepared by authors, 2020.

Appendix 2. Health Consortia, 2017 and 2018

Institution	Municipality	FU	Region	Municipalities	Population*
Consórcio Intermunicipal do Sul do Estado de Alagoas – CONISUL	Penedo	AL	NE	18	592,878
Consórcio Intermunicipal do Vale do São Francisco – CONIVALES	Amparo de São Francisco	SE	NE	13	150,474
Consórcio Intermunicipal de Saúde do Médio Paraopeba	Betim	MG	SE	39	2,272,066
Consórcio Intermunicipal do Oeste Paulista	Presidente Prudente	SP	SE	24	545,065
Consórcio Intermunicipal de Saúde do Vale do Paranapanema	Assis	SP	SE	27	434,941
Consórcio de Desenvolvimento da Região de Governo de S.J.B.Vista	Casa Banca	SP	SE	16	501,574
Consórcio Intermunicipal de Saúde	Pato Branco	PR	S	20	178,746
Consórcio Intermunicipal de Saúde do Oeste de SC	Chapecó	SC	S	22	320,938
Consórcio Intermunicipal de Saúde do Nordeste de Santa Catarina	Joinville	SC	S	12	1,091,189
Consórcio Intermunicipal de Saúde do Médio Vale do Itajaí	Blumenau	SC	S	15	795,067
Consórcio Intergestores Paraná Saúde	Curitiba	PR	S	397	9,172,929
Consórcio Intermunicipal de Saúde do Vale do Rio Taquari – CONSISA – VRT	Lajeado	RS	S	37	338,966
Consórcio Intermunicipal do Vale do Rio Caí – CIS-CAÍ	Montenegro	RS	S	23	234,253
Consórcio Intermunicipal de Saúde do Alto Vale do Itajaí – CISAMAVI	Rio do Sul	SC	S	28	295,201
Consórcio Intermunicipal Catarinense – CIMCatarina	Florianópolis	SC	S	74	990,207
Consórcio Intermunicipal de Desenvolvimento Sustentável da Serra Gaúcha – CISGA	Garibaldi	RS	S	17	377,193
Consórcio Integrado de Gestão Pública do Entre Rios – CIGAMERIOS	Maravilha	SC	S	17	110,321
TOTAL				799	18,402,008

Source: Prepared by authors, 2020.

*Estimated population - 2018 (IBGE, 2020).

For 2018, the estimated population for the 5,570 Brazilian municipalities was 208,494,900 inhabitants. Thus, the studied consortia represent 14.3% of the municipalities and 8.8% of the population.

Appendix 3. Municipal Health Institutions, 2017 and 2018

Region [No. of municipalities]	State (No. of municipalities): Municipalities*
Central-West [33]	<p>Goiás (12): Abadiânia, Buriti Alegre, Caldazinha, Campo Alegre de Goiás, Córrego do Ouro, Goianésia, Goiás, Mineiros, Morrinhos, Ovidor, Paraúna e Rianópolis.</p> <p>Mato Grosso (19): Anastácio, Aparecida do Taboado, Aquidauana, Bataguassu, Batayporã, Brasilândia, Camapuã, Corguinho, Douradina, Figueirão, Ivinhema, Laguna Carapã, Nova Andradina, Paranaíba, Santa Rita do Pardo, Selvíria, Sidrolândia, Sonora e Três Lagoas.</p> <p>Mato Grosso do Sul (2): Campo Verde e Comodoro.</p>
Northeast [199]	<p>Alagoas (11): Campestre, Canapi, Coqueiro Seco, Estrela de Alagoas, Jacaré dos Homens, Maceió, Murici, Paulo Jacinto, Piranhas, Santana do Mundaú e São Miguel dos Milagres.</p> <p>Bahia (7): Amargosa, Boa Vista do Tupim, Ibipitanga, Itaparica, Piritiba, Remanso e Santa Cruz da Vitória.</p> <p>Ceará (5): Fortaleza, Jardim, Quixeré, Sobral e Viçosa do Ceará.</p> <p>Paraíba (74): Aguiar, Alagoinha, Algodão de Jandaíra, Alhandra, Aparecida, Araçagi, Arara, Araruna, Baía da Traição, Bananeiras, Barra de Santana, Belém, Boa Ventura, Boa Vista, Cabedelo, Cacimba de Dentro, Caiçara, Caldas Brandão, Capim, Carrapateira, Casserengue, Condado, Conde, Cuité, Cuitegi, Damião, Dona Inês, Duas Estradas, Esperança, Frei Martinho, Gurinhém, Ingá, Itabaiana, Itapororoca, Jericó, João Pessoa, Joca Claudino, Juarez Távora, Juazeirinho, Juripiranga, Lagoa de Dentro, Logradouro, Lucena, Mamanguape, Manaíra, Marcação, Mataraca, Mogeiro, Natuba, Nazarezinho, Nova Floresta, Nova Palmeira, Pedras de Fogo, Pedro Régis, Pilar, Pilões, Pilõezinhos, Píripituba, Riachão, Riachão do Bacamarte, Salgado de São Félix, São Bentinho, São Francisco, São João do Rio do Peixe, São José da Lagoa Tapada, São José de Caiana, São José dos Ramos, São Miguel de Taipu, Serra da Raiz, Serra Grande, Sertãozinho, Solânea, Sossêgo e Tacima.</p> <p>Pernambuco (29): Afogados da Ingazeira, Água Preta, Alagoinha, Aliança, Barreiros, Belém de Maria, Bom Jardim, Cabrobó, Catende, Condado, Cortês, Escada, Feira Nova, Ferreiros, Gameleira, Igarassu, Ipojuca, Itambé, Macaparana, Machados, Palmares, Paudalho, Saloá, São Benedito do Sul, São Joaquim do Monte, São José da Coroa Grande, Tamandaré, Vicência e Xexéu.</p> <p>Piauí (46): Alagoinha do Piauí, Alto Longá, Alvorada do Gurguéia, Antônio Almeida, Aroazes, Baixa Grande do Ribeiro, Barra D'Alcântara, Batalha, Bertolínia, Bom Princípio do Piauí, Buriti dos Montes, Campo Alegre do Fidalgo, Campo Maior, Canavieira, Castelo do Piauí, Colônia do Gurguéia, Conceição do Canindé, Dom Inocêncio, Domingos Mourão, Esperantina, Floresta do Piauí, Francinópolis, Francisco Ayres, Fronteiras, Itainópolis, Lagoa Alegre, Lagoa de São Francisco, Landri Sales, Marcos Parente, Miguel Alves, Nazária, Novo Santo Antônio, Oeiras, Pajeú do Piauí, Porto Alegre do Piauí, Redenção do Gurguéia, Rio Grande do Piauí, Santa Cruz dos Milagres, São Francisco de Assis do Piauí, São Francisco do Piauí, São Gonçalo do Piauí, São João da Serra, São João da Varjota, São José do Divino, São José do Piauí e Tanque do Piauí.</p> <p>Rio Grande do Norte (21): Água Nova, Angicos, Caicó, Caraúbas, Carnaubais, Coronel Ezequiel, Florânia, Frutuoso Gomes, Lajes, Macaíba, Major Sales, Monte das Gameleiras, Natal, Olho-D'Água do Borges, Pendências, Rodolfo Fernandes, São João do Sabugi, São Rafael, Severiano Melo, Taboleiro Grande e Viçosa.</p> <p>Sergipe (6): Aracaju, Canhoba, Cedro de São João, Itabaiana, Pacatuba e Porto da Folha.</p>
North [26]	<p>Acre (3): Manoel Urbano, Rio Branco e Xapuri.</p> <p>Pará (7): Castanhal, Conceição do Araguaia, Jacundá, Monte Alegre, Paragominas, Sapucaia e Xinguara.</p> <p>Rondônia (6): Buritis, Ji-Paraná, Mirante da Serra, Pimenta Bueno, Teixeiraópolis e Vilhena.</p> <p>Roraima (2): Boa Vista e Bonfim.</p> <p>Tocantins (8): Centenário, Cristalândia, Guaraí, Pedro Afonso, Pequizeiro, Pium, Porto Nacional e Recursolândia.</p>
Southeast [259]	<p>Espírito Santo (32): Água doce do Norte, Alegre, Anchieta, Aracruz, Barra de São Francisco, Boa Esperança, Cachoeiro de Itapemirim, Cariacica, Castelo, Ecoporanga, Fundão, Governador Lindenberg, Guaçuí, Ibirapu, Itapemirim, Jaguaré, Jerônimo Monteiro, João Neiva, Laranja da Terra, Linhares, Marataízes, Mucurici, Nova Venécia, Presidente Kennedy, Santa Maria de Jetibá, São Roque do Canaã, Serra, Venda Nova do Imigrante, Viana, Vila Pavão, Vila Velha e Vitória.</p> <p>Minas Gerais (63): Alpinópolis, Alto Jequitibá, Araporã, Arceburgo, Areado, Bambuí, Betim, Bom Despacho, Bom Jesus do Amparo, Cachoeira Dourada, Campina Verde, Campos Gerais, Capinópolis, Cascalho Rico, Cássia, Delfinópolis, Divisa Nova, Doresópolis, Engenheiro Navarro, Estrela do Sul, Franciscópolis, Governador Valadares, Grupiara, Guapé, Guaraniésia, Guaxupé, Ibiraci, Indianópolis, Ipatinga, Ipiacu, Itamarandiba, Itamogi, Itaú de Minas, Iturama, Jacuí, Januária, Juruáia, Lamim, Manhauçu, Monte Alegre de Minas, Monte Carmelo, Montes Claros, Muzambinho, Nova Era, Nova Ponte, Pai Pedro, Paraguaçu, Piumhi, Prata, Rio Pombo, Santa Vitória, São João Batista do Glória, São José da Barra, São Pedro da União, São Roque de Minas, São Sebastião do Oeste, São Tomás de Aquino, Senhora dos Remédios, Tupaciguara, Uberlândia, Vargem Bonita, Varginha e Visconde do Rio Branco.</p> <p>Rio de Janeiro (8): Cachoeiras de Macacu, Itaguaí, Paty do Alferes, Petrópolis, Rio Bonito, São Fidélis, Três Rios e Volta Redonda.</p>

Region [No. of municipalities]	State (No. of municipalities): Municipalities*
Southeast [259]	<p>São Paulo (156): Aguaí, Agudos, Altinópolis, Álvaro de Carvalho, Américo Brasiliense, Anhumas, Arandu, Araraquara, Areiópolis, Artur Nogueira, Arujá, Assis, Atibaia, Avaí, Avaré, Balbinos, Barretos, Barrinha, Barueri, Bastos, Batatais, Bauru, Birigui, Boa Esperança do Sul, Bom Jesus dos Perdões, Boracéia, Brotas, Caiabu, Cândido Rodrigues, Caraguatatuba, Cássia dos Coqueiros, Catanduva, Cerqueira César, Conchas, Cotia, Diadema, Divinolândia, Dobrada, Dourado, Duartina, Embu das Artes, Embu-Guaçu, Emilianópolis, Fartura, Fernandópolis, Florínia, Francisco Morato, Garça, Gavião Peixoto, Guará, Guarantã, Guararema, Guarujá, GuataPará, Holambra, Ibaté, Ibirá, Ibirarema, Igarapava, Ilhabela, Itapeperica da Serra, Itapetininga, Itápolis, Itaquaquetuba, Itirapuã, Jaboticabal, Jacaré, Jaguariúna, Jardinópolis, Junqueirópolis, Lins, Lucianópolis, Luís Antônio, Lupércio, Macatuba, Manduri, Maracá, Martinópolis, Matão, Meridiano, Mirante do Paranapanema, Mogi das Cruzes, Monções, Monte Alto, Nantes, Neves Paulista, Nova Europa, Osasco, Oscar Bressane, Panorama, Paraguaçu Paulista, Paranapanema, Pederneiras, Piacatu, Piedade, Piquerobi, Pirapora do Bom Jesus, Pirassununga, Platina, Pongá, Pontalinda, Porangaba, Porto Ferreira, Pradópolis, Pratânia, Presidente Prudente, Regente Feijó, Registro, Ribeirão Preto, Rincão, Sales Oliveira, Salto, Santa Branca, Santa Clara d'Oeste, Santa Cruz da Conceição, Santa Cruz da Esperança, Santa Cruz do Rio Pardo, Santa Ernestina, Santa Fé do Sul, Santa Gertrudes, Santa Lúcia, Santa Rita do Passa Quatro, Santo André, Santo Antônio de Posse, Santo Antônio do Jardim, Santópolis do Aguapeí, Santos, São Bernardo do Campo, São Caetano do Sul, São João da Boa Vista, São José do Rio Pardo, São Manuel, São Paulo, São Sebastião, São Sebastião da Gramma, São Vicente, Serrana, Sertãozinho, Socorro, Tabatinga, Taboão da Serra, Taciba, Taiúva, Tambaú, Taquaral, Taquaritinga, Tejuπά, Trabiju, Três Fronteiras, Ubarana, Ubatuba, Uchoa, Uru, Várzea Paulista, Vera Cruz e Votuporanga.</p>
South [193]	<p>Paraná (136): Adrianópolis, Agudos do Sul, Almirante Tamandaré, Alto Paraíso, Alto Paraná, Altônia, Amaporã, Antônio Olinto, Apucarana, Arapuã, Araucária, Ariranha do Ivaí, Assis Chateaubriand, Astorga, Balsa Nova, Bandeirantes, Barracão, Bituruna, Boa Esperança do Iguazu, Boa Vista da Aparecida, Bocaiúva do Sul, Bom Jesus do Sul, Cafeara, Cafezal do Sul, Califórnia, Cambé, Campo do Tenente, Campo Largo, Campo Magro, Campo Mourão, Cândido de Abreu, Capanema, Carlópolis, Cascavel, Cianorte, Cidade Gaúcha, Clevelândia, Colombo, Colorado, Contenda, Coronel Vivida, Cruzeiro do Iguazu, Curitiba, Douradina, Doutor Camargo, Esperança Nova, Fazenda Rio Grande, Florai, Flórida, Formosa do Oeste, Foz do Iguazu, Francisco Alves, Goioerê, Grandes Rios, Guamiranga, Guaporema, Iguaraçu, Imbituva, Inácio Martins, Indianópolis, Itambé, Jacarezinho, Jandaia do Sul, Japurá, Jataizinho, Juranda, Lapa, Laranjeiras do Sul, Leópolis, Lidianópolis, Lobato, Lunardelli, Lupionópolis, Mandaguari, Mandirituba, Mangueirinha, Marechal Cândido Rondon, Maria Helena, Marialva, Maringá, Maripá, Marmeleiro, Matelândia, Mercedes, Missal, Nossa Senhora das Graças, Nova Aurora, Nova Esperança, Nova Esperança do Sudoeste, Nova Tebas, Ouro Verde do Oeste, Paiçandu, Palotina, Paraíso do Norte, Paranaíba, Paula Freitas, Piên, Pinhais, Piraquara, Planaltina do Paraná, Pranchita, Prudentópolis, Querência do Norte, Quitandinha, Realeza, Renascença, Reserva, Ribeirão do Pinhal, Rio Azul, Rio Negro, Rolândia, Roncador, Rondon, Sabáudia, Salto do Lontra, Santa Fé, Santa Helena, Santa Isabel do Ivaí, Santa Terezinha de Itaipu, Santo Antônio da Platina, São João, São João do Ivaí, São João do Triunfo, São Jorge do Ivaí, São Jorge do Patrocínio, São José dos Pinhais, São Mateus do Sul, São Pedro do Iguazu, São Pedro do Paraná, Sarandi, Tamarana, Toledo, Ubitatã, Umuarama, União da Vitória e Uniflor.</p> <p>Rio Grande do Sul (18): Barão do Triunfo, Barra do Ribeiro, Camaquã, Capivari do Sul, Charqueadas, Coqueiro Baixo, Eldorado do Sul, Independência, Lindolfo Collor, Mostardas, Nova Hartz, Novo Hamburgo, Osório, Palmares do Sul, Santo Antônio da Patrulha, São Jerônimo, São José do Norte e Xangri-Lá.</p> <p>Santa Catarina (39): Anchieta, Bandeirante, Barra Bonita, Blumenau, Braço do Norte, Campo Erê, Campos Novos, Criciúma, Descanso, Dionísio Cerqueira, Entre Rios, Florianópolis, Forquilha, Guarimir, Guarujá do Sul, Jaraguá do Sul, Joinville, Lages, Massaranduba, Mondai, Nova Itaberaba, Otacílio Costa, Ouro, Palhoça, Palma Sola, Papanduva, Paraíso, Peritiba, Pinhalzinho, Princesa, Saltinho, Santa Terezinha do Progresso, São Domingos, São Miguel do Oeste, Schroeder, Sul Brasil, Tunápolis, União do Oeste e Xavantina.</p>
710 Municipalities**	

Source: Prepared by authors, 2020.

*Municipal Institutions (Municipal Health Departments, Municipal Health Foundations, Municipal Health Funds and/or Municipal Governments).

**The 710 municipalities of these institutions represent 12.7% of 5,570 municipalities in the country. The estimated population for 2018 is over 53 million inhabitants, about 25.6% of the population in Brazil (IBGE, 2020).