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Resource allocation for pharmaceutical procurement in the Brazilian Unified Health System

ABSTRACT

OBJECTIVE: To analyze resource allocation for pharmaceutical procurement by federative entities in the Brazilian Unified Health System.

METHODS: The amounts allocated to purchase pharmaceuticals during 2009 in two information systems were analyzed: *Siga Brasil* (Follow Brazil) for national data and *Sistema de Informações sobre Orçamentos Públicos em Saúde* (Information System on Public Health Budgets) for states, the Federal District and municipalities data. *Per capita* spending and the mean and median spending were calculated by municipalities, according to region and population size. The Spearman correlation coefficient was calculated for some variables. The statistical analysis included tests of normality and multiple comparisons for differences between groups.

RESULTS: In 2009 the total amount spent by the three spheres of government for purchase of medicines was approximately R$ 8.9 billion. States and the Federal District were the main players, accounting for 47.1% of the total amount spent in the health system. Some states had *per capita* spending well above the mean (R$ 22.00 per resident/year) and the median (R$ 17.00 per resident/year). There were differences in municipal spending by region. The mean *per capita* expenditure of municipalities with less than 5,000 residents was 3.9 times that of municipalities with over 500,000 residents. Municipalities with less than 10,000 residents had higher *per capita* spending than other municipalities.

CONCLUSIONS: Economic aspects such as the scale of procurement and bargaining power may explain differences in *per capita* spending between federal entities, especially among municipalities. The study indicates inefficiencies in the use of financial resources to procure medicines in the Brazilian Unified Health System.

DESCRIPTORS: Health Care Costs. Pharmaceutical Services, economics. Health Care Rationing. Equity in the Resource Allocation. Health Expenditures. Unified Health System.

INTRODUCTION

For many years, governments around the world have contended with the evolving challenge of managing the allocation of resources for health services, while several factors have contributed to increased spending.[3]

In this context, expenditures on medicine have increased in various countries. In Canada *per capita* spending on solid oral prescriptions increased 10% per

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year from 1998 to 2004, in the majority of provinces, faster than economic growth over the same time period.[9]

This situation has stimulated measures to control costs. In Europe, price policies were established in the 1980s and 1990s, including price controls, the establishment of reference pricing and control of profits.[2,6]

In these countries, price controls have taken direct and indirect forms. Policies classified as direct control include negotiation of prices with suppliers, establishment of price ceilings, performance of international comparisons and price cuts or freezes. Indirect control has been implemented by regulating profits, establishment of a reference price and use of a price index.[1]

Impact evaluations of these policies have found decreased government expenditures immediatly following implementation and shown that direct price control measures are more effective.[1,8]

In Brazil there has also been a substantial increase in total spending on medicines, as indicated by spending by the Ministry of Health on the acquisition of antiretrovirals and medicines on the Specialized Component on Pharmaceutical Assistance.[11] Economic regulations were instituted in 2003 with the creation of the Regulatory Council of the Pharmaceutical Market (*Câmara de Regulação do Mercado de Medicamentos*, CMED), responsible for approving prices for market entry and the annual readjustment of pharmaceutical products on the market.[a]

Since 2007, CMED also began regulating the price of sales to the government for medicines in the list recommended by clinical protocols from the Ministry of Health. The Price Adequacy Coefficient was created, which consists of an amount to be discounted from the manufacture price of these medicines (currently 22.85%), instituting the maximum sale price to the government. It is a minimum mandatory discount that should be applied by distributors and/or laboratories when they sell to the public sector.[b,c,d].

In the Brazilian Unified Health System (*Sistema Único de Saúde*, SUS), procurement of medicines are performed autonomously by the Federal Union, 5,564 municipalities, 26 states and the Federal District, in addition to hospitals under indirect public administration. The complexity of the administrative structure necessitates an analysis of expenditures for medicines by each federal entity, so that potential problems can be monitored and policies formulated to improve the efficient use of public resources.

This study objective was to analyze the direct use of financial resources by federal entities in the acquisition of medicines in SUS.

METHODS

The amount liquidated[e] in the acquisition of medicines by the federal government in 2009 was obtained from the Follow Brazil (*Siga Brazil*) system, which makes the federal budget available on an internet website from the Federal Senate.[f] The following budget items of the federal Union are directly associated with acquisition of medicines: a) 6031; b) 4295; c) 6142; d) 20AE; e) 4368; f) 4370; g) 4705 and h) 20BA. For each of these budget items, the only values used were extracted by the direct application mode.

To calculate *per capita* spending by the Union on medicines, the sum of the values liquidated in direct applications for these items was divided by the total estimated population of Brazil on 1 July 2009, available from the Brazilian Institute of Geography and Statistics (*Instituto Brasileiro de Geografia e Estatística*, IBGE).

The amounts liquidated by states, the Federal District and municipalities for acquisition of medicines were extracted from the Information System about Public Health Budgets (*Sistema de Informações sobre Orçamentos Públicos em Saúde*, SIOPS).[g] The accounting classifications used were 3.3.3.90.30.09.00 and 3.3.3.90.32.03.01. The sum of the two values obtained by each accounting classification corresponds to the total expenditure for each entity.

Per capita spending by states, the Federal District and municipalities on medicines was obtained by dividing

[a] Brasil. Lei nº 10.742 de 6 de outubro de 2003. Define normas de regulação para o setor farmacêutico, cria a Câmara de Regulação do Mercado de Medicamentos - CMED e altera a Lei n° 6.360, de 23 de setembro de 1976, e dá outras providências. *Diario Oficial Uniao*. 7 Oct 2003[cited 2010 Aug 31]:1. Available from: http://www.planalto.gov.br/ccivil_03/Leis/2003/L10.742.htm

[b] Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Resolução CMED nº4, de 18 de dezembro de 2006. Dispõe sobre o Coeficiente de Adequação de Preços – CAP, sua aplicação, e altera a Resolução CMED nº. 2, de 5 de março de 2004. *Diario Oficial Uniao*. 19 dez 2006:1.

[c] Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Comunicado CMED nº 15, de 28 de dezembro de 2007. Estabelece os critérios de composição de fatores para o ajuste de preços de medicamentos a ocorrer em 30 de março de 2007. *Diario Oficial Uniao*. 31 dez 2007:23-4.

[d] Ministério da Saúde. Agência Nacional de Vigilância Sanitária. Comunicado CMED nº 1, de 3 de fevereiro de 2010. *Diario Oficial Uniao*. 04 fev 2010:1.

[e] A liquidação da despesa consiste na verificação do direito adquirido pelo credor, tendo por base os títulos e documentos comprobatórios do respectivo crédito. Implica o reconhecimento do débito por parte do administrador público e, portanto, neste caso ao valor gasto com medicamentos, considerando que os mesmos foram entregues à administração pública.

[f] Senado Federal. Orçamento Federal. Siga Brasil. Brasília; 2001[cited 2010 Oct 04]. Available from: http://www9.senado.gov.br/portal/page/portal/orcamento_senado/SigaBrasil

[g] Ministério da Saúde. Departamento de Economia da Saúde e Desenvolvimento. Sistema de informações sobre orçamentos públicos em saúde - SIOPS. Brasília; 2000[cited 2010 Aug 16]. Available from: http://siops.datasus.gov.br/

the total cost of medicines in each federative entity by its respective population, estimated for July 1st 2009 by the IBGE.

Median and mean per capita disbursements were calculated for each municipality, according to geographical region and population size: less than 5,000 residents; 5,001 to 10,000; 10,001 to 20,000; 20,001 to 50,000, 50,001 to 100,000; 100,001 to 500,000 and more than 500,000 residents.

Data was obtained on the number of consultations, to investigate the association between number of visits per resident and spending on medicines per resident, using the website from the SUS Informatics Department (DATASUS).[h]

The Spearman linear coefficient correlation was calculated for the following municipal variables: a) visits per resident per year and expenses on medicines per person per year; b) visits per resident older than 40 years per year and expenses on medicines per resident per year; and c) population and spending on medicines per resident per year.

Statistical analysis was performed with R (version 2.6.2) and the following tests were performed: Lillefors test for normality; Grubbs test for outliers; Shapiro-Wilk test for normality; Kruskal-Wallis for differences between groups; and multiple compairson for differences between groups.[10]

RESULTS

The Table shows that in 2009 the total value liquidated for acquisition of medicines by the three spheres of government in SUS was 8.9 billion reais, approximately 4.9 billion US dollars, according to the total declared by states and municipalities in SIOPS until the date of data collection (6/16/2010).[i] This value does not include expenditures by all states and municipalities, since during the period analyzed three states (Espírito Santo, Paraná e Pernambuco) and 152 municipalities lacked information. Direct disbursements by the Union totaled 12.33 reais/resident/year in 2009.

In regards to the percentage of participation by federative entities in direct disbursements for the acquisition of medicines, the states and Federal District were the main players in volume of resources, responsible for 47.1% of the total value liquidated in SUS. They were followed by the Union with 26.5% and municipalities with 26.4%.

Some states had *per capita* spending far above the mean (22.00 reais per resident/year) and median (17.00 reais per resident/year), suggesting the presence of outliers (inconsistent values) (Figure 1). Use of the Lillefors test ($D=0.1646$, $p=0.09184$) indicated that the hypothesis of a normal distribution should not be rejected, and the Grubbs test ($D=0.4206$, $p<0.001$) indicated that the extreme values, for Amapá and the Federal District, did not happen randomly.

The mean and median *per capita* spending on medicines by municipalities, according to Region, showed that municipalities in the North and South states were different than states in the Northeast and Southeast (Figure 2). According to the Shapiro-Wilk test, the hypothesis of normality can be rejected for each region: North, $W = 0.4253$ and $p < 0.0001$; Northeast, $W = 0.6792$ and $p < 0.0001$; South, $W = 0.7537$ and $p < 0.0001$; Southeast, $W = 0.1079$ and $p < 0.0001$ and Central-West, $W = 0.5809$ and $p < 0.0001$. Therefore, since the observations cannot be described as resulting from a Gaussian distribution, non-parametric tests for comparisons between groups should be performed. In this case, the Kruskal-Wallis test rejected the hypothesis that the groups are similar and that, at least, one group is different than the others (207.0103, 4 degrees of freedom; $p<0.001$).

The multiple comparison test performed after the Kruskal-Wallis test indicated that the Central-West has statistically different expenditures than the North, Northeast and Southeast regions. The North differs than

Table 1. Total value liquidated by the administrative spheres in direct disbursements for acquisition of medicines. Brazil, 2009.

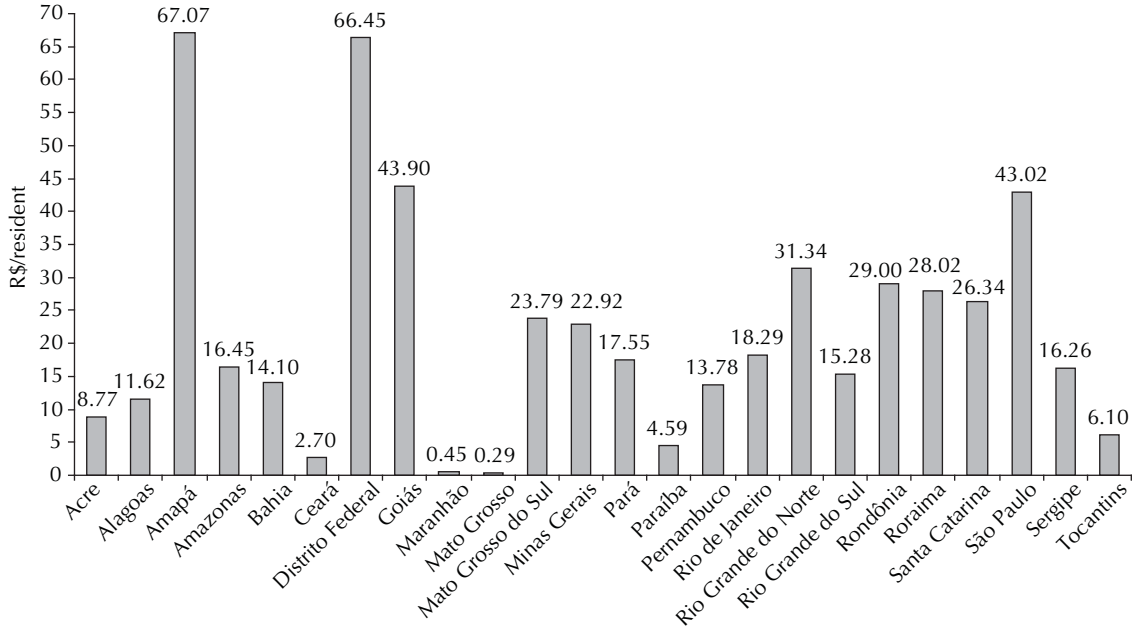
Sphere	Total federative units	No. of informants*	Total spending (R$)
Union	1	1	2.360.115.095,07
States and Federal District	27	24	4.187.072.744,13
Municipalities	5.564	5.412	2.351.363.521,55
Total			8.898.551.360,75

Source: Information System on Public Health Budgets – SIOPS (states, Federal District and municipalities) and from Follow Brazil (federal budget).

* Number of informants corresponds to the total states and municipalities that reported spending on public health activities and services in SIOPS. Retrieved on 8/16/2010.

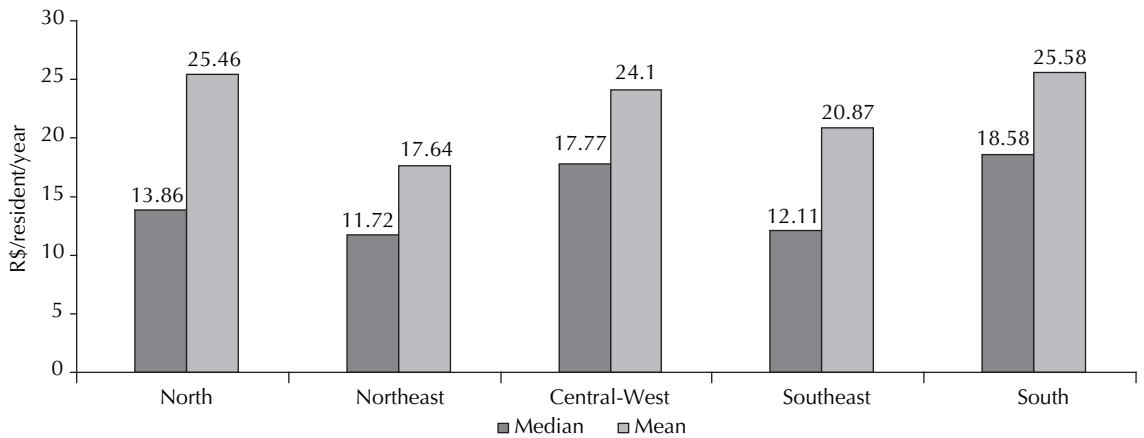
[h] Ministério da Saúde. Departamento de Informática do SUS – DATASUS. Brasília; 2009[cited 2010 Oct 05]. Available from: http://www.datasus.gov.br

[i] Conversão para a moeda norteamericana segundo a cotação diária para compra no período de 1/7 a 31/12/2009 (1 dólar = 1,80 reais).



Source: Information System and Public Health Budgets (SIOPS) and the Brazilian Institute of Geography and Statistics (IBGE)

Figure 1. Per capita spending on medicines by states and the Federal District according to direct disbursements. Brazil, 2009.



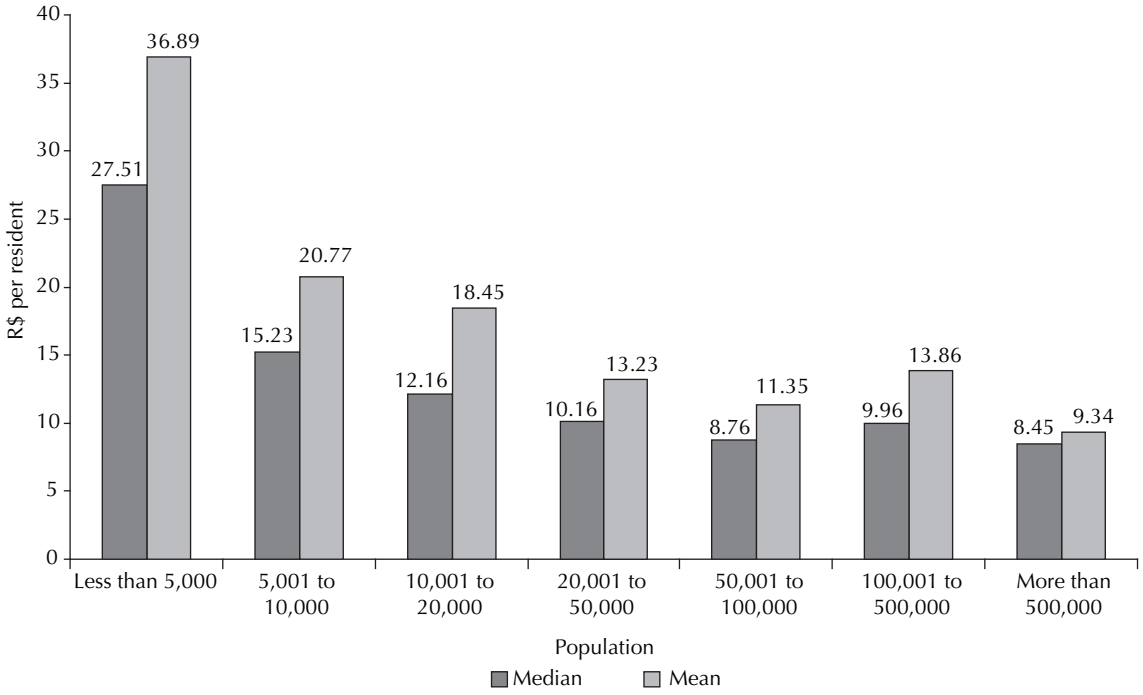
Source: Information System and Public Health Budgets (SIOPS) and the Brazilian Institute of Geography and Statistics (IBGE).

Figure 2. Mean and median *per capita* disbursements for acquisition of medicines, by region. Brazil, 2009.

the South but not from the Northeast and Southeast regions. *Per capita* spending by the Southeast and Northeast regions are similar, although they are different than the South region.

In analyzing the mean and median *per capita* direct disbursements by municipalities, stratified by population size, we verify that the mean *per capita* spending of municipalities smaller than 5,000 residents is 3.9 times greater than municipalities with more than 500 thousand residents. Median *per capita* spending is 3.3 times greater for municipalities with less than 5 thousand residents in relation to those with at least 500 thousand residents (Figure 3).

The normality hypothesis for spending, according to municipal size was rejected by the Shapiro-Wilk test: a) less than 5,000, $W = 0.7845$ and $p<0.0001$; b) 5,001 to 10,000, $W = 0.5383$ and $p <0.0001$; c) 10,001 to 20,000, $W = 0.0693$ and $p <0.0001$; d) 20,001 to 50,000, $W = 0.7837$ and $p <0.0001$; e) 50,001 to 100,000, $W = 0.6507$ and $p <0.0001$; f) 10,0001 to 500,000, $W = 0.3419$ to $p <0.0001$; g) more than 500,000 $W = 0.8941$ and $p<0.001$. The Kruskal-Wallis test showed that *per capita* spending by small municipalities (less than 5,000 residents, or 5,001 to 10,000) was different than spending by the other size classes. Spending by municipalities between 10,001 and 20,000 residents



Source: Information System and Public Health Budgets (SIOPS) and the Brazilian Institute of Geography and Statistics (IBGE)

Figure 3. Mean and median *per capita* disbursements by municipalities for acquisition of medicines. Brazil, 2009.

was equal only if compared to municipal spending by municipalities with more than 500,000 residents. For all the classes of municipalities with more than 20,000 residents, *per capita* spending on medicines was not statistically different.

According to the correlation test (Spearman, R) the variables "*per capita* spending on medicines" and "number of medical visits per resident" showed a statistically significant positive correlation, although of a small magnitude ($R=0.06377$, $p<0.001$).

The Spearman test indicated a week positive correlation ($R=0.06925$, $p<0.001$) between *per capita* spending and number of medical consultations per resident aged 40 years or more.

Per capita spending was inversely related with municipal population ($R=-0.39087$, $p<0.001$).

DISCUSSION

This article presents the values allocated for acquisition of medicines by the federative entities in SUS, considering only direct disbursements. Therefore, financing is not discussed here.

The allocation of 8.9 billion reais in direct disbursements for SUS medicines in 2009, does not represent the full actual value due to the characteristics of SIOPS, used to collect data on states and municipalities. Since the system depends on reporting and is not compulsory, some states and municipalities had not provided their budgets and expenses on health, including medicines, by the end of data collection.

Therefore, the total value of direct disbursements by states and municipalities is greater than presented in the Table, and these spheres of government participate more in total SUS spending for the purchase of medicines.

In regards to direct *per capita* spending by states, the values allocated by Amapá, northern Brazil, (67.07 reais per resident/year) and the Federal District (66.45 reais per resident/year), stand far above the mean (22.00 reais per resident/year). Many situations may explain these findings, including inefficient purchase of medicines and misappropriation.

Analysis of mean and median municipal values by region indicates differences of up to 46% among these measures, showing some very discrepant municipalities in relation to other municipalities of the same region. Statistical comparison of the regional differences in *per capita* municipal spending (Figure 2) reveals that municipalities in the Central-West spend more than those in the Northeast and Southeast and less than in the North. In addition, municipal spending in the Northeast and Southeast regions are similar but different than in the South. The greater difference between the mean and median in the North suggests greater inequality in spending on medicines by municipalities, where many municipalities have very low spending and few have

very high spending. This pattern also occurs in low population municipalities.

The inverse relationship between *per capita* spending and municipal population is interesting. Municipalities with population less than 5,001 residents had mean *per capita* spending 3.9 times greater than municipalities with a population above 500,000 residents. Spending by municipalities with less than 10,001 residents is statistical different than spending by the other municipal sizes. Some hypotheses were developed to explain this finding. First, it was necessary to evaluate if smaller municipalities produce more consultations, since a greater number of consultations could imply more prescriptions and greater *per capita* spending. Second, more consultations may have been performed among people 40 years of age or older in smaller municipalities, this could involve more prescriptions and greater *per capita* spending due to a higher prevalence of chronic diseases among this population. Third, the differences could have been due to qualitative differences in the list of medicines prescribed to the population. Fourth, these differences could have been explained by a greater proportion of people with health plans, who did not use SUS to obtain prescribed medicines, in larger municipalities. The fifth hypothesis regarded economic questions, such as negotiating power and scale of purchase that could mean smaller municipalities[j] pay higher prices for products due to less negotiating power and economies of scale.

In regards to the first two hypotheses, the number of consultations did not interfere with the differences observed in *per capita* spending by municipalities since the current study found a weak and positive correlation.

As for the third hypothesis, it can be affirmed with a high degree of confidence that the qualitative variations of the medicines offered to the population are minimal, due to national policy and federal financing for the acquisition of medicines available in primary health care. Municipal managers have little discretionary responsibility to change the items on the federal list.

In the case of the fourth hypothesis, few private health plans offer medicines in Brazil. Therefore, we believe that if this effect exists, it is very limited since even people with health plans utilize SUS for medicines.

The rejection of the prior hypotheses, since they do not explain or explain very little of the *per capita* differences in spending, implies that the most plausible hypothesis concerns differences in negotiating power and scale of purchases.

The impact is greater on smaller municipalities, since they pay higher prices due to lower negotiating power and smaller quantities purchased.

There is a need to discuss the efficient use of public resources, since medicines are acquired with resources from the payment of taxes by society.

Chalkidou et al[4] analyzed the prices paid for the same medication by different government agencies in the USA. They concluded there was no acceptable economic or social justification for the large differences paid for pharmaceutical products by the federal government.

In the Brazilian case, if the large difference in the prices paid is confirmed, the difference would not be intra-governmental as in the USA and instead be intergovernmental. In any case, it does not seem acceptable that public resources are used in this fashion, indicating a need to adopt policies that promote efficiency in public purchases by all spheres of government.

Some strategies have already been implemented by some state governments in Brazil. For example, São Paulo and Minas Gerais (both in southeastern Brazil) produce medicines in public pharmaceutical laboratories for supply to municiplaities.[5] In Paraná (southern Brazil) a consortium for medicines has been established, where municipalities unite to increase the scale of the purchase and negotiating power over prices.[5,7] These strategies were considered effective for the reduction of costs to acquire medicines.

Nonetheless, these measures are far from reaching all Brazilian municipalities, meaning there is an urgent need to discuss policies that promote the efficient use of resources. Policies can be implemented to guarantee better prices in public purchases, such as the establishment of municipal consortium and the registration of prices by states so that municipalities purchase at pre-registered prices under a contract.

Centralization of purchases by the federal government is only justified for medicines sold by one provider and/or acquired from abroad and/or have a very high per unit cost. In these situations, the economic savings from centralization appears to surpass logistic difficulties and cost given the extent of the national territory.

Another possibility to guarantee efficiency includes the adoption of more ample measures that have a national impact. The regulation of public purchases through a price ceiling for all SUS medicines currently occurs with some medicines that have a maximum sale price to the government. This policy appears to be one of the most effective and least dependent on administrative attention. Nonetheless, it is necessary to evaluate the impact of other policies, given that the Brazilian pharmaceutical market is one of the largest in the world and SUS is a large purchaser of medications for this market.

[j] Brazil has 2,551 municipalities with less than 10,001 residents, accounting for 45.8% of the total amount.

In conclusion, it is critical to implement and monitor pharmaceutical policies in order to regulate public purchases in Brazil. The international trend of increased spending on medicines is present in Brazil, which indicates a need to adopt measures to guarantee the sustainability of SUS.

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