Does Municipal Expenditure Count for Primary Care Sensitive Hospitalizations? An analysis of Minas Gerais cities, Brazil

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ABSTRACT
The aim of this paper is to assess the effect of municipal health expenditures on the percentage of primary care sensitive hospitalizations (PCSH). We analyzed 853 municipalities in the state of Minas Gerais for the period 2004 to 2013 using a fixed-effects panel. Results show that municipal health expenditures are important to the variation in the PCSH index. However, a focus on specific groups of individuals such as children, pregnant and elderly and municipal sanitary conditions might be an alternative way to increase the productivity of health care municipal expenditure instead of only expenditure rises.

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INTRODUCTION
The current organization of the Brazilian Health System (SUS) treats primary care as the core of health care network and the gateway for citizens to access health services. As such, municipalities have great responsibility in the health care organization and its financial, material and human resource allocation. Only after implementation of the Health Community Workers Program in 1991, Family Health Program in 1993 and National Primary Health Care Policy (PNAB 2006 and PNAB 2008) that municipal responsibility on healthcare management has become effective (Brasil, 1988; Brasil, 2007a; 2007c; 2012b).

Each municipality in Brazil is responsible for managing a tripartite fund with its own health budget and a portion of resources transferred from State and Federal Government to produce primary care services. Specifically, Minas Gerais State government plays an important role not only in financial resource allocation but also in managing those resources. We can also assume that municipalities also play a role in increasing efficiency of health expenditures as well as the quality of the health system because of its responsibility to manage primary care. While some scholars have reinforced low efficiency of resource allocation and hospital orientation in Brazilian health system (Casanova; Colomer; Starfield, 1996; Field; Barros, 2004; Mendes, 2012), others have shown that the current health care organization has produced satisfactory effects in increasing primary care coverage and decreasing primary care sensitive hospitalizations (Macinko; Almeida, 2004; Macinko; Guanais; Souza, 2006; Elias; Magajewski, 2008; Fontenelle, 2011).

This study aims to contribute to the knowledge about importance that municipalities have for current Brazilian health care system. This article aims to answer at least three questions: a) Are municipal health expenditures important to explain the variation of Primary Care Sensitive Hospitalizations (PCSH)?; b) What is the size of those effects?; c) Are there differences in marginal effects produced by the municipal health expenditure before and after the period of PNAB 2006 and PNAB 2011?

A number of scholars have argued that PCSH represent a set of health hospitalization problems that can be preventable by primary care actions (Alfradique et al. (2009); Fontenelle (2011); Passion, Pereira & Figueiredo (2013). High rates of hospitalization in a population may indicate serious problems in accessing health care system. Scholars...
Brazilian primary care and its budget:

Due to the recent changes in Brazil toward a public, comprehensive and universal health care system, primary health care has been increasingly seen as the core of a new current system of health care. This belief has helped maximize the financial resources invested in the health sector (Casa Nova; Colmer; Starfield, 1996; Starfield, 2004; Starfield, 2004; Elias et al., 2006; Elias; Magajewski, 2008; Brasil, 2007; 2012b; Fontenelle, 2011; Mendes, 2012). Besides, it is important to note that knowledge about the community, ownership of local space and establishment of a relationship between population and primary health care facilities is as important as the allocation of financial resources. Factors such as demographic and epidemiological profile of the population, historical and cultural context, social facilities (associations, churches, schools and kindergartens), local leaders and other interventions in the health-disease process must be accounted in analysis of primary care outcomes. In addition, while personal characteristics such as gender and age are important to well-being, other environmental factors such as lifestyle, education, social networking, and more broadly, socioeconomic, cultural and political status also have to be considered (Mendes, 2012; Thunhurst, 2012; Macinko et al., 2007; Brasil, 2006, Giovanna; 2006, Ibañez et al., 2006; Costa et al., 2011).

According to Conill (2008), Henrique & Calvo (2009) and Rock & Caccia-Bava (2009), Brazilian Ministry of Health implemented primary care programs initially in the areas of nutritional risk, socioeconomic vulnerable sites with sanitary infrastructure problems and small municipalities. Ibañez et al. (2006), Alfradique et al. (2009), Fontenelle (2011), Perry, Shanklin & Schroeder (2003) and Passion, Pereira & Figueiredo (2013) showed the significant impact of the supply of primary care in reducing hospitalizations or reducing the use of more sophisticated therapeutic procedures that involve greater cost to the health system.

Brazilian Government has launched many program addressing the importance of primary health care as the Primary Care National Policies (PNAB 2006 and PNAB 2011), Health in School Program, Promotion of Health Policy and guidelines for the organization of the Health Care Network. The primary health care definition in National Primary Care Policy is very similar to the definition of primary care of World Health Organization (Brazil, 2007c; Brazil 2010a; 2010b; Fontenelle, 2011).

Primary health care system in Brazil has gone through several stages. Traditionally, Brazilian primary care performed at primary care facilities supported by teams of health professionals such as physicians, nurses and administrative staff. The first Brazilian experience started with Community Health Worker Program (PACS in Portuguese) before 1991. In 1993, Ministry of Health created the Family Health Program (PSF in Portuguese), based on the PACS and the Family Medical Program (PMF in Portuguese). The PSF was established in 1994 and contributed to the reorientation of the health care model from primary health care in accordance with the principles of the Brazilian Health System.

The current health public policies turned municipalities managers of local communities, responsible to accomplish principles of primary health care, the organization and execution of actions in its local territory. The municipalities have to decide on how to use the financial resources of the Primary Care fixed budget (fixed PAB) and Primary Care variable budget (variable PAB). They also became responsible for ensuring all primary care infrastructure, select, hire and pay professionals who make up the Family Health Teams (Brasil, 2007a; 2010).

Primary Care National Policy 2011 changed the design of federal budget for primary care. The fixed PAB started to differentiate per capita budget by municipality benefiting poorer, and small-populated municipality. From the perspective of quality, policy induced changes in Family Health Strategy and created a quality component that evaluates and rewards Family Health Teams, ensuring higher budget according to the contractual commitments and results (Brasil, 2012b).

According Brasil (2012b), Primary Health Care budget should be tripartite. At the federal level, there is funds for processes and infrastructure. Federal government transfer resources to municipalities in an account in order to facilitate Health Councils surveillance and transparency. After PNAB 2011, Federal Government started transfer additional budget conditioned to results according primary care quality as well as budget for specific projects such as compensation of regional inequalities. The funds associated with quality and goals should be transferred based on results obtained according to Access and Improvement to Quality of Primary Care.
Program - PMAQ in Portuguese (Brazil, 2012a; 2012b).

**Primary Care Sensitive Hospitalizations:**

The Primary Care Sensitive Hospitalizations (PCSH) is a derivative of Ambulatory Care Sensitive Conditions (Alfradique et al. 2009; Fontenelle, 2011). They are a set of health problems for which the effective action of primary care may reduce the risk of hospitalization. According to Fontenelle (2011) the conceptual framework of Ambulatory Care Sensitive Conditions (ACSC) was adapted in Brazil by Alfradique et al. (2009) to PCSH, describing the various ways in which a person can have access to different components of the health system, according or not the role of primary health care.

According Fontenelle (2011), there are conflicting evidence on the association between primary care and PCSH in Brazil. Veloso & Aratijó (2009) observed a decrease in the proportion of PCSH in small municipalities of Minas Gerais, between 1999 and 2007, concomitant to an expansion of Family Health Program. On the other hand, Henry & Calvo (2009) observed that in the period 2001-2004 the municipalities of Santa Catarina State maintained the same rates of PCSH, despite the expansion of the Family Health Program.

Fontenelle (2011) and Cardoso et al. (2013) points out evidences that primary care characteristics may be associated with low rates in PCSH. Because those conflicting results, it would be very important to search for more analytical studies in this field. Moreover, despite primary care is related with PCSH in Spain and USA, it is still unclear whether this association remains in Brazil. Alfradique et al. (2009) and Fontenelle (2011) point to the lack of Brazilian studies that focus on the analysis of PCSH.

According to Cardoso et al. (2013), in Brazil, PCSH list includes 19 causes of hospitalization and diagnosis according to the tenth revision of the International Classification of Diseases (ICD-10).

The prevalence of PCSH in the study of Cardoso et al. (2013) was 36.6% (CI 95% was 34.7% to 38.6%). In another study, Alfradique et al. (2009) in 2006 shows that ICSAP accounted for 28.5% of all hospitalizations.

Some studies support the hypothesis of increased primary care coverage associated with reduction in percentage of PCSH when the health care system focuses on primary care (Bindman, Chattopadhyau; Auerback, 2008; Billings et al. 1993; Billings; Anderson; Newman, 1996; Caminal et al., 2001; Conill, 2008).

According Alfradique et al. (2009) and Caminal et al. (2001) there may be an increase in hospital admissions related with primary care coverage. This can be attributed to expansion of access to health services that was latent in the case of low primary care coverage. Besides is expected that a high PCSH index is more related with disability in delivery of health services.

Scholarship indicates that high PCSH rates may indicate deficiency not only in the health coverage but also low resolution of primary care services, deficiency of medicine supplies and deficiency in disease management (Casanova; Starfield, 1995; Casanova; Colomer; Starfield, 1996; Nedel et al 2008).

**Methods:**

We used official secondary data of 853 municipalities of Minas Gerais State that is divided into 11 geographical regions and 78 health strategies regions for establishing of public policies (Minas Gerais, 2014).

We can classify this study as a partial economic evaluation in health according to Brasil (2009) and Bosi & Uchimura (2007) and an assessment of public policies as described by Delrjen (2001), Trevisan & Bellen (2008) and Ramos & Schabbach (2012).

Equation 1 gives us the theoretical model that supported all data collection and analysis:

\[
\text{PCHS} = \text{(Municipal Expenses)} + \text{(Primary health care demand)} + \text{(Sanitation and Infrastructure)} + \text{(Economic and Social Factors)} + e_i
\]

Where \(e_i\) is the error term of the equation.

The PCSH is the percentage of hospitalizations formed by 19 groups of diseases and may represent an efficacy variable for the local health care system. This variable was regressed on the independent variables grouped into four theoretical groups. “Municipal Expenditures”, “Demand for Primary Health Care”, “Sanitation and Infrastructure” and “Socioeconomic Factors”. Those were conceptual dimensions formed by available variables from Brazilian National Treasury and the Ministry of Health datasets. The seven types of municipal expenditure represented municipal budget on health care that reflect the stage of liquidation in which the administration recognizes that the goods and contracted services have been completed and there is obligation to pay.

National Treasury classified municipal health expenditures in primary care, hospitalizations, prophylactic support, sanitary surveillance, epidemiological surveillance, food and nutrition and other expenses. We analyzed per capita variables compared to level of prices of year 2004 according to inflationary index INPC.

We added control variables divided into the three theoretical groups as shown by Equation 1. The group representing the “Demand for Primary Care” took into account three group of individuals important according Ministry of Health (Brasil, 2006b): children, elderly and pregnant. We assumed that higher share of these individuals into total coverage population can directly influence the percentage of PCSH. Another variable that we added
with respect to this group was the proportion of individuals with private health insurance. We assumed that individuals with private health coverage prefer to use the supplementary care system instead of public services when it is possible.

We added in the group of “Sanitation and Infrastructure” some variables that represent the coverage of households with electricity, sewage systems, drinking water supply and garbage collection.

Finally, we added four variables for the last group that sought to represent “Socioeconomic factors”. We added the variables GDP per capita, percentage of the population with low income (less than half minimum wage), per capita household income and proportion of illiterates. Regarding illiteracy, we assumed that, indirectly, the education may be related to behaviors that help in the prevention of diseases.

In order to remove outliers from dataset with multivariate discrepancy, we used the algorithm Blocked Adaptive Computationally Efficient Outlier Nominator (BACON), proposed by Billor, Hadi and Velleman (2000). We used the twentieth ($p = 0.2$) percentile of the chi-square distribution as a criterion for separation between atypical and not atypical observations. By BACON algorithm, any severe distance shall be measured by the criterion of Mahalabonis distance (WEBER, 2010; STATACORP, 2013). This criterion detected the presence of 92 observations with multivariate discrepancy, considering all the variables included in Equation 1.

We used a fixed effect panel with 8438 observations of 853 municipalities between the years 2004 to 2013, sought to specify the most efficient model for Equation 1. We used the backward method to remove one by one variables not significant for the model. Equation 2 shows the model with the best specification obtained using fixed effects model, following description of Baum (2006) and Wooldridge (2012). In addition to the statistical tests that demonstrate the need for use of fixed effects, Alfradique et al. (2009) stated that to use PCSH as a performance indicator of primary health care in Brazil, we should control factors related to individuals directly or with the use of proxies. By its constitution, fixed effect model allows us control these specific variables cited by Alfradique et al. (2009) with the intercept of each municipality in the Equation 2.

Results:
We obtained the best specification as defined in Equation 2:

$$f(\text{PCSH}) = \begin{align*}
30.60755 & + 0.003PC & + 6.15e-07PC^2 & + \\
51.01^* & + 4.03^* & + 3.26^* & + \\
-0.002HC & + 3.24e-07HC^2 & + -0.009PS & + 0.035SS & + \\
-0.0002SS^2 & + -0.001OE & + -0.029Gar & + \\
t-2.51^* & + t-3.34^* & + t-2.58^* & + \\
0.0522Ener & + 0.0005Preg & + -0.2681Eld & + \\
t3.70^* & + t5.36^* & + t-4.02^* & + \\
u_i + \delta_{it}
\end{align*}
$$

Equation 2

Where PC, HC, PS, SS, OE means expenses with primary care, hospital, profilatic support and other expenses. Gar, Ener, Preg and Eld means percentage of householder with garbage collection and energy and the percentage of pregnant and elderlies among primary care coverage. By using fixed effect model, $v_i$ error term of Equation 1 was replaced by the sum of the terms $(u_i + \delta_{it})$ where $u_i$ is the specific error term of the municipality and $\delta_{it}$ is the usual error term, homokedastic, mean 0, without correlation between independent variables and $u_i$.

Equation 2 was significant for hypothesis that all variables coefficients are non-zero ($F (12, 851) = 7.63 ^* $). A high correlation was observed between the independent variables and the error term $u_i$ (cor $\text{u}_i, Xb = -0.9430$), showing the strong presence of specific variables for each municipality invariant to time. The intra-class correlation (rho = 0.9953) showed that almost 100% of the model variance is due to differences over the panels and not among the municipalities. The Hausman test (chi-square = 129.57 *) supports the use of fixed effects rather than random effects.

We used fixed effect model with robust standard error corrected by groups of municipalities, due to the presence of heteroskedasticity and serial correlation tests mentioned by Wooldridge ($F (1, 845) = 129.95 ^*$) and Wald (chi-square = 2.9E + 30 *) as suggested by Wooldridge (2012). The fixed effects explore the relationship between the dependent and independent variables within each municipality, considering the specificities of local management, professional training of health, culture, in other possible specificities in various micro and macro health regions in the State of Minas Gerais. Then, the fixed effects removed the effects of features invariant to time in a way that it is possible to assess the net effect of independent variables on the dependent variable. Another important assumption of the fixed effects model is that these features invariant to time are unique to individuals and could not correlate to other individuals. That means if unobservable variables do not change over time, then any change in PCSH dependent variable should be a change over the years instead of change in municipalities.

The value of $r^2$-within (2.56%) showed that the specified model could explain the variations of ICSAP by the specified covariates. The model is
sufficient to answer the research questions and proposals meet the study objective.

We observed in coefficients of Equations 2 a significant quadratic effects of the costs of primary care (PC), hospital care (HC), and sanitary surveillance (SS). Moreover, this effect was not observed for prophylactic support (PS). These squared interactions show that the impact of these variables is associated with a decreasing marginal effect, i.e. the additional increase of R$ 1.00 (One Brazilian Real) in per capita expenditure will always be associated with a lower variation of ICSAP until it reaches a point of inflection where the variation of PCSV is up to 0. According to Equation 2, increases in spending on primary care is associated with a decrease in percentage of PCSV until this reduction is reset with expenditure per capita primary care (PC) reaches R$ 3,079.00 ((0.00379 / 6.15E-07)/2). The inflection points of the other variables can also be obtained with same calculation. We also observed negative coefficient for primary care and hospital care expenditure and a positive coefficient for health surveillance.

Table 1 help us understand the magnitude of the effect of variation of PCSV with the first derivatives (dy/dx) and elasticity (d(lny)/d(lnx)) of the independent variables on dependent variable. The variable sanitary surveillance expenses (SS), electricity coverage (En) and the proportion of pregnant women (Preg) have positive covariance with PCSV.

<table>
<thead>
<tr>
<th></th>
<th>dy/dx</th>
<th>Std.</th>
<th>Z</th>
<th>ey/ex</th>
<th>Std</th>
<th>Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>PC</td>
<td>-0.00354</td>
<td>0.00088</td>
<td>-4.02*</td>
<td>-0.01901</td>
<td>0.005146</td>
<td>-3.69*</td>
</tr>
<tr>
<td>HC</td>
<td>-0.00257</td>
<td>0.000673</td>
<td>-3.82*</td>
<td>-0.00852</td>
<td>0.002255</td>
<td>-3.78*</td>
</tr>
<tr>
<td>PS</td>
<td>-0.00937</td>
<td>0.003271</td>
<td>-2.87*</td>
<td>-0.00204</td>
<td>0.000761</td>
<td>-2.68*</td>
</tr>
<tr>
<td>SS</td>
<td>0.03455</td>
<td>0.015557</td>
<td>2.22**</td>
<td>0.00219</td>
<td>0.001239</td>
<td>1.77**</td>
</tr>
<tr>
<td>OR</td>
<td>-0.00166</td>
<td>0.000448</td>
<td>-3.34*</td>
<td>-0.00377</td>
<td>0.001268</td>
<td>-2.97*</td>
</tr>
<tr>
<td>Garb</td>
<td>-0.052973</td>
<td>0.01153</td>
<td>2.58*</td>
<td>-0.07008</td>
<td>0.027356</td>
<td>-2.56*</td>
</tr>
<tr>
<td>Ener</td>
<td>0.05222</td>
<td>0.014103</td>
<td>3.7*</td>
<td>0.16667</td>
<td>0.049960</td>
<td>3.71*</td>
</tr>
<tr>
<td>Preg</td>
<td>5.16E-05</td>
<td>9.62E-06</td>
<td>5.36*</td>
<td>0.00003</td>
<td>5.15E-06</td>
<td>5.44*</td>
</tr>
<tr>
<td>Eld</td>
<td>-0.026813</td>
<td>0.066654</td>
<td>-4.02*</td>
<td>-0.11920</td>
<td>0.029751</td>
<td>-4.01*</td>
</tr>
</tbody>
</table>

About expenditure on primary care (PC), Table 1 showed that the absolute marginal effect (first derivative) was -0.00354 (CI 95% -0.00526 to -0.00182), which leads us to infer that in the 10 years analyzed, municipalities need to increase, on average, R$ 282.50 (1/0.00354) per capita for an additional reduction of 1% in PCSV.

We interpreted the elasticity (dy/lny/d(lnx)) as a proportional change in the dependent and independent variables. It shows that for a proportional increase of 1% in PCSV variable a proportional increase would take 1% in primary health expenses. Despite not having the largest absolute marginal effect, spending on primary care has the greatest elasticity among other health expenses. On the other hand, Table 1 shows that the controlling variables have a greater impact on PCSV than the municipal health expenses.

Table 2 shows the descriptive analysis of the variables specified by Equation 2 that supports the interpretations for the coefficients of the equations. The PCSV average of 29% is quite similar to the averages found in Cardoso et al. (2013) and Alfradique et al. (2009). The intercept of the Equation 2 of our article also show an expected rate of approximately 30% of PCSV when all independent variables coefficients are zero. In addition to these variables shown in Table 2, we find that the municipalities have an average population of 20,988 inhabitants (median of 7963 inhabitants). The absolute PCSV average is 347 hospitalizations per residents in the municipality (median of 132 hospitalizations). The average GDP per capita at current prices of 2004 was R$ 10,394.00 (median of R$ 7,243.72) and per capita income of R$ 456.29 (median of R$ 429.70).

We can see in Table 2 the highest average of municipal spending on health is with primary care. This help us explains the importance of this expenditure for the organization of municipal health system and maybe an explanation why it has the largest elasticity among all health expenses. Average for primary care expenses was almost double hospitalization expenses and more than 30 times higher than expenses with prophylactic support (PS) and sanitary surveillance (SS). Table 2 also shows that primary care was the only expense that has no minimum equal 0 between municipalities. This shows that every year, all municipalities allocated financial resources in primary care but other health expenditures.

About the controlling variables, we observed that on average about 68% of households have garbage collection and more than 92% have electricity. Among individuals relevant to primary care demand, on average, 15% correspond to pregnant women and 13% elderly. Only these two groups account for almost 27% of people accompanied by the Family Health Team in municipalities.
In order to answer the third question posed in the introduction of the article, we found a significant interaction between spending on primary care (PC) and two binary variables created to represent the period before and after the National Primary Care Policy (PNAB) in 2006 and 2011. We found that municipal expenses have no significant interaction with dummies but primary health care expenditure (Equation 3 and 4).

$$f(ICSAP) = \left(30.60T55 + -0.0028PC + 6.15e-07PC2 + (51.01\times t - 4.03\times t + 3.26) + -0.0096PNAB2006\#PC + t,217 + -0.002HC,3.24e-07HC2 + -0.009PS,0.035SS + t - 3.80 + t,291 + -0.009PS,0.035SS + t - 2.87 + t,224 + -0.002SS2 + -0.010OE + -0.029Garb + t - 2.51 + t,3.34 + t - 2.58 + 0.052Ener + 0.0005Preg + -0.2681Eld + t,3.70 + t,5.36 + t - 4.02 + u_t + \delta_t \right) \text{ Equation 3}$$

$$f(ICSAP) = \left(30.60T55 + -0.00356PC + 6.15e-07PC2 + (51.01\times t - 4.03\times t + 3.26) + -0.00073PNAB2011\#PC + t,217 + -0.002HC,3.24e-07HC2 + -0.009PS,0.035SS + t - 3.80 + t,291 + -0.009PS,0.035SS + t - 2.87 + t,224 + -0.002SS2 + -0.010OE + -0.029Garb + t - 2.51 + t,3.34 + t - 2.58 + 0.052Ener + 0.0005Preg + -0.2681Eld + t,3.70 + t,5.36 + t - 4.02 + u_t + \delta_t \right) \text{ Equation 4}$$
Table 3 shows that after the years of 2006 and 2011 we perceived increased marginal effect of primary care expenses. The effect before PNAB 2006 calculated in Equation 3 changed from 0.0026 to 0.00354 after 2006. This means that before 2006, municipalities would need an average of R$ 387.59 (1/0.00258) additional to cause a reduction of 1% in ICSAP, while this value was R$ 282.00 (1/0.00354) after 2006, showing a productivity gain for each Brazil Real invested. In the same direction, in Equation 4, we can see a larger marginal effect after 2011. Before 2011 it would take on average $287.00 (1/0.00348) and after 2011 this value would be $226.00 (1 / 0.00441), also showing a productivity gain. Similarly, there was an increase in elasticity followed by the average increase in spending on primary health care expenses.

**Discussion:**

The theoretical model proposed in Equation 1 enabled us support hypothesis that municipal health expenses have importance to variation in PCHS. These results are consistent with the findings of Alfradique et al. (2009), Fontenelle, 2011 and Cardoso et al. (2013) and others scholars. Our study showed that, on average, it is expected that 30% of PCHS in municipalities without the influence of the independent variables what is in line with Alfradique et al. (2009) and Cardoso et al. (2013).

Primary care was the biggest health expense and had the highest elasticity among health expenses. We can infer that, in average, municipalities would need a great increase in its health budget to continue achieving reductions in ICSAP index. We observed that besides primary care expenses, prophylactic support (PS) and other expenses (OE) are associated with the reduction of PCHS. In this sense, we infer that good hospital conditions can also impact the PCHS rates. In the same way, prophylactic support can contribute to the prevention and treatment of diseases, also contributing to the reduction of PCHS.

The diminishing marginal effect in some expenditure showed that the budget increase in health expenses is not guarantee of continuous reduction in PCHS. It would be necessary a large budget effort to observe reductions in PCHS throughout 2004–2013. Some alternative showed as alternatives to budget increase such as sanitation, infrastructure and attention to groups of individuals such as the elderly and pregnant women. Our theoretical models showed a higher size impact for controlling variables.

With respect to spending on primary care, municipalities would have to almost double its per capita spending for a unit percentage change in PCHS. This value is even higher for other expenses. For example, whereas the average expenditure with prophylactic support in the city was approximately R$ 6.00 per capita (Table 2), to observe a percentage reduction of 1% in PCHS, it would be necessary increase of approximately R$ 106.00 per capita (1/0.00937), which would require an increase of almost 17 times higher than the current situation. From a pragmatic view, we have observed that sanitation, infrastructure and a comprehensive care to specific group is a viable alternative to increasing health budget. These evidences support the search for efficiency of health public health spending according to Mendes (2012), given that the increase in expenditure would be the diversion of resources to other areas.

We observe an exception among municipal health expenditures. We found that an increase in sanitary surveillance spends is associated with increased in percentage of PCHS. Although we expected a similar result from other expenses, we believe that in sanitary surveillance management is more indirectly associated with the dependent variable of the model. So is a tradeoff of financial resource allocation. While primary care, hospital care and prophylactic support relate to care of humans, on the other hand, health surveillance activities turn to environmental sanitation and have indirect contact to individuals.

Regarding the control variables included in the equations, we observed that the theoretical variables for sanitation as the proportion of households with garbage collection (Garb) and electricity (Ener) were significant. The increase in garbage collection was related to reduction of the percentage of PCHS. With opposite effect, increasing the electricity household coverage was associated with increased percentage of PCHS. One possible inference between electricity and ICSAP, which makes sense with some statements of Alfradique et al. (2009) is that, generally, households with access to electricity are in urban areas with greater accessibility to health services, which consequently increases the demand levels for health services.

We also found an opposite effect to the two variables that theoretically represent the demand for primary care, as defined in Equation 1. Increasing the number of pregnant follows the increase of PCHS. In other hand, a higher percentage of elderly means in reducing PCHS. Historically, these two groups of individuals has been the focus of pacts for health activities. What we infer is that pregnant women require more services directly associated with the primary care sensitive conditions related to natural causes. With regard to the elderly, we found two assumptions. Despite the elderly need of care arising from primary care, the worsening of diseases of this group is generally associated with the incidence of chronic diseases that are not accounted for PCHS. Another assumption is that the focus given to these individuals, in the 10 years analyzed, has been effective in reducing PCHS but not for pregnant.

We suggest based on these results and assumptions made that municipal and health managers create public policies for sanitation and infrastructure when concern with primary care...
benefits. We have evidences that is inefficient a only increase in municipal spending dissociated to the controlling dimensions we presented.

Finally, this article argues evidences that PNAB 2006 and 2011 were important to improve the efficiency of allocation of public resources. Another fact that corroborates those inferences was all non-significant interactions of binary variables to other health expenses but primary care. That gives evidence that the recent health policies have been able to play an increased efficiency of municipal expenditure on health and health quality improvement.

Final Considerations:

We believe that the main contribution of this paper was to show importance of municipal health expenditures to PCSH variation. We deliberate more focus in the interpretation of primary care expenses coefficients in detriment of others expenses.

Through the theoretical model proposed in this paper, we found that spending on primary care (PC), hospital care (HC) and prophylactic support (PS) were associated with reduced percentage of PCSH. However, municipal and health managers should be aware that improvement of health conditions, focus on specific groups of individuals and redirecting the National Primary Health Care Policy might be alternatives instead of only increase healthf budgetary. In addition sanitation and infrastructure should be a main concern.

We hoped this paperhighlithed the importance that municipalities have in Brazilian health system to allocate financial resources as well as organize primary care. Considering that the resources for hospitalizations are largely from states and federal government, we can infer that the financial allocation of the municipalities might affect all Brazilian health budgetary.

Unlike expected, economic variables were not significant for the model. We believed that fixed effect model absorbed some socioeconomic disparities. Also we believe that our explanation about PCSH variation by this theoretical model might be analyzed with caution as some important variable can be out of the model. Another limitation is that we used aggregated data that can limit the knowledge about variability of some variables in the groups of PCSH and health expenses. We suggest subdividing dependent variable in its various groups of PCSH for future articles.

We also suggest for further articlesto analyze the contributions of municipal expenditures for the infrastructure of the municipal health system and for variation in primary care coverage. Moreover, we need more research about effects of the National Primary Care Policy over municipal health management.

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