

Strengthening Primary Health Care in the municipalities in the Metropolitan Region of Porto Alegre, Brazil, after the introduction of the *Mais Médicos* (More Doctors) Program: an inter-municipal comparison

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Abstract *This article aims to propose an adaptation of the methodology used by Starfield and Shy (2002) to assess the quality of health care in the municipalities which joined the Mais Médicos (More Doctors) Program. The indicators were adapted for each one of the nine criteria proposed in the methodology and were applied to medium and large municipalities in the Metropolitan Region of Porto Alegre before and after they were integrated in the Mais Médicos Program. In 2014, the municipalities were grouped into three groups according to their scores. An analysis concerning any correlations between the different group scores for the municipalities and the health indicators that were evaluated, did not reveal anything significant. However the averages of the evaluated indicators were better in the group of municipalities characterized through having the best APS scores. In relation to the income indicator, the highest amount of money spent per capita in health is related to the best APS performance in the municipalities. An adaption of this methodology may be able to provide a better understanding of the policies related to health care.*

Key words *Primary Health Care, Income Inequality and Health, Medical Provision, Evaluation of Health Systems*

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Introduction

Based on the objective of dealing with the lack of doctors in priority regions that work in SUS and to reduce regional inequalities in health care, the Federal Government set up the *Mais Médicos* (More Doctors) Program (hereafter PMM) in Brazil. This Program is part of a wider project aimed at improving the service given to users of the Brazilian National Health Service (hereafter SUS) that also involves: more investment in basic health centers, increasing the numbers of medical school vacancies to train more doctors and having more medical residencies to improve the quality of teaching for doctors in Brazil, all of which are directed towards Primary Health Care (hereafter APS)¹.

The metropolitan region of Porto Alegre is made up of 12 medium and large municipalities in the region, and has 31.6% of the state's population. Before the implementation of the PMM for primary health care, this area had one of the lowest coverages for doctors in the country, being 20.7% and two of the municipalities did not even have one designated medical team until 2012. The objective of this analysis was to use the criteria created by Starfield and Shy², which was used to compare the operational effectiveness of 13 primary health care centers in industrialized countries and then adapt and apply them to the 12 municipalities in the metropolitan region of Porto Alegre/RS. The purpose was to measure the characteristics of primary health care and their relations with the level of health care in the population before and after the implementation of PMM. 244 doctors were working in these areas in 2013.

According to Starfield, having a large number of doctors working in the primary health care network will: reduce the adverse effects of social inequality, increase the amount of doctors available in the primary health care network and increase the number of available specialists doctors. This will result in better health care indicators for the population³. In studies carried out in developed countries, the findings showed that good APS meant lower costs in the general health care system which in turn has a beneficial impact on the health of the population⁴. The adaption of this tool to evaluate the operational effectiveness of APS at a infra-national level, in this case, was relative since from the outset there were low coverage levels for APS and a high level of social vulnerability which was the reason why the PMM was implemented in the region. The proposal

was to use the aforementioned methodology as a starting point to make subsequent comparisons between the municipalities and regions and to search for the cutting off point for the score results that would mean an alteration in the quality of primary health care using the classic indicators such as: post-neonatal mortality rates, reductions in admissions and avoidable deaths.

Methods

The data used to assess the operational effectiveness of the APS in the municipalities took into account macro characteristics which are indicative of a Health System based on primary care. The characteristics of an APS service are not being considered in this paper as there are other studies that will provide this type of analysis using tools such as PCATool to do this.

The original criteria used to classify Health Systems guided by APS that was used by Starfield included: extending regulations for the health system from the perspective of APS, the type of APS professional, the percentage of active doctors that are specialists, APS doctors earnings in relation to specialists, a division of APS costs, the registration and list of patients, the existence of 24 hour service coverage and the importance of family health care being covered in medical school courses².

In order to classify the positions and states of APS for each municipality, a points based criteria was developed based on 8 characteristics of health systems. They were adapted for use at local levels in Brazilian municipalities. Each characteristic was given a numerical point from 0 (not having it or very poor performance in relation to this characteristic) to 2 (high level of development in this characteristic). A point of 1 was given where the development of the characteristic was considered to be moderate. All the points were added up and the averages were taken, in order to obtain the total scores for the primary health care networks in each municipality for 2012 covering the introduction of the PMM and then in 2014 after the program was implemented (Table 1).

The indicators that were adapted for each of the 8 criterion are below:

Criterion 1: Coverage of Family Health Strategy. In order to characterize the regulation of the municipal health system through APS, the population ought to access the health system services from the services or professionals in APS. This criterion takes into account the population cov-

Table 1. Scores covering the characteristics of the Health System related to the operational effectiveness of the primary health care network and total scores, 2012 and 2014.

Criteria Year	1		2		3		4		5	
	2012	2014	2012	2014	2012	2014	2012	2014	2012	2014
Alvorada	1	1	0	0	1	1	1	1	1	1
Cachoeirinha	0	1	0	0	0	0	0	0	1	1
Canoas	0	1	1	2	0	1	1	1	1	2
Esteio	0	1	0	0	0	1	2	2	1	1
Gravataí	0	1	0	1	1	2	1	1	2	2
Guaíba	0	0	0	0	0	0	0	0	1	1
Novo Hamburgo	0	1	1	1	1	2	1	1	1	2
Porto Alegre	0	1	1	1	1	1	0	0	1	2
Sapiranga	0	0	0	0	0	2	1	1	0	1
Sapucaia do Sul	0	1	0	1	1	2	2	2	1	1
São Leopoldo	0	0	1	1	0	1	1	1	1	1
Viamão	0	0	0	0	0	2	1	2	0	1

Criteria Year	6		7		8		Score	Score
	2012	2014	2012	2014	2012	2014	2012	2014
Alvorada	0	1	0	0	0	0	2,5	3,1
Cachoeirinha	0	1	1	1	0	1	1,2	3,1
Canoas	2	2	2	2	1	2	5	8,1
Esteio	0	1	0	0	1	1	2,5	4,3
Gravataí	2	2	2	2	1	1	5,6	7,5
Guaíba	1	1	0	0	0	0	1,2	1,2
Novo Hamburgo	2	2	2	2	0	2	5	8,1
Porto Alegre	2	2	2	2	1	2	5	6,8
Sapiranga	0	1	0	0	0	1	0,6	3,7
Sapucaia do Sul	2	2	2	2	1	2	5,6	8,1
São Leopoldo	1	1	0	2	0	2	2,5	5,6
Viamão	0	1	1	2	0	1	1,2	5,6

1. Type of System; 2. Financing; 3. Type of APS Professional; 4. Percentage of specialists doctors; 5. co-payment by patients in the primary health care network; 6. Register and/or list of patients; 7. coverage 24 hours and 8, The strength of the academic departments in Family Medicine.

erage for Family Health (between 0 and 40% = 0, between 41 and 60% = 1 and above 60% = 2).

Criterion 2: Public resources per capita. This criterion deals with financing in the health system in Brazil which is a mix system with part of the population being catered for by the private sector whilst the majority rely on financing from tax revenues, which leaves the system underfunded. For the financing score we used the figure of expenditure per capita in health. We then discounted all those from the population who were served through supplementary health. If it was less than R\$ 500.00 = 0, between R\$ 501.00 and 1,000.00 = 1, and more than R\$ 1,000.00 = 2.

Criterion 3: Type of APS Professional. According to the data from the National Register of Health Establishments, the following doctors needed to be considered: doctors from APS, doc-

tors from the health strategy for families and family/community health center doctors. The scores were given based on the ratio of doctors per inhabitant compared with the total amount of doctors in outpatient units in the municipality. Ratios considered less than 0.1 = 0, between 0.15 to 0.29 = 1 and > 0.3 = 2.

Criterion 4: Percentage of active doctors that were specialists. The number of specialists were considered to be all those other doctors in the APS, outpatients units and policlinics taken from the total amount of general practitioners in the aforementioned medical areas. Above 70% = 0, from 51 to 69% = 1 and < 50% = 2.

Criterion 5: Co-payment in APS. This criterion entered into the scores as it substituted the salary relations of APS doctors and specialists doctors because we did not have any sources of

information to undertake these calculations. In the Brazilian model of primary health care there is, in theory, no co-payment for services. However, due to low investment in health care in some municipalities, patients often have to pay from their own pockets for essential medication. In order to evaluate co-payment, we used the per capita value of pharmaceutical assistance to get an idea of the expenditure from peoples own pockets. If the expenditure *per capita*, taking into account Pharmaceutical Assistance was less than R\$ 5.00 = 0, from R\$ 5.1 to 10.00 = 1 and greater than 10 = 2⁵.

Criterion 6: List and register of the patients. We considered having a defined area according to the information from the Supervision of the PMM Report whose sources were tutors from the municipalities. No area defined = 0, having an area that was defined and registered with a number of inhabitants greater than desired for doctors/team = 1 and having a defined and registered population and an information system = 2.

Criterion 7: Coverage 24 hours. We considered whether there were excellent Accident and Emergency (A & E) and Primary Health Care Units in the municipalities. If there were no 24 hour services in the municipality = 0. If the general hospitals covered A & E and primary health care services but this coverage was insufficient for the entire population in the municipality = 1. If there were decentralized emergency services and other important services were decentralized with reference to the use of APS teams = 2.

Criterion 8: Medical Schools with Departments/Professors from the area of Family and Community Health Care (hereafter MFC). This criterion was included due to its importance and evidence obtained in other contexts⁶. If there were no medical school students in the APS = 0. If there were experiences of students having worked in APS units in the municipalities becoming professionals = 1. If there were obvious examples of those becoming qualified in MFC at Universities using the municipal services as an area for becoming medically qualified = 2.

The purpose was to evaluate the relation between income inequalities and the levels of health amongst the different municipalities. The idea was that reductions in inequalities would be the prerequisite for the allocation of doctors in the poorest municipalities as the distribution of income was based on the Gini Coefficient for 2010⁷. All of the expenditure was used on health and the spending per capita was on health care in the municipalities⁸. In relation to the health in-

dicators, the low weight at birth was used as well as: the infant mortality rates, the rate of avoidable mortalities in those less than 5 years old, the rate of premature mortality for those with chronic, transmissible diseases for those who were between 30 and 69 years old and the rate of mortality due to External Causes. Information on the rate of admissions for sensitive conditions for APS was considered. All of the above was obtained from the Health Ministry's Information System⁹.

Pearson's correlation coefficient was used to measure the inter-correlations between the effectiveness scores for the primary health care networks and the distribution of expenditure in health. Also Spearman's correlation was used to measure the relation between APS rankings in the municipalities and the health indicators. The level of significance was determined as $p < 0.05$.

Results

In Table 1 are the score figures for each criterion and the total scores for 2012 covering before the PMM and 2014 after the PMM was implemented. We noted that before the PMM the scores were very low in these municipalities, where only two groups had been formed. The average total scores were 1.8 amongst 7 municipalities and 5.2 in the other 5 municipalities giving a total of 16 points. Later in 2014 the municipalities could be grouped into three groups with average scores being 3, 5.6 and 7.7. The improvements in the scores were principally due to: the increase in coverage of Family Health (criterion 1), a greater amount of doctors in APS (criterion 2), an increase in spending in pharmaceutical assistance (criterion 5), the demarcation of the population to receive APS services (criterion 6) and widening the services network through Accident and Emergency units (criterion 7). This was similar to what occurred in the medical schools with increases in residencies in MFC and using APS services in the municipalities for training those in the medical profession (criterion 8).

Table 2 shows the final scores based on the criteria used to evaluate the operational effectiveness of the primary health care network in the municipalities that were analyzed one year after the arrival of the first and second phases of the *Mais Médicos* Program in 2014. The municipalities were grouped into three similar groups in relation to the results of the final scores and covering expenditure per capita on health in

these municipalities in 2014. Gini's coefficient was used corresponding to the year 2010 and the Gross Domestic Product per capita for the year 2012.

In Figure 1 we noted that spending values per capita that are very low, were associated with the municipalities with the worse APS scores. The highest amount of spending per capita in health is related to the best APS performances ($r = 0.74$, $p < 0.001$) in these municipalities. This is in accordance with the last studies in relation to European countries which showed a direct correlation between good primary health care and the health of the population. This resulted in fewer unnecessary hospitalizations and relatively low socioeconomic inequalities. Overall spending on health care was higher in the countries with the best APS structures¹⁰.

An analysis of the correlations between the three different groups of scores from the municipalities and the health indicators that were evaluated did not show anything significant. However, as can be seen in the Table 3, the percentage indicators for: low weight at birth, infant mortality rates, rates of premature deaths by DCNT and the rates of ICSAP are better in municipalities with good scores. The averages in the indicators that were evaluated were better in

the municipality groups characterized by having better APS scores compared with the groups having the worse scores for avoidable mortalities for the under 5s.

Our analysis did not show anything significant when we analyzed the differences between the municipality groups and the results of the

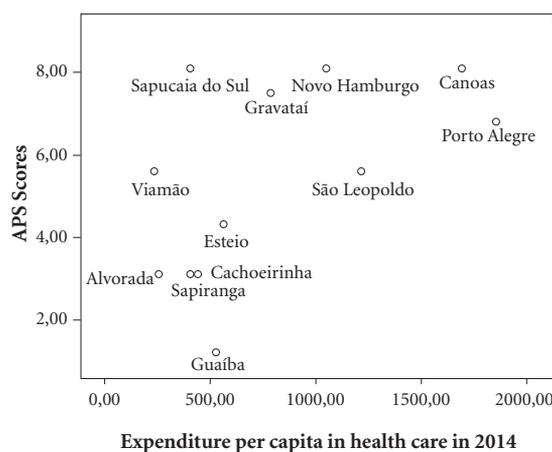


Figure 1. Scores for the Primary Health Care Network à Health and Expenditure per capita in Health, 2014.

Table 2. Municipalities grouped by APS scores and economic indicators: Expenditure *per capita* in health, GDP *per capita* and Gini Coefficient*.

The Primary Health Care Scores	Total Scores 2014	Expenditure <i>pc</i> in Health (R\$)	Gini coefficient	GDP <i>per capita</i> R\$
Low APS Scores				
Alvorada	3.1	261.70	0.44	8.599
Cachoeirinha	3.1	436.73	0.44	37.455
Esteio	4.3	563.74	0.48	33.491
Guaíba	1.2	526.02	0.47	27.709
Sapiranga	3.1	412.89	0.41	19.535
Intermediate APS Scores				
Viamão	5.6	237.30	0.48	10.410
São Leopoldo	5.6	1,217.39	0.53	21.049
The Highest APS Scores				
Canoas	8.1	1,689.33	0.51	45.501
Gravataí	7.5	787.87	0.45	26.767
Novo Hamburgo	8.1	1,046.82	0.53	24.385
Porto Alegre	6.8	1,854.30	0.61	33.883
Sapucaia do Sul	8.1	405.57	0.45	18.000

Source: The Reality Observatory and the Public Policies of the Vale do Rio in Sinos-Sinos observed; <http://www.fns.saude.gov.br/>; <http://siops-asp.datasus.gov.br/cgi/siops/serhist/MUNICIPIO/indicadores.HTM>

* Gini Coefficient the level of concentration of income in specific population groups varies 0 to 1 where 0 is the total distribution of income (everyone in the population that have the same income) and 1 means the total concentration of income (only one person has an income).

Table 3. Averages for the Indicators of children's health, mortality for Chronic non-transmissible Diseases in adults between the ages of 30 and 69 years old, mortality rate due to external causes and rates of Hospital Admissions for ambulatory care sensitive conditions in the Primary Health Care Network, for municipalities grouped by their APS scores.

The Primary Health Care Scores	% BPN	MI Rate	Rate of Avoidable Deaths <5 years	Rate of Premature Deaths DCNT	Death Rate External Causes	Rate of ICSAP
Baixo Escore	9.02	10.54	10.69	410.03	429.63	28.02
Alvorada	8.98	9.80	11.3	465.31	468.14	30.85
Cachoeirinha	8.74	10.45	6.72	370.19	406.42	22.96
Esteio	8.22	13.40	9.83	389.62	445.32	34.91
Guaíba	9.49	9.60	10.38	465.60	477.63	27.69
Sapiranga	9.70	9.47	15.26	359.87	350.67	23.7
Médio Escore	9.82	10.45	9.43	443.22	373.19	26.26
São Leopoldo	9.77	12.29	8.09	348.55	422.12	23.48
Viamão	9.87	8.79	10.78	397.84	464.32	29.04
Maior Escore	8.56	9.12	12.23	436.64	393.63	24.44
Canoas	8.22	10.30	10.87	431.22	469.61	26.03
Gravataí	8.52	7.52	9.47	412.27	428.63	18.33
Novo Hamburgo	8.66	9.45	11.03	353.06	418.98	21.91
Porto Alegre	9.26	9.47	11.50	371.23	415.00	31.94
Sapucaia do Sul	8.15	8.89	18.30	400.38	451.00	24.02

Source: MS/SVS/DASIS. Information System on those born alive. Information System on mortality. Datasus.gov.br/Indicadores de Saúde.

health indicators. Nevertheless one can see a tendency where the best APS scores are associated with the best health indicators.

Discussion

20 years ago there was the creation of the Brazilian APS model that we know as Family Health in the metropolitan region of Porto Alegre which covers 40% of the population in the state of Rio Grande do Sul. At this time it started with the development of an organized health care system based around primary health care for the population. Innumerable international studies have shown that better health indicators in health care systems occur where they are based on the guiding force of APS. The studies have shown better cost benefits even in regions with high levels of inequalities^{11,12}. This was not the case in the region that we studied. The program for bringing in more doctors to work in APS services in the state of RS which started in 2012 with PROVAB and then in 2013 with the PMM, brought to light the needs of the municipalities that were either starting to or continuing in reforming their health systems through bolstering their APS. The PMM has clearly shown the need for more doctors in the country particularly in the munic-

ipalities with the lowest rates of doctors per inhabitant where there is extreme poverty and high necessity rates for health care. There was a reduction by 53.5% in the number of municipalities with a scarcity of health care¹³⁻¹⁵ professionals in the year after the program was launched¹⁵. It also brought to light the deficiencies in the infrastructure and the organization of the services geared towards meeting the needs of the population.

When we analyzed the municipalities in RM in Porto Alegre, the results from the indicators suggested different stages in the organization of primary health care even though they were in no way significant when we also analyzed the differences between the municipality groups. This was because the intermediate stages values were very close to those that had low scores. In the municipalities with lower populations linked to APS, the indicators were worse, whereas the municipalities with relatively stable access to APS showed better scores and better health indicator results.

There were some potential limitations with this type of analysis. These include: using indicators that only cover one year after the implementation of the PMM, subjectively analyzing the score criteria, the use of secondary data that may be limited with reference to what they register (or not showing results that we had not found) and a lack of specific indicators that measures the ef-

fectiveness of the APS services where the doctors were placed. Out of indicators that are normally used to evaluate health care systems only some of them reflected good primary health care, which was the case for post-neonatal mortality rates. These rates could not be analyzed in detail this study as the data from the Mortality System was not available for the year 2014.

In relation to the financing criterion, areas designated for cuts were underestimated if we consider what is adequate financing for APS based on international examples or using good examples from Brazil. In large municipalities that had the groups with the best scores, financing of APS competed with financing of other specialties in the large third party hospitals and A & E units. We suggest that expenditure per capita in primary health care in relation to any remaining expenditure should be done in subsequent evaluations. Bearing in mind the criteria in the current scenario for the evaluated municipalities, they would have scored better for diagnosis, admissions and emergency services as nearly all of the spending in these services in these areas would be covered in primary health care (as is the case for Cachoeirinha and Esteio).

Including analysis of the health care system indicators for income (GDP per capita and spending per capita in health) and inequalities (Gini rates), they reinforce the importance in using these indicators in any analysis on the evaluation of health systems. The majority of municipalities with a Gini rate of 0.4 that were not a part of the group with the lowest APS scores, showed low income inequalities, however, due to the GDP per capita the other rates were also very low. In other words, low rates do not necessarily mean that these municipalities showed good economic development. There was a lack of any correlations when the municipalities were considered to be very poor performers. The importance of this aspect in our analysis is that the PMM with Federal funding for these municipalities took the onus from the municipalities to spend in health care which is important. Where there are economic crises, one can infer that the absence of this program would leave the municipalities even more vulnerable in relation to access to medical care and for having good health care outcomes for the wider population. Subsequent studies in this area should look at the impacts of the above, comparing these municipalities with others that do not have the program and which have similar economic vulnerabilities.

In the context of the PMM which Brazil intends to fully introduce through APS in the municipalities, it is important to focus on the aspects in the health care systems that are more related to the best health care results for the population. If, in other studies in different countries, the operational effectiveness of the APS is related to how much is spent in health care, this study has demonstrated that a minimum spending threshold exists that needs to be surpassed in order to obtain better indicators. Out of the 8 characteristics that we evaluated, upon using the original study from the OECD, three of them made a difference in countries showing low scores for APS in two areas: universal financing/the equitable distribution of resources and the absence of payment by users of the APS services. We can therefore use this data that is available, which is important, in order to establish priorities and implement necessary changes.

The health services can contribute to reducing inequalities in health care^{10,11} particularly when these services are needed in shaping the primary health care networks in the municipalities. It is therefore necessary to use a methodology that monitors these scores with the inclusion of other indicators that are more specific for APS services in order to evaluate to what extent the municipalities are following the APS.

The creation of a methodology that permits comparisons between and inside of municipalities over a period of time, in spite of their limitations, have become fundamental in demonstrating the importance of continuity in investments for the achieving of better organized APS services and the coordination of primary health care networks for the population. This is principally in the context of major social inequalities as is the case in the metropolitan region of Porto Alegre.

Collaborations

CS Mendonça participated in coming up with the idea for this paper as well as the methodology that was used and drafting the final version. L Kopitke participated in designing and completing the database and obtaining information for this study. MS Diercks reviewed the final version of this paper.

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