MORE DOCTORS PROGRAM: AN ANALYSIS OF THE COVERAGE AND RETENTION OF PROFESSIONALS[1]

Mariana Silva Siqueira[2], Victoria Martins Mendes[3], Carina Silva de Freitas[4], Luis Felipe Marinho Costa[5], Jamile Pereira Dias dos Anjos[6], Kênia Souto Moreira[7], Silvio Ferreira Júnior[8] and Evandro Barbosa dos Anjos[9]

ABSTRACT

The More Doctors Program (PMM) was created to address inequality in access to healthcare, especially in remote and vulnerable areas of Brazil, by attracting and retaining doctors through financial incentives, improvements in working conditions, and support for professional development. This study aims to analyze the effectiveness of the PMM in overcoming the challenges of medical coverage in the North of Minas Gerais.

Keywords: More Doctors Program, Health Inequality.

INTRODUCTION

Inequality in access to health services, especially in remote and socially vulnerable areas, is a persistent and widely recognized problem in Brazil's public health policies. This inequality is strongly associated with the difficulty in attracting and retaining health professionals, especially doctors, in regions far from large urban centers. The shortage of professionals in such locations limits access to health and compromises the quality of the services offered, deepening disparities and limiting the reach of a universal and equitable health system (Stralen *et al.*, 2017).

Previous studies suggest that the permanence of physicians in vulnerable areas is influenced by a series of factors, ranging from financial incentives and work structure to emotional issues and belonging to the place of practice (Campos & Malik, 2008). The literature points out that working conditions and professional development opportunities also play a decisive role in retaining these professionals, since many face not only the lack

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[2]Funorte University Center – MG
[3]Funorte University Center – MG
[4]State University of Montes Claros – MG
[5]State University of Montes Claros – MG
[6]State University of Montes Claros – MG
[7]State University of Montes Claros – MG
[8]João Pinheiro Foundation – MG
[9]State University of Montes Claros – MG

of equipment and infrastructure, but also limitations regarding technical support and the possibility of continuous growth (Oliveira *et al*., 2017).

In this context, the More Doctors Program (PMM) emerged in 2013 due to a growing demand from Brazilians to have universal health coverage. Universal health coverage is a scientific concept that refers to a health system that aims to ensure that all people have access to essential and quality health services, without financial or geographic discrimination, all based on the health need indices of each population (Kemper *et al.*, 2018).

Therefore, the PMM is an important strategy to address the gap related to the shortage of doctors in remote and vulnerable areas, through actions aimed not only at increasing the supply of doctors, but also at strengthening policies to attract and retain these professionals in vulnerable areas. The program incorporates, in an innovative way, elements such as financial incentives, improvements in the infrastructure of health units and support for training and continuous professional development, with the aim of making the work environment in these regions more attractive and sustainable (Girardi *et al.*, 2016).

FACTORS FOR ATTRACTING AND RETAINING HUMAN RESOURCES IN HEALTH

The attraction and retention of health professionals in specific areas, especially in regions of difficult access or in contexts of social vulnerability, are multifaceted processes, influenced by a range of financial and non-financial factors. The scientific literature, both nationally and internationally, addresses this topic in a comprehensive way, highlighting, among other aspects, the relevance of public policies, working conditions, financial incentives, and social variables that impact the permanence of these professionals in more remote locations (Stralen *et al*., 2017).

In this sense, several studies have explored the complexity of these factors and their interrelationships, providing a deeper understanding of the challenges and the most effective strategies for attracting and retaining these professionals. The main factors identified are presented below:

Working Conditions

- Infrastructure and resources: The adequacy of facilities and accessibility to health equipment and supplies play a crucial role in the permanence of health professionals. In regions with inadequate infrastructure, retention becomes significantly more difficult (Stralen *et al*., 2017).

- Autonomy and organization of work: Environments in which professionals enjoy autonomy in their activities and in which the work structure is clear and efficient tend to promote greater satisfaction and, consequently, the retention of these professionals (Stralen *et al*., 2017).

Financial Incentives

- Salaries and benefits: The offer of attractive remuneration, accompanied by benefits such as bonuses, subsidized housing and additional compensation for working in hard-to-reach regions, is a key factor in attracting and retaining health professionals (Stralen *et al*., 2017).

Professional Development

- Continuing education: Regions that offer continuing education programs tend to attract more professionals, as they provide opportunities for development and improvement in the professional trajectory, stimulating growth and specialization over time (Stralen *et al*., 2017).

Quality of Life

- Housing conditions and social life: The quality of life outside the work environment, encompassing aspects such as housing, access to education for children and leisure options, has a significant impact on the retention of professionals, as it influences their satisfaction and general well-being, essential factors for staying in a given region (Stralen *et al*., 2017).

Institutional Support and Leadership

- Work environment and institutional support: Effective leadership, adequate administrative support, and harmonious interpersonal relationships among team members are crucial elements for the retention of professionals, as they contribute to a collaborative and motivating work environment, which favors satisfaction and stability in the profession (Stralen *et al*., 2017).

Community Integration

- Acceptance and support from the community: Professionals who perceive their work as valued and who feel integrated into the communities in which they work demonstrate a greater propensity to stay in the region, since the sense of belonging

and the recognition of the social impact of their actions contribute significantly to their professional satisfaction and stability in the position (Stralen *et al*., 2017).

THE MORE DOCTORS PROGRAM

The PMM was implemented in July 2013 through Provisional Measure No. 621, later converted into Law No. 12,871/2013, in a context of political instability and popular demonstrations throughout Brazil. These demonstrations had as one of their main demands the improvement of health conditions. For a large part of the population, that was the first contact with the PMM's proposals, which aimed to increase the number of doctors in Primary Health Care (PHC) to reduce regional inequalities in the distribution of human resources, with the help of foreign professionals. In addition, the program proposed to expand vacancies and courses in Medicine, especially in areas where there were no colleges, and to work on the medical education axis with professionals in activity, through specialization in Family and Community Medicine and supervision carried out by professors linked to higher education institutions called academic supervisors (Telles, Silva, Bastos, 2019; Brazil, 2013).

Brazil had an insufficient number of doctors per inhabitant, considering an internationally acceptable minimum standard, in addition to an unequal distribution of professionals throughout the territory. The difficulty in attracting and keeping doctors in regions with greater health needs and the perception that the lack of medical care was one of the main problems of the Unified Health System (SUS) evidenced the urgency of coping measures (Campos, Junior, 2016).

In addition to the recognition of the PMM, as a measure of professional supply, especially in areas with such deficiencies, it is essential to consider their time of operation. It is known that the physicians who participate in the program have a four-year contract, extendable for the same period (Brasil, 2013). The prolonged permanence of the professional in the team is crucial for the creation of bonds with the population and for the work based on the principles of territoriality and longitudinality of care (Starfield, 2002).

The difficulty of access to PHC affects a large part of remote and vulnerable regions, mainly due to the difficulty of attracting and retaining doctors. The PMM seeks to combat this reality by ensuring the presence of complete teams and promoting access and equity in health services, especially in regions with high professional turnover and among historically marginalized populations. In this way, the PMM aims to contribute to the reduction of inequalities by serving municipalities with low doctor/inhabitant ratios, high social vulnerability and greater health needs (Molina; Tasca; Suárez, 2016).

OBJECTIVE

This article seeks to analyze the performance of the PMM in overcoming the challenges related to the coverage and retention of physicians in vulnerable areas of the North of the State of Minas Gerais, discussing how the factors identified in the literature can contribute to a more inclusive and egalitarian health system.

METHODOLOGY

ANALYTICAL MODEL

In general terms, the empirical approach sought to analyze the dynamics of physician coverage in PHC in the municipalities of the northern health region of Minas Gerais between the years 2014 and 2019. The year 2014 was chosen as the initial period because it corresponds to the first year after the creation of the PMM, while 2019 represents the last year before the Covid-19 pandemic. Thus, the period included in the analysis corresponds to the years of validity of the PMM without considering the untimely impacts of a pandemic.

The regression model adopted corresponds to the following general representation.

$$\ln MEDi.19MEDi.14 = 0 + 1.\ln MEDi.14 + 2.PMMi + 3.\ln INSi.10 + \beta 4.\ PoloMicroi + \varepsilon i$$

where:

- ln MEDi.19MEDi.14 indicates the growth rate of physician coverage in PHC in municipality i, between 2014 and 2019;
- ln MEDi.14 represents the coverage of physicians in PHC in municipality i, in 2014, the beginning of the analysis period;
- PMMi is a binary variable that allows discriminating those municipalities that were adhering to the PMM in the period of analysis;
- ln INSi.10 is the index of health needs of the population of municipality i, for the census year of 2010;
- PoloMicroi is a binary variable that allows discriminating those municipalities that act as micro-regional health centers.
- *i = 1*, ..., *n* represents each of the *n* municipalities in the analysis (n = 86); β0.... β4 are the parameters to be obtained by adjusting the regression by the method of ordinary least squares (M.Q.O.); and
- εiit are the error terms, with the usual statistical assumptions of models adjusted by M.Q.O. (Gujarati, 2011).

The municipal coverage of physicians in 2014 (MEDi.14) corresponds to the monthly average of physicians available in PHC, for every 3 thousand residents, estimated for 2014. Physicians available to the SUS in the 3 primary specialties were considered, according to the criteria suggested in Girardes et al. (2016): (1) allopathic clinicians or generalists, (2) family health physicians or community physicians, and (3) pediatricians, hebiatricians, and neonatologists. An analogous interpretation applies to the coverage of physicians in 2019. 10

In turn, the growth rate of physician coverage between 2014 and 2019, ln MEDi.19MEDi.14, represents the percentage variation between the average monthly quantities (for every 3 thousand inhabitants) observed in the two years. The monthly number of physicians in the municipalities was obtained from the National Registry of Health Establishments (CNES), while the total estimated resident population was obtained from the IBGE website.

As for the health needs index (INSi.10), we used the database obtained from the study by Ferreira Júnior et al. (2017), who proposed and estimated the health needs indices of the municipalities of Minas Gerais, based on the literature on social determinants of health (SDH), and using census data from 2010, available on the DataSUS website.11

The PMMi variable was constructed in such a way as to assume a value of 1 (one) when the municipality was adhering to the PMM during the period of analysis, and a value of zero, otherwise. This variable seeks to capture the net effect of the set of actions concerning the program on the provision of doctors in PHC.

In turn, the PoloMicroi variable was constructed in such a way as to assume a value of 1 (one) in the case in which the municipality acts as the center of the health micro-region to which it belongs, and a value of zero, otherwise. This variable acts as a proxy for a set of socioeconomic, cultural and institutional characteristics of the municipality, which interact in a combined way as a force of attraction and fixation of human resources in health (working conditions related to infrastructure and resources, quality of life related to the

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[10] The population coverage parameter of Technical Note https://egestorab.saude.gov.br/paginas/acessoPublico/relatorios/nota_tecnica/nota_tecnica_relatorio_de_cobertura_AB.pdf was used.

[11] It consists of a multivariate index that considers socioeconomic, demographic, and epidemiological aspects of the municipality, whose selection was based on the literature on the social determinants of health (Ferreira Júnior et al., 2017). The indices of that study were estimated by the factor analysis technique, so that their values are expressed in units of standard deviation and are distributed around the mean zero. In this case, in order to be used satisfactorily in the model expressed by Equation 1, the indices obtained from the study by Ferreira Júnior et al. (2017) underwent a linear transformation (INS_i _ INSmínimo + 1) in such a way that all their values started to have a positive sign without, however, changing the distances between the observed values.

socioeconomic conditions of the municipality, among other factors mentioned in the literature), but that are not directly contemplated in the range of actions of the PMM.

With the exception of the PMMi and PoloMicroi variables, the others were expressed by their natural logarithms (ln), as a way to improve the fit of the model and facilitate its statistical interpretation.

As for the expected signals for the parameters of the regression equation, a possible negative relationship ($\beta 1 < 0$) between the growth rate of physician coverage and the preexisting coverage in 2014 (beginning of the analysis period) indicates a trend of convergence or approximation in physician coverage among the municipalities of Minas Gerais over time. In other words, in this case, it is possible to say that inter-municipal disparities would be decreasing over time, regardless of other factors that may also be contributing to the growth in coverage, such as actions concerning the PMM.

In turn, a positive relationship between the growth rate of physician coverage and the variable "PMMi" ($\beta 2 > 0$) would indicate that the PMM has contributed positively to increase the growth rate of physician coverage in PHC in the benefited municipalities, compared to those that did not adhere to the program.

Regarding the levels of municipal health needs (INSi.10), a positive relationship between this variable and the growth rate of physician coverage ($\beta 3 > 0$) would indicate that the municipalities with the highest indices of needs are those that have presented the highest growth rates in physician coverage, regardless of the actions within the scope of the PMM.

Finally, a possible positive relationship between this PoloMicroi variable and the growth rate of physician coverage ($\beta 4 > 0$) would be corroborating the arguments of the relevant literature, that the factors related to the attraction and retention of health professionals in a given location involve aspects of both the working conditions to which they are willing to submit, as well as involving the socioeconomic profile of the municipalities, among other municipal characteristics.

DEVELOPMENT

The descriptive statistics presented in Table 1 consolidate the behavior of the coverage of physicians in PHC in the municipalities of the health region of Northern Minas Gerais, in the years 2014 and 2019, as well as its variation between these two years. The results indicate that the average coverage rose from 1.44 to 1.49, while the median rose from 1.39 to 1.45 doctors per 3 thousand inhabitants. On average, coverage grew 10.48

between 2014 and 2019, while the median growth was 1.10%, indicating that half of the municipalities grew above this value.

Table 1 - Municipal coverage of physicians in PHC in the municipalities of the North health region in the state of Minas Gerais - 2014 and 2019[12]

Statistics	2014	2019	Growth in municipal coverage (%)[13]
Average	1,44	1,49	10,48
Median	1,39	1,45	1,10
Standard deviation	0,47	0,66	48,63
Coefficient of Variation (%)[14]	33,0	44,0	464,1
Minimum Value	0,30	0,30	-79,98
Maximum Value	3,90	4,50	191,21
Number of municipalities	86	86	86
Quartis: Q1	1,14	1,00	-26,80
Q2	1,39	1,45	1,10
Q3	1,66	1,86	43,91

Source: Survey results.

Regarding the coefficient of variation, the results indicate that the municipalities of the North region have become more heterogeneous in terms of the coverage of physicians. While in 2014, municipal coverage was dispersed around the average at 33%, in 2019, the dispersion increased to 44%. This finding, associated with a coefficient of variation of 464.1% for growth rates, suggests a dynamic in which the coverage of physicians among the municipalities of the region has become more heterogeneous, despite the average growth of 10.48% in this coverage. This dynamic, however, translates the total net effect of the conjunction of several factors. As will be analyzed later, the regression model represented by Equation 1 made it possible to evaluate the growth dynamics of coverage rates, when controlled by some of its determinant variables.

Regarding the minimum values, the results in Table 1 show that the lowest coverage observed remained at 0.30 physicians per 3 thousand inhabitants in the two years of the analysis, and that it corresponds to only 30% of the minimum recommended coverage, that is, one physician for every 3 thousand inhabitants. Regarding the growth rate of municipal coverage, the minimum value observed reveals that there was a municipality that presented a decrease of 79.98% in its coverage of doctors in PHC.

In turn, the maximum values indicate that the municipalities with the highest coverage in 2014 and 2019 were 3.9 and 4.5 doctors per 3 thousand inhabitants,

[12] It was decided to use the number of doctors available to the SUS, in the primary specialties, for every 3 thousand inhabitants.
[13] Calculated for each of the 86 municipalities in the northern health region of Minas Gerais, the growth in the coverage of doctors in PHC is calculated by the percentage difference between the average monthly coverage of doctors (for every 3 thousand inhabitants) in the years 2014 and 2019.
[14] It corresponds to the ratio between the standard deviation and the mean, with the result multiplied by 100.

respectively, while the municipality that grew the most in its coverage between 2014 and 2019 showed a growth of 191.21%.

Also, in Table 1, the quartiles (Q1, Q2 and Q3) allow the municipalities of Minas Gerais to be divided into four equal parts, ordered in ascending order of the observed values. Thus, it is possible to see that, in 2014 and 2019, 1/4 of the municipalities had coverage below 1.14 and 1.00 doctors per 3 thousand inhabitants, while another 25% had coverage that exceeded 1.66 and 1.86 doctors per 3 thousand inhabitants, respectively. Regarding the growth rate, quartile Q1 shows that 25% of the municipalities showed a reduction in their coverage (reductions between 79.98% and 26.80%), while another 25% of the municipalities showed growth that exceeded 43.91%.

Table 2 presents the results of the regression model used to analyze the dynamics of the growth rates of physician coverage in PHC in the municipalities of the northern health region of Minas Gerais, between the years 2014 and 2019. In an overall analysis, the results confirm the statistical validity of the proposed regression model. The "F" test was significant at 1% probability of error, validating the values of the regression adjustment coefficients (*R2* and *adjusted R2*).[15]

The R2 value indicates that about 20.8% of the variations in the growth rates of physician coverage between 2014 and 2019 are related to the explanatory variables of the regression model. In other words, about 79.2% of the variations in the growth rates of physician coverage are due to factors other than those considered in the model. The "t" tests were significant at 1% for all parameters, with the exception of parameter *b4*, which was not statistically different from zero to up to 10% probability of error.[16]

Table 2 - Results of the regression model for analyzing the dynamics of growth rates in the coverage of primary care physicians in the northern health region of the State of Minas Gerais

Variable	Coefficients	Standard Error	Statistic "t"	Probability
Intercept	*b0* = 0,9056	0,1576	5,7478	0,0000
*ln (*MEDi.14*)*	*b1* = - 0,1650	0,0812	- 2,0317	0,0455
PMMi	*b2* = 0,0786	0,0210	2,6520	0,0096
ln INSi.10	*b3* = -0.2901	0,1083	- 2,6800	0,0089
PoloMicroi	*b4* = 0.0305	0,0476	0,6407	0,5236

[15] The "F-test" tests the H0 hypothesis that R2 is statistically equal to zero, which is the same as stating that the regression parameters are statistically equal to zero, that is, that none of the variables inserted in the model can explain the variations in the coverage rates of physicians. This hypothesis was rejected, since when making this decision, an extremely low probability of error is assumed, as shown in Table 2 (Probability = 0.0008 = 0.08%).

[16] For each sample parameter of the regression (bj), the "t-test" tests the H0 hypothesis that the corresponding population parameter (βj) is statistically equal to zero, which is the same as stating that the variable related to the parameter has no causal relationship with the dependent variable (growth rate of physician coverage). This hypothesis can be rejected if, when making this decision, the assumed probability of error is not greater than 10%. In the case of parameters b0 to b_3, it is concluded that H0 should be rejected, since the probabilities of error in making this decision are, respectively, approximately 0.00%, 4.55% and 0.01%. For the sample parameter b4, it is not possible to reject hypothesis H0, that the corresponding population parameter (β4) is zero, since the assumed probability of error would be 52.36%.

N = 86	R2 = 0.2077	Statistic "F" = 5.3082
	Adjusted R2 = 0.1686	Probability = 0.0008

Source: Survey results.

The negative sign of parameter *b1* reveals that the municipalities with the lowest coverage of physicians in 2014 were those that presented the highest growth rates in coverage between 2014 and 2019 (and vice versa). In other words, for every 1% increase in municipal coverage of physicians observed in 2014, the growth rate of this coverage was 0.17% lower (b_1 = - 0.1650), and vice versa. In other words, the municipalities with the lowest coverage of doctors in 2014 were those that had the highest growth rates in their coverage, between 2014 and 2019 (and vice versa), regardless of whether or not they were adhering to the PMM.[17]

In turn, the positive sign of parameter *b2* shows that the growth rates of physician coverage were higher among the municipalities that adhered to the PMM, compared to those that did not. On average, the municipalities adhering to the PMM had growth rates 7.9% higher (*b2* = 0.0786) than the average growth rate observed for the other municipalities. This finding allows us to affirm that the set of actions concerning the PMM had a positive and expressive effect, with regard to its axis "emergency provision of doctors" in PHC.[18]

As for parameter *b3*, its negative sign reveals that the highest growth rates in the coverage of physicians occurred in the municipalities with the lowest indices of health needs (and vice versa) in the northern region of the state of Minas Gerais. That is, for each 1% decrease in the municipal index of health needs, there was a growth rate of 0.29% higher (*b3* = - 0.2901), and vice versa. In other words, the municipalities with the lowest rates of health needs were those that had the highest growth rates in their coverage, between 2014 and 2019, regardless of whether or not they were adhering to the PMM. [19]

Despite the fact that, in its conception, the PMM sought to determine the priority territories based on the percentage of its population that were in conditions of extreme

[17] In order to assess whether the trend of convergence observed in the coverage of physicians would have presented a different behavior for the group of municipalities adhering to the PMM, the adjustment of an alternative model that included the interaction between the variables MEDi.14 and PMMi was tested. However, the corresponding parameter did not present statistical significance. In other words, it is not possible to reject the hypothesis that the convergence rate is the same between the group of municipalities adhering to the PMM and the group of other municipalities in the northern health region of the state.

[18] Since the PMM is a dichotomous qualitative variable, or *dummy variable*, with attributes valued as zero and one, the interpretation of its parameter requires its value to be previously multiplied by 100.

[19] In order to assess whether this causal relationship was statistically different for the group of municipalities adhering to the PMM, the adjustment of an alternative model that included the interaction between the variables INSi.10 and PMMi was tested. However, the corresponding parameter did not present statistical significance. In other words, it is not possible to reject the hypothesis that the effect of the levels of health needs on the growth rates of physician coverage is the same between the group of municipalities adhering to the PMM and the group of other municipalities in the northern health region of the state.

poverty (Brasil, 2013), the signs of parameters *b2* and *b3* suggest that, if, on the one hand, the program induced the greatest growth in the coverage of doctors in those municipalities to which they had the lowest coverage observed (principle of equality), On the other hand, this growth did not meet the principle of equity (greater growth in coverage towards municipalities with higher rates of health needs).[20]

Finally, in terms of its sign and value obtained for the sample of the research data, parameter *b4* = 0.0305 suggests that the growth rates of physician coverage were higher in the municipalities that act as regional health reference centers, compared to the other municipalities in the northern region of the state. On average, the hub municipalities would have had growth rates 3.0% higher (*b4* = 0.0305) than the average growth rate observed for the other municipalities in the region. This result, however, should not be considered statistically significant, since, from the inferential perspective, it was not possible to reject the hypothesis H0 that the corresponding population parameter is equal to zero (H0: *β4* = 0), when assuming the probability of error of up to 10%. In other words, it is concluded that there was no difference in the average growth rates of physician coverage between the group of hub municipalities and the group of other municipalities, so that the average positive effect of the PMM on growth rates (*b2* = 0.0786) is the same in these two groups of municipalities.[21]

FINAL CONSIDERATIONS

Studies indicate that attracting and retaining health professionals are complex and multifaceted processes, influenced by a variety of interconnected factors, such as working conditions, financial incentives, professional development opportunities, and the quality of life offered. In this sense, programs that integrated these various approaches, such as the PMM, as well as incentive policies implemented at the international level, have shown promising results.

The present study allows us to conclude that, in the northern region of the State of Minas Gerais, there was an increase in coverage by medical care between 2014 and 2019. However, this coverage, among the municipalities in the region, has become more heterogeneous, despite the average growth. The municipalities with the lowest coverage of

[20] As can be seen in Table 2, if the decision were made to reject this hypothesis H0: *β4* = 0), the probability of error in this decision would be 52.36% (Probability = 0.5236), much higher than the maximum probability of error (10%) admitted for this test.
[21] As can be seen in Table 2, if the decision were made to reject this hypothesis H0: *β4* = 0), the probability of error in this decision would be 52.36% (Probability = 0.5236), much higher than the maximum probability of error (10%) admitted for this test.

doctors in 2014 were those that had the highest growth rates in their coverage, between 2014 and 2019.

Regarding the effect of the PMM on this growth, it was possible to observe that the growth rates of the coverage of physicians were higher among the municipalities that adhered to the PMM, compared to those that did not.

In addition, it is possible to state that the program induced the expansion of the coverage of physicians in those municipalities that had the lowest coverage initially observed, however this growth did not meet the principle of equity, as the growth was not greater in those municipalities with the highest rates of health needs.

Thus, the positive effect of the PMM can be attested with regard to the increase in the availability of medical services to the population, especially in the areas that needed it most, with caveats to the need for a continuous process of improvement and adaptation to local specificities and changes in the health scenario, in order to ensure its long-term effectiveness.

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