











Access to medicines in the Brazilian Unified Health System's primary health care: assessment of a public policy

Journal of **Comparative Effectiveness Research**

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In 2008, the Programa Rede Farmácia de Minas (RFM, literally translated: 'Minas Gerais Pharmacy Network' program) was created as a strategy to expand access to medicines. **Aim:** Measure access to medicines in public pharmacies through comparison between municipalities that joined or not the RFM. **Materials & methods:** Cross-sectional, evaluative study, gathering information from a representative sample of the municipalities in Minas Gerais between July 2014 and May 2015. The Poisson regression results were obtained by calculating the prevalence ratios. **Results:** Adequate access to medicines in Minas Gerais was 69.9%, being 75.8% in municipalities with and 69.2% without the RFM. The municipalities with the RFM showed statistically higher percentages in the Availability, Adequacy/Accommodation, and Acceptability dimensions. **Conclusion:** RFM appears an efficient strategy for promoting access to medicines.

First draft submitted: 4 February 2021; Accepted for publication: 29 April 2021; Published online: 25 May 2021

Keywords: access to medicines • health services accessibility • infrastructure • pharmaceutical services • Rede Farmácia de Minas

In 2007, the Minas Gerais State Department of Health (SES/MG) undertook a survey of Pharmaceutical Services (PS) among some of the municipalities in the Brazilian state of Minas Gerais due to perceived concerns within the public healthcare system. SES/MG found problems regarding the quality of PS currently provided. In addition, weaknesses in the current infrastructure leading to an inadequate response to the population's demands for medicines. In this regard, in 2008 the Programa Rede Farmácia de Minas (RFM, literally translated: 'Minas Gerais Pharmacy Network' program) was created as a strategy to expand access to medicines as well as enhance the rational use of medicines [1]. To achieve its objectives, the program provides financial incentives for the implementation of public community pharmacies in independent buildings, with standardized physical infrastructures duly certified by the relevant health surveillance body as adequate for the provision of PS [1]. Furthermore, the program provides for an annual subsidy of R\$15,600 (US\$2943.90) for pharmacists' salary supplementation, with an emphasis on hiring and retention. The program also establishes that the State of Minas Gerais and the municipalities have a responsibility toward continual training and development of the human resources involved with PS within the Brazilian Unified Health System (SUS) [1], in other words, the Brazilian public healthcare system. In addition, the SES/MG has implemented an Integrated Pharmaceutical Assistance Management System, in Web language, to

support and subsidize the development of activities and work processes within the pharmacies of each municipality and to integrate them into a single network within the state-level SUS to improve medicine availability and usage [1].

By the end of 2017, a total of 595 units of RFM pharmacies were installed, seven of which were integrated from a state investment of R\$67,405,000 (US\$12,720,084.54) destined for the construction of the units, and R\$58,677,118.35 (US\$11,073,034.73) as an incentive for the hiring of a pharmaceutical workforce [1]. We have recently published on strategies to improve the availability of medicines within the public healthcare system in Brazil as well as developing access indicators to medicines to improve future availability [2]. We wanted to build on this through assessing the influence of the state public policy toward the availability of medicines by comparing the municipalities in Minas Gerais that implemented the Programa Rede Farmácia de Minas with those that did not (henceforth referred to as ‘municipalities with/without the RFM program’). We believe our findings will help to support health managers’ decision making regarding PS planning and management, both statewide and nationwide. This is because we believe the Minas Gerais’ territorial dimension and the diversity of its population can be considered a good reference point for Brazil and other countries.

Materials & methods

Cross-sectional, exploratory and evaluative study, gathering information from a representative sample of the municipalities within the state of Minas Gerais, Brazil, using the same methodological pathway of the National Survey on Access, Use and Promotion of Rational Use of Medicines (PNAUM) [3]. The representative sample of the State of Minas Gerais, and the total number of respondents in the survey, took into account the key stakeholders including healthcare professionals, managers and patients, as well as the stratification and population size of the sampled municipalities. The methodological design, including this calculation of a representative sample, have been fully described in a previous study [4]. Data collection was conducted from July 2014 to May 2015. Both this study and the PNAUM were approved by the National Research Ethics Committee (CONEP). All participants signed an informed consent form.

The analysis of patients’ access to medicines comprised a total sample of 949 individuals, who reported having used at least one medicine in the last 30 days prior to the interview, and were interviewed on leaving the pharmacies by trained professionals. For this analysis, ‘patients’ access to medicines’ was the dependent variable, calculated by the average of each of its dimensions. The concepts adopted for the dimensions regarding ‘access to medicines’ were those proposed by Penchansky and Thomas and adapted by Álvares *et al* [3,5]. They include:

- Availability: the relationship established between the type of service and the volume of existing resources according to the needs and number of patients.
- Geographic accessibility: the relationship established between the location where the service is provided and the patient’s home, taking into account the patients’ resources for transport, journey time, distance and cost.
- Adequacy/accommodation: refers to the relationship between the way in which services are organized to receive patients, and the ability of patients to adapt to such organizations.
- Affordability: the relationship established between the service cost and the patient or customer’s ability to pay.
- Acceptability: refers to the attitudes of people and providers in relation to each one’s characteristics and practices.

To measure each of the dimensions, the participants were asked different questions, and their answers were categorized as 0 or 1, where zero means absence of access and one means satisfactory access in the relevant dimension (Table 1).

Full access was categorized as adequate access, when the means were greater than or equal to 0.80, and as inadequate when the means were less than 0.80. This cutoff point was chosen because the WHO defined the guarantee of 80% of availability to essential medicines as one of the nine global goals for the control of chronic diseases [6].

The data obtained were analyzed using SPSS® software version 20. The descriptive analysis drew on absolute, relative and average frequencies (with 95% CI for relative and average frequencies).

Associations between dimensions and full access were tested using Pearson’s chi-square tests, the Fisher’s exact test and linear-by-linear association tests, when appropriate, with the following independent variables: gender, age, color/race, marital status, education, economic class classified as A (higher), B, C, D or E (lower) according to the Brazilian Market Research Association (ABEP), and whether patients have private insurance or not to supplement SUS, how often they use the SUS, whether they know about the Farmácia Popular program, whether they use

Table 1. Questions included in the analysis of access to medicines for patients of pharmaceutical assistance in primary healthcare, according to the dimensions and categorization thereof for the item response theory model.

Dimension	Question	Categorization
Availability	In the last 3 months, how often were you provided with the medicines you were looking for in this public pharmacy?	Answers 'Always' and 'Repeatedly' were categorized as 1, and answers 'Sometimes', 'Rarely' and 'Never' as 0.
Geographic Accessibility	Is this place far from your home?	Answers 'No' were categorized as 1, and 'Yes' and 'Somewhat' as 0.
	How easy/hard is it for you to get here?	'Very easy' and 'Easy' were categorized as 1, and 'Neither easy nor hard', 'Hard' and 'Very hard' as 0.
Adequacy/ Accommodation	How would you rate the cleanliness of the SUS public pharmacy where you get your medicines dispensed?	'Very good' and 'Good' were categorized as 1, and 'Neither good nor bad', 'Bad' and 'Very bad' code 0.
	How would you rate the comfort of the SUS public pharmacy where you get your medicines dispensed, regarding chairs/benches, drinking fountain and sun and rain protection?	'Very good' and 'Good' were categorized as 1, and 'Neither good nor bad', 'Bad' and 'Very bad' code 0.
	How long do you usually need to wait until the SUS public pharmacy dispenses your medicines?	The answers 'No wait needed' and 'Just a little' were categorized as 1, and 'Very long' as 0.
	How would you rate the opening hours of this Health Unit?	'Very good' and 'Good' were categorized as 1, and 'Neither good nor bad', 'Bad' and 'Very bad' code 0.
	How easy/hard is the wayfinding signage (e.g., overhead signs and posters) leading to the SUS public pharmacy where you get your medicines dispensed?	'Very easy' and 'Easy' were categorized as 1, and 'Neither easy nor hard', 'Hard' and 'Very hard' as 0.
Affordability	In the last year, were your family financially unable to buy something important for everyday life, or did they need to take out a loan or sell any belongings in order to pay for medicine?	Answers 'Yes' were categorized as 0 and 'No' as 1.
	The last time you needed to buy your medicines, were you prevented from doing so because you did not have the money?	Answers 'Yes' were categorized as 0 and "No" as 1.
Acceptability	Does the SUS public pharmacy staff where you get your medicines normally provide the service with respect and politeness?	'Always' and 'Repeatedly' were categorized as 1, and 'Sometimes', 'Rarely' and 'Never' as 0.
	What is your opinion about the service provided by the SUS public pharmacy from where you get your medicines?	'Very good' and 'Good' were categorized as 1, and 'Neither good nor bad', 'Bad' and 'Very bad' code 0.
	For you, does the SUS pharmacy normally provide the service with due privacy?	'Always' and 'Repeatedly' were categorized as 1, and 'Sometimes', 'Rarely' and 'Never' as 0.

SUS: Brazilian Unified Health System.

the Farmácia Popular program, whether at least one of their medicines in use is a multiple sourced medicine, in other words, a generic, the number of medicines they currently use, the Human Development Index (HDI) of their municipality of residence according to the 2010 IBGE census, and whether their municipality of residence takes part in the RFM program [7]. Variables with p-value < 0.20 were included in the Poisson model with robust variance, in which only those with $p < 0.05$ remained. The Poisson regression results were obtained by calculating the prevalence ratios and their respective 95% CIs. The Omnibus test was used to verify the suitability of the final model.

Results

Of the 1159 patients interviewed, 949 (81.9%) reported taking at least one medicine in the 30 days prior to the interview. The sociodemographic characteristics of the patients from the municipalities with and without implementation of the RFM program were similar, except for the marital status variable, which showed a greater predominance of patients 'in a partnership' in the municipalities with the RFM program (Table 2).

Adequate access to medicines in Minas Gerais was 69.9%, being 75.8% in municipalities with the RFM program and 69.2% in municipalities without the RFM program. Overall, the Acceptability dimension showed the lowest percentage, 61.9%, and the Affordability dimension presented the highest percentage, 93.3%. The municipalities with the RFM program showed statistically higher percentages in the Availability, Adequacy/Accommodation, and Acceptability dimensions; however, with a smaller percentage for Geographic Accessibility compared with the municipalities without the RFM program (Table 3).

Most of the patients considered that the SUS pharmacy was not far from their homes (69.4%). Likewise, the majority of the patients considered it easy or very easy to get to a pharmacy (80%). Among the variables within the Adequacy/Accommodation dimension, the patients reported less adequacy (71.5%) regarding the comfort of the pharmacies, and more adequacy (91.5%) regarding waiting times. In turn, for the variables within the Acceptability dimension, the lowest percentage (66.6%) concerned service provision with due privacy and the highest percentage

Table 2. Sociodemographic characteristics of medicine patients in the Unified Health System Primary HealthCare.

Variable	With RFM (n = 91) n (%)	Without RFM (n = 858) n (%)	Minas Gerais (n = 949) n (%)	p-value
Gender				
– Female	74 (81.3)	686 (80.0)	760 (80.1)	0.76
– Male	17 (18.7)	172 (20.0)	189 (19.9)	
Age range				
– 18–44 years old	45 (49.5)	362 (42.2)	407 (42.9)	0.41
– 45–64 years old	34 (37.4)	364 (42.2)	398 (41.9)	
– 65 years or older	12 (13.2)	132 (15.4)	144 (15.2)	
Color/race				
– White	32 (35.6)	273 (32.3)	305 (32.7)	0.537
– Non-white	58 (64.4)	571 (67.7)	571 (67.7)	
Marital status				
– Not in a partnership	27 (29.7)	380 (44.3)	407 (42.9)	0.007
– In a partnership	64 (70.3)	478 (55.7)	542 (57.1)	
Education				
– Illiterate	9 (9.9)	71 (8.3)	80 (8.4)	0.87
– Completed high school	76 (83.5)	728 (84.8)	804 (84.7)	
– Completed higher education	6 (6.6)	59 (6.9)	65 (6.8)	
Economic class[†]				
– A or B	16 (17.6)	153 (17.8)	169 (17.8)	0.091
– C	49 (53.8)	541 (63.1)	590 (62.2)	
– D or E	26 (28.6)	164 (19.1)	190 (20.0)	

p-value referring to the Pearson's chi-square test.
[†] According to the Brazilian Economic Classification Criteria (CCEB) of the Brazilian Market Research Association (ABEP-2014).
The bold terms used in the table show that these values are statistically significant with 95% CIs.
RFM: Rede Farmácia de Minas (literally translated: 'Minas Gerais Pharmacy Network').

(91.0%) related to pharmacy staff's respect and politeness toward the patients. Additionally, just over 5.0% of patients had been financially unable to buy something important for everyday life, or needed to take out a loan or sell belongings to pay for their medicines in the last year (Table 4).

The variables comprising the pharmacies' medicine dispensing, cleanliness, comfort, signage, as well as respect, politeness and privacy in service provision, were rated statistically higher by patients of the municipalities within the RFM program. However, the two variables within the Geographic Accessibility dimension were rated statistically higher by patients from the municipalities without the RFM program. For the variables regarding waiting time, opening hours, and quality of the service provided, the differences between municipalities with and without the RFM program were not significant (Table 4).

In the final Poisson regression model, as regards patients' multidimensional access to medicines, only the sociodemographic variables remained, namely: RFM, gender, age group, color/race, education, economic class and HDI (Table 5).

As for the Availability dimension, patients from the municipalities with the RFM program were 22.0% more likely to have adequate availability of medicines in the SUS public pharmacies compared with patients from municipalities without this program. Similarly, patients in the medium and high HDI municipalities were 13.0 and 33.0% more likely to have adequate availability of medicines, respectively, than patients in low and very low human development municipalities. Patients of economic classes A/B and C were more likely to have their medicines available (20.0 and 6.0%, respectively). As for age groups, the younger the patient was, the less likely they were to consider the availability of his medicines adequate. Concerning the Geographic Accessibility dimension, male patients from the municipalities without the RFM program were more likely to have their pharmacy geographically accessible. Living in municipalities with the RFM program, being male and being 65 years or older were significantly associated with greater Adequacy/Accommodation. A higher likelihood of Affordability was significantly associated with A/B-class patients living in high human development municipalities. In the Acceptability dimension, elderly

Table 3. Access to medicines, based on the five dimensions, in the Unified Health System Primary HealthCare in municipalities of the state of Minas Gerais, Brazil.

Dimensions	With RFM (n = 91) n (%)	Without RFM (n = 858) n (%)	Minas Gerais (n = 949) n (%)	p-value
Availability				
– ≥80%	55 (77.5)	439 (65.4)	494 (66.6)	0.041
– <80%	16 (22.5)	232 (34.6)	248 (33.4)	
Geographical accessibility				
– ≥80%	50 (54.9)	581 (67.7)	631 (66.5)	0.014
– <80%	41 (45.1)	277 (32.3)	318 (33.5)	
Adequacy/accommodation				
– ≥80%	83 (91.2)	661 (77.0)	744 (78.4)	0.002
– <80%	8 (8.8)	197 (23.0)	205 (21.6)	
Affordability				
– ≥80%	81 (89.0)	804 (93.7)	885 (93.3)	0.089
– <80%	10 (11.0)	54 (6.3)	64 (6.7)	
Acceptability				
– ≥80%	57 (80.3)	402 (60.0)	459 (61.9)	0.001
– <80%	14 (5.0)	268 (40.0)	282 (38.1)	
Full access				
– ≥80%	69 (75.8)	594 (69.2)	663 (69.9)	0.192
– <80%	22 (24.2)	264 (30.8)	286 (30.1)	

Variation in the total number of patients due to nonresponses to some questions by the interviewed patients.

The bold terms used in the table show that these values are statistically significant with 95% CIs.

RFM: Rede Farmácia de Minas (literally translated: 'Minas Gerais Pharmacy Network').

white patients with lower levels of education and residing in municipalities with the RFM program were more likely to consider the pharmacies adequate. The following aspects were significantly associated with greater likelihood of patients having full access to medicines: living in a municipality with the RFM program and with a high human development; being 65 years or older; and belonging in class A or B (Table 5).

In the final Poisson regression model, patients' access to medicines was only associated with having a health insurance plan (Table 5). In the Availability dimension, there was a 16.0% likelihood that patients would be using at least one generic medicine. No variable for the use of services and medicines was associated with the Geographical Accessibility or the Adequacy/Accommodation dimensions. Among the patients, the fewer medicines they use, the greater the likelihood of Affordability. In the Acceptability dimension, patients with health insurance are 11.0% more likely to consider public pharmacies adequate, when compared with patients without private health insurance to supplement SUS services (Table 6).

Discussion

Full access to medicines in the Minas Gerais municipalities was 69.9%, that is, almost 70% of the patients had an average total of 80% or more of access to their prescribed medicines, which was weighted by all five dimensions. A study analyzing data from the PNAUM, a Brazilian assessment of multidimensional access, found prevalence rates of 94.3, 5.2 and 0.5% for full, partial and null access to medicines for chronic diseases, respectively [8]. However, another study analyzing the PNAUM assessed the dimensions of access, and found a national availability of 59.8%, which is slightly lower than the 66.6% found for the state of Minas Gerais, Brazil [3]. The high medicine availability rated by patients from the municipalities with the RFM program may be a direct reflection of the program's strategy, as it provides for pharmaceutical staff retention, HR training and a computerized system for better planning and acquisition of medicines.

The best ratings regarding medicine dispensing, a variable used to measure medicine availability in the present study, stemmed from the total population of patients rather than only from those who reported having used a medicine in the last 30 days, similar to the findings in the PNAUM study of Barbosa *et al.* [4]. Furthermore, the Availability dimension, frequently used by researchers as an access proxy, was positively associated with the

Table 4. Measurement of the variables within each of the analyzed dimensions in the Unified Health System Primary HealthCare in municipalities of the state of Minas Gerais, Brazil.

Dimensions	Variables	With RFM (n = 91) n (%)	Without RFM (n = 858) n (%)	Minas Gerais (n = 949) n (%)	p-value
Availability	In the last 3 months, how often were you provided with the medicines you were looking for in this SUS public pharmacy?				
	Always/repeatedly	55 (77.5)	439 (65.4)	494 (66.6)	0.041 [†]
	Sometimes/rarely/never	16 (22.5)	232 (34.6)	248 (33.4)	
	Is this place far from your home?				
	No	54 (59.3)	605 (70.5)	659 (69.4)	0.028 [†]
	Yes/somewhat	37 (40.7)	253 (29.5)	290 (30.6)	
Adequacy/accommodation	How easy/hard is it for you to get here?				
	Very easy/easy	63 (69.2)	706 (82.3)	769 (81.0)	0.003 [†]
	Neither easy nor hard/hard/very hard	28 (30.8)	152 (17.7)	180 (19.0)	
	How would you rate the cleanliness of the SUS public pharmacy where you get your medicines dispensed?				
	Very good/good	69 (97.2)	548 (87.0)	617 (88.0)	0.005 [‡]
	Neither good nor bad/bad/very bad	2 (2.8)	82 (13.0)	84 (12.0)	
	How would you rate the comfort of the SUS public pharmacy where you get your medicines dispensed, regarding chairs/benches, drinking fountain and sun and rain protection?				
	Very good/good	66 (93.0)	458 (69.2)	524 (71.5)	<0.001 [‡]
	Neither good nor bad/bad/very bad	5 (7.0)	204 (30.8)	209 (28.5)	
	How long do you usually need to wait until the SUS public pharmacy dispenses your medicines?				
	No wait needed/just a little	68 (95.8)	602 (91.1)	670 (91.5)	0.125 [‡]
	Very long	3 (4.2)	59 (8.9)	62 (8.5)	
Affordability	How would you rate the opening hours of this Health Unit?				
	Very good/good	80 (87.9)	726 (84.7)	806 (85.0)	0.416 [†]
	Neither good nor bad/bad/very bad	11 (12.1)	131 (15.3)	142 (15.0)	
	How easy/hard is the wayfinding signage (e.g., overhead signs and posters) leading to the SUS public pharmacy where you get your medicines dispensed?				
	Very easy/easy	64 (92.8)	520 (79.9)	584 (81.1)	0.004 [‡]
	Neither easy nor hard/hard/very hard	5 (7.2)	131 (20.1)	136 (18.9)	
	In the last year, were your family financially unable to buy something important for everyday life, or did they need to take out a loan or sell any belongings in order to pay for medicine?				
	No	89 (97.8)	807 (94.3)	896 (94.6)	0.114 [‡]
	Yes	2 (2.2)	49 (5.7)	51 (5.4)	
	The last time you needed to buy your medicines, were you prevented from doing so because you did not have the money?				
No	8 (8.8)	7 (0.8)	15 (1.6)	<0.001 [†]	
Yes	83 (91.2)	850 (99.2)	933 (98.4)		
Acceptability	Does the SUS public pharmacy staff where you get your medicines dispensed normally provide the service with respect and politeness?				
	Always/repeatedly	69 (98.6)	602 (90.3)	671 (91.0)	0.009 [‡]
	Sometimes/rarely/never	1 (1.4)	65 (9.7)	66 (9.0)	
	What is your opinion about the service provided by the SUS public pharmacy from where you get your medicines dispensed?				
	Very good/good	62 (87.3)	598 (89.7)	660 (89.4)	0.544 [‡]
	Neither good nor bad/bad/very bad	9 (12.7)	69 (10.3)	78 (10.6)	
For you, does the SUS pharmacy normally provide the service with due privacy?					
Always/repeatedly	60 (85.7)	410 (64.5)	470 (66.6)	<0.001 [†]	
Sometimes/rarely/never	10 (14.3)	226 (35.5)	236 (33.4)		

Variation in the total number of patients due to nonresponses to some questions by the interviewed patients.

The bold terms used in the table show that these values are statistically significant with 95% CIs.

[†] Pearson's chi-square test;

[‡] Fisher's exact test.

RFM: Rede Farmácia de Minas (literally translated: 'Minas Gerais Pharmacy Network'); SUS: Brazilian Unified Health System.

Table 5. Poisson regression model of access to medicines among Primary HealthCare patients regarding the five dimensions by sociodemographic characteristics.

Variable	Availability			Geographic accessibility			Adequacy/accommodation			Affordability			Acceptability			Full access			
	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	
RFM																			
- With	1.22	1.10-1.37	<0.001	0.88	0.79-0.98	0.019	1.16	1.08-1.24	<0.001	-	-	-	1.22	1.10-1.35	<0.001	1.14	1.03-1.25	0.012	-
- Without	1	-	-	1	-	-	1	-	-	-	-	1	-	-	-	1	-	-	-
Gender																			
- Female	-	-	-	0.93	0.86-1.00	0.043	0.93	0.88-0.99	0.030	-	-	-	-	-	-	-	-	-	-
- Male	-	-	-	1	-	-	1	-	-	-	-	-	-	-	-	-	-	-	-
Age range																			
- 18-44	0.88	0.80-0.98	0.017	-	-	-	0.91	0.85-0.98	0.009	-	-	-	0.88	0.79-0.98	0.020	0.83	0.76-0.90	<0.001	-
- 45-64	0.95	0.86-1.05	0.289	-	-	-	0.92	0.86-0.99	0.018	-	-	-	0.96	0.87-1.06	0.380	0.90	0.83-0.98	0.010	-
- 65+	1	-	-	-	-	-	1	-	-	-	-	-	1	-	-	1	-	-	-
Color/race																			
- White	-	-	-	-	-	-	-	-	-	-	-	-	1.13	1.05-1.22	0.002	-	-	-	-
- Non-white	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Education																			
- Illiterate	-	-	-	-	-	-	-	-	-	-	-	-	1.35	1.10-1.65	0.003	-	-	-	-
- Completed high school	-	-	-	-	-	-	-	-	-	-	-	-	1.19	1.00-1.42	0.048	-	-	-	-
- Completed higher education	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-	-	-
Economic class																			
- A/B	1.20	1.07-1.34	0.002	-	-	-	-	-	-	-	-	1.12	1.06-1.18	<0.001	-	-	1.20	1.09-1.33	<0.001
- C	1.06	0.97-1.16	0.207	-	-	-	-	-	-	-	-	1.06	1.01-1.11	0.031	-	-	1.09	1.00-1.18	0.042
- D/E	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-
HDI																			
- Low/very low	1	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	1	-	-
- Medium	1.13	1.04-1.22	0.003	-	-	-	-	-	-	-	-	1.02	0.96-1.09	0.477	-	-	1.09	1.02-1.17	0.010
- High	1.33	1.20-1.47	<0.001	-	-	-	-	-	-	-	-	1.10	1.06-1.14	<0.001	-	-	1.19	1.02-1.17	<0.001

Economic class classified as A (higher), B, C, D or E (lower) according to the Brazilian Market Research Association (ABEP). HDI: Human development index; PR: Prevalence ratio; RFM: Rede Farmácia de Minas (literally translated: 'Minas Gerais Pharmacy Network').

Table 6. Poisson regression model of access to medicines among Primary HealthCare patients regarding the five dimensions by characteristics of use of services and medicines.

Variable	Availability			Geographic accessibility			Adequacy/ accommodation			Affordability			Acceptability			Full access					
	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value	PR	CI 95%	p-value			
Has a health insurance plan																					
- Yes	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.11	1.02-1.23	0.047	1.11	1.04-1.18	0.003
- No	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	1	-	-
Number of medicines used																					
- 1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.14	1.04-1.24	0.004	-	-	-
- 2-4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1.11	1.02-1.22	0.015	-	-	-
- More than 5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1	-	-	-	-	-
At least one of the medicines used is generic																					
- Yes	1.16	1.04-1.30	0.011	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
- No	1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

PR: Prevalence ratio.

patients' municipalities of residence (22%) participating in the RFM program (Table 5), which was also verified by Nascimento *et al.* [9].

Similarly, the fact that the best ratings for Adequacy/Accommodation and Acceptability came from patients from municipalities with the RFM program may be associated with the facility layout, furniture and equipment standardized by the program itself. High ratings by patients from municipalities with the RFM program regarding pharmacies' cleanliness, comfort, signage, as well as respect, politeness and privacy in service provision were also observed by another PNAUM-based study (Table 4), carried out by Barbosa *et al.* [4]. Their Poisson regression results also corroborate the high ratings for Adequacy/Accommodation and Acceptability of the pharmacies in municipalities with the RFM program observed in the present study (Table 5) adding robustness to our findings.

However, patients from municipalities with the RFM program demonstrated less Geographic Accessibility, which may also be a reflection of the program, since RFM units are mandatorily built in independent buildings, unlike most other public pharmacies in Brazil, which are within healthcare center/units, community health posts, or mixed health units, as stated by Nascimento *et al.* (Table 4) [9]. However, it is noteworthy that most patients from municipalities with the RFM program considered it easy or very easy to get to pharmacies for their medicines, which demonstrates that the accountability placed on the RFM program for reducing geographical accessibility appears to be working. In addition, such an accountability, or burden, was partially offset by the improvement in the Availability, Adequacy/Accommodation and Acceptability dimensions, since in the final Poisson model the RFM program was positively associated with the likelihood of full access (Table 5).

Lower likelihood of adequateness regarding the dimensions of access for women, non-white individuals, those with less education, younger people, and those belonging to lower social classes was also verified by other PNAUM-based studies assessing multidimensional access to medicines for chronic diseases and by studies assessing satisfaction with pharmaceutical assistance services in primary healthcare in Brazil [8,10]. This is a concern to address going forward.

Higher likelihood of elderly people to consider the Availability, Adequacy/Accommodation and Acceptability dimensions as adequate, hence having full access to medicines, may be related to the fact that this age group also presents greater satisfaction with the health services, which was also observed by several national and international studies [11–16].

As regards the use of generic (multiple sourced medicines), the regression analysis showed that this characteristic is associated with a greater likelihood of patients being effectively provided with the medicines they need. This association can be, in part, explained by the fact that public bodies always purchase the lowest price medicine, so, as by law, generics must cost at least 35% less than the reference medicines, these being, alongside similar ones, the medicines most frequently found in public pharmacies [17–19]. This fact reinforces the need to strengthen the use of generic medicines as an important strategy in PS management. This result is similar to the ones identified in a number of European studies showing that promoting the preferential prescribing of multiple sourced (generic) medicines within a class or related class through multiple initiatives can save considerable resources without compromising care [20–24].

The inverse association between the increased number of medicines used and the likelihood of Affordability (Table 6) is understandable as there is association between economic class and this dimension (Table 5). This results reflects potential copayment factors in reducing access to medicines, as discussed in other studies [8,25,26]. Consequently, it is increasingly essential that there are low costs for good quality, multiple sourced medicines in Brazil. For instance, we have seen in the Netherlands that the price of good quality omeprazole and simvastatin within their public health system can be as low as 2% of the prepatent loss price [27], with similar low prices for generic imatinib among European countries [28]. These are considerations for the future to enhance access and affordability to prescribed medicines in Brazil.

Different to expectations, patients with health insurance were more likely to consider public pharmacies adequate as regards the Acceptability dimension (Table 6). This was different to the findings of Soeiro *et al.* [10]. We are not sure of the reasons behind this, and will be exploring this further in future studies.

The Poisson regression model showed that patients who lived in a municipality with the RFM program were 14% more likely to have multidimensional access to medicines, compared with patients in municipalities without the program. This will support health managers in their decision making since a difference of such magnitude could not be attained by changing one level in the patients' social class stratification, not even by changing the municipalities' HDI from low/very low to medium or from medium to high (Table 5). It is worth stressing though that such ratings regarding access to medicines stemmed from a *ceteris paribus* condition, a Latin phrase meaning

'other things held constant' or 'all other things being unchanged', for the reason that the financing of medicines was not different among municipalities with or without the RFM program. Consequently, this program aimed at restructuring PS proved to be an efficient strategy capable of being implemented across the country.

However, it cannot be categorically stated that the perceived improvements in access to medicines resulted solely from the implementation of the RFM program as this is a cross-sectional study, hence susceptible to reverse temporality.

Conclusion

This study provides important information to guide public policies that aim to expand access to medicines to patients in Minas Gerais. We believe that our findings show that the RFM program is an efficient and appropriate strategy for improving access to medicines. Consequently, we believe the financing of this program must be maintained in the State of Minas Gerais, with special attention from public managers for key issues including maintenance of the infrastructure as well as training and ongoing development and incentives for clinical activities.

Since the state of Minas Gerais, which, due to its size and population diversity, can be considered a reliable proxy for Brazil, we believe that this program is potentially implementable throughout the country to improve access to medicines for patients in Brazil. The results of the program should also be monitored continuously to guide other countries in the future.

Summary points

- In 2008 the Programa Rede Farmácia de Minas (RFM, literally translated: 'Minas Gerais Pharmacy Network' program) was created as a strategy to expand access to medicines as well as enhance the rational use of medicines.
- Measure access to medicines in public pharmacies through comparison between municipalities that joined or not the RFM.
- Cross-sectional, exploratory and evaluative study, gathering information from a representative sample of the municipalities within the state of Minas Gerais, Brazil, using the same methodological pathway of the National Survey on Access, Use and Promotion of Rational Use of Medicines.
- The concepts adopted for the dimensions regarding 'access to medicines' were those proposed by Penschansky and Thomas and adapted by Álvares *et al.*
- The Poisson regression results were obtained by calculating the prevalence ratios and their respective 95% CIs.
- Adequate access to medicines in Minas Gerais was 69.9%, being 75.8% in municipalities with the RFM program and 69.2% in municipalities without the RFM program.
- Overall, the Acceptability dimension showed the lowest percentage, 61.9%, and the Affordability dimension presented the highest percentage, 93.3%.
- The municipalities with the RFM program showed statistically higher percentages in the Availability, Adequacy/Accommodation, and Acceptability dimensions; however, with a smaller percentage for Geographic Accessibility compared with the municipalities without the RFM program.
- RFM appears an efficient strategy for promoting access to medicines.

Financial & competing interests disclosure

The authors have no relevant affiliations or financial involvement with any organization or entity with a financial interest in or financial conflict with the subject matter or materials discussed in the manuscript. This includes employment, consultancies, honoraria, stock ownership or options, expert testimony, grants or patents received or pending, or royalties.

No writing assistance was utilized in the production of this manuscript.

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