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Strategies to improve the availability of medicines in the primary health care in Brazil: findings and implications

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Abstract

Aim: Access to essential medicines is a key component of managing patients in ambulatory care. In 2008, the State of Minas Gerais, Brazil, created the Pharmacy Network of Minas (RFM) program to improve access to medicines in some municipalities, increasing availability and restructuring the physical facilities of public pharmacies. The aim was to assess the current situation, comparing municipalities with and without RFM. **Methods:** Cross-sectional study, with data collected from 2014 July to May 2015. Availability of medicines was verified by reviewing stock levels. **Results:** The general availability index of medicines was 61.0%, higher in municipalities with RFM. Most physicians considered the pharmaceutical services as good/very good. The main reasons for medicines shortage were “financial transference problems”, “insufficient financial resources” and “budget”. **Conclusions:** Strategies such as the program Pharmacy Network of Minas can promote improvements in essential medicine availability.

1. INTRODUCTION

Historically, access to essential medicines is an important public health policy especially among low- and middle-income countries (LMICs) as they strive for universal access^{1,2}. Since the International Conference on Primary Health Care in Alma Ata in 1978, access to these medicines has been recognized as one of the critical components to assure a minimal acceptable standard of care across populations³. In 2008, the World Health Organization (WHO) defined the assurance of at least, 80% of the availability of essential medicines as one of the nine key targets for the control of chronic diseases⁴. In 2015, this target was emphasized again as one of the eight Millennium Sustainable Development Goals (SDGs)^{2,5}.

Brazil is a LMICs, where the accomplishment of these goals is even more critical as the country has health as a constitutional right, and the supply of health care by the Unified Health System (*Sistema Único de Saúde – SUS*) represents one of the principal forms for the provision of essential medicines to the population⁶⁻⁸. However, medicines considered of importance for the treatment of relevant diseases in Brazil currently have inadequate availability in SUS^{7,9,10}. In contrast, federal government *per capita* spending on medicines has increased by 271% between 2006 and 2013¹¹, similar to a number of other countries¹². However, we are aware that an appreciable number of middle-income countries spent less than US\$13 per capita on medicines in 2010². In addition, 1.0 to 2.1 billion people in the world currently do not have access to essential medicines, with lower income countries being the most affected¹³⁻¹⁵. In some parts of Asia and Africa, lack of access to essential medicines can reach up to 50% of the population¹⁵ made worse by high levels of co-payment, as well as irrational use of medicines, with catastrophic consequences for the family if members become ill^{16,17}. Since 1998, with the National Policy of Medicines (*Política Nacional de Medicamentos – PNM*), medicines management including the provision of medicines in community pharmacies, has been decentralized, that is, it is not exclusively the responsibility of the federal government but also of the states and municipalities¹⁸. Currently, the majority of municipal pharmacies at the primary health care level in Brazil are placed within health centers⁹. The federal government created in 2004 ‘Popular Pharmacy of Brazil’ (*Farmácia Popular do Brasil*) as a strategy to improve access to medicines given previous concerns¹⁹. This program had two components: one of with pharmacies under public management and the other in which the government reimburses private pharmacies accredited to dispense medicines to the Brazilian population. Under this system, patients pay limited co-payments for their medicines, which is called “Here you have Popular Pharmacy” (*Aqui tem Farmácia Popular*) with the Federal Government covering the remainder of the costs^{19,20}.

To further improve access to medicines and enhance their rational use in Minas Gerais State, the Pharmacy Network of Minas Gerais strategy (*Rede Farmácia de Minas – RFM*) was created in 2008. Under this initiative, community public pharmacies with standardized infrastructures were implemented to qualify for Pharmaceutical Services. A State government financial incentive was given to the municipalities for the implementation of public community pharmacies in Minas Gerais State and pharmacists’ professional fees to support their establishment, with professional training initiatives to improve pharmaceutical care and the availability of medicines. In the initial phase, the program prioritized municipalities with up to 10,000 inhabitants. The program was expanded in 2009 to municipalities having up to 30,000 inhabitants and, in 2013, to the remaining pharmacies in the State of Minas Gerais²¹⁻²³. In 2019, there are 585 pharmacies in operation, covering 68.6% of the State.

Even with this investment, access to essential medicines continues to be a challenge in the public sector in Minas Gerais²³ because the concept of access is complex and involves, at least, five dimensions. These include accessibility, acceptability, accommodation/adequacy, affordability, and the availability of medicines for all citizens^{24,25}. However, despite the considerable network of public distribution of medicines in Brazil, which includes in the State of Minas Gerais approximately six thousand health public services among its 853 municipalities for 20 million inhabitants,²⁶ the availability of medicines remains a concern²⁵.

Under the perspective of universal health care, analyzing the availability of medicines is seen as a *proxy* for the evaluating access to essential medicines⁹. Additionally, such studies provide feasible targets for developing public health policies to improve the care of patients within health care systems^{25,27,28}. As mentioned, it is desirable for patients to have access to at least essential list medicines to improve their health, especially with the growing burden of infectious and noncommunicable chronic diseases across countries². For instance, there is variable availability of medicines to treat hypertension across countries with a large number of LMICs only having access to one antihypertensive, and this can often be unaffordable unless

there are access programmes²⁹⁻³². There are also concerns with the availability of medicines to treat patients with diabetes among LMICs^{32,33}. We are also aware that countries such as South Africa are re-vamping their healthcare systems to address concerns with the availability of medicines in the public healthcare system along with measures to improve the care of patients with chronic diseases as part of their recent universal healthcare initiative³⁴. Given concerns regarding the availability of medicines within the public health care system in Brazil, the purpose of this study was to measure the availability of medicines in primary care public pharmacies within the state of Minas Gerais, comparing municipalities that have adhered, or not, to the program Pharmacy Network of Minas²³. We have previously shown that municipalities introducing the RFM programme had significantly higher rates of legal documentation, greater benefits for patients and staff, better storage conditions of medicine such as insulins and greater competence to offer clinical advice to patients²³. We would like to build on this, with the findings potentially used to guide future strategies within Minas Gerais and wider in Brazil to make sure patients have access to at least essential medicines. This also builds on our recent paper to develop a single access indicator for medicines for LMICs including Brazil²⁵. The findings may also be of interest to other LMICs looking to provide universal health care, including access to an agreed list of medicines, for their population.

2. METHODS

This is a descriptive survey study measuring the availability of essential medicines among public pharmacies within primary health care in Minas Gerais State, and the availability of medicines perceived by patients and professionals involved in pharmaceutical services in the municipalities.

The methodological design, including the calculation of a representative sample, and the total number of individuals interviewed in the research, are fully described in a preliminary study²³, where several key stakeholders (managers, healthcare professionals and users) combined with the population stratum and size of municipalities have been considered. Overall, 104 municipalities were selected of which 41.3% had adopted the RFM²³. The data were collected from 2014 July to May 2015 where no municipalities with more than 100,000 inhabitants had implemented the program of RFM. Consequently, we were able to compare the municipalities having RFM with those without this network and having a population up to 100,000 inhabitants.

This present study utilized the same methodological resources and instruments as those adopted by the 'National Investigation about Access, Utilization, and Promotion of the Rational Use of Medicines' (*Pesquisa Nacional sobre Acesso, Utilização e Promoção do Uso Racional de Medicamentos – PNAUM*) conducted throughout Brazil^{24,35}. We used the concept of access as defined by Penchansky that considered access has five dimensions, i.e. accessibility, acceptability, accommodation/adequacy, affordability, and the availability of medicines²⁴. The availability of medicines was verified by means of direct observation of 50 medicines from the Brazilian National Listing of Essential Medicines (*Relação Nacional de Medicamentos Essenciais – RENAME*)³⁶ 2012 version, previously defined by a group of specialists for the PNAUM^{9,35}. Such medicines were selected by specialists from the area involved in the investigation, being grouped according to their respective Anatomical Therapeutic Chemical (ATC) classification into 42 items for verification of their availability in public pharmacies³⁷. The Availability Index of medicines and pharmacological groups was presented as the percentage of averages of the evaluated public pharmacies in which the medicines and pharmacological or therapeutic groups were available.

Availability was defined as the presence of at least one pharmaceutical unit visible at the moment of data collection according to direct observation by the trained field investigator.

This concept of availability was adopted by PNAUM; consequently, we adopted the same methodology for this study acknowledging the limitations. For medicines of the same pharmacological or therapeutic groups, grouped into one item, the existence of, at least, one unit among the established therapeutic options was considered as available⁹.

The sampling plan considered the various study populations, composed of municipal secretaries of health, municipal managers of Pharmaceutical Service, professionals responsible for drug delivery (dispensers), physicians and patients of SUS. The different sample sizes for each of these populations was subsequently estimated. The calculation led to the study being conducted in 91 pharmacies/ municipalities in the state of Minas Gerais²³. Additionally, to evaluate the perception of availability, face-to-face interviews were conducted with users, physicians, and people responsible for dispensing medicines. In addition, telephone interviews were conducted with municipal health secretaries and those responsible for the pharmaceutical services (managers)²³. The availability perceived by patients was measured by the frequency of success to obtain the medicines they were looking for in public pharmacies during the three months preceding the interview. While for the interviewed professionals (managers, physicians and people responsible for dispensing medicines), such perceived availability was measured through questions about their opinion regarding the availability of medicines in public pharmacies.

For the statistical analysis, absolute, relative, and average frequencies were presented (with confidence intervals of 95%). The groups' comparison was conducted by means of Pearson's chi-square test, Fisher's exact test and the T-test, as appropriate. The PNAUM and this present work were approved by the National Committee of Ethics in Research (*Comitê Nacional de Ética em Pesquisa*). All interviews were preceded by a clarification of the objectives of the study and all interviewees signed an Informed Consent Form.

3. RESULTS

A total of 91 pharmacies were visited by the interviewers in 69 municipalities of the state of Minas Gerais having less than 100,000 inhabitants. 32 of these municipalities (46.4%) had adhered to the RFM program and 37 (53.6%) had not. Since the municipalities with the RFM program had smaller population sizes, only one pharmacy was visited per municipality, while in the remaining cities without the RFM program a total of 59 pharmacies were visited.

The medicines availability index in the state of Minas Gerais was 61.0%, being higher in the municipalities with the RFM programs (65.6% *versus* 57.0%, $p = 0.001$) compared to those without. On the other hand, the availability index of ATC groups in the state of Minas Gerais was 86.0%, being again statistically higher in municipalities with the RFM program (90.7% *versus* 82.2%) as compared to those without (Table 1).

Table 1: Availability Index, comparison in municipalities with or without RFM.

AVAILABILITY INDEX	Municips. with RFM N= 32	Municips. without RFM N= 37	Minas Gerais state N=69	p -value
Medicines	65.6%	57.0%	61.0	0.001
Pharmacological or therapeutic groups	90.7%	82.2%	86.0	0.023

The medicines with high availability were paracetamol (92.8%), salts for oral rehydration and ferrous sulfate (91.3%), while those with lower availability were the hormonal vaginal creams, conjugated estriol and estrogens (4.3%). Statistically significant greater availability was found in the municipalities with the RFM program for NPH insulin, regular insulin, prednisolone/prednisone, nicotine, Isoniazid 75 mg + Rifampicin 150 mg + Pyrazinamide 400 mg + Ethambutol 275 mg and all the psychotropic medicines (amitriptyline, carbamazepine, fluoxetine and clonazepam).

No medicine had statistically higher availability in the municipalities without the RFM program. Between the pharmacological or therapeutic groups, statistically significant differences were found between the groups of municipalities for the psychotropic medicines (93.8% in municipalities with the RFM *versus* 59.2%, $\rho = 0.002$) and those for tuberculosis (40.6% in municipalities with the RFM *versus* 16.2%, $\rho = 0.024$) (Table 2).

Table 2- Average availability of medicines among municipalities in the state of Minas Gerais, according to implementation of the Pharmacy Network Program (RFM)

MEDICINES	Municips. with RFM N= 32	Municips. without RFM N= 39	Minas Gerais N=69	ρ -value
<i>Antihypertensives and diuretics</i>	31 (96.9)	36 (97.3)	67 (97.1)	0.716
Captopril/enalapril	28 (87.5)	34 (91.9)	62 (89.9)	0.417
Hydrochlorothiazide	24 (75.0)	29 (78.4)	53 (76.8)	0.740
Atenolol/propranolol/carvedilol/metoprolol	27 (84.4)	31 (83.8)	58 (84.1)	0.947
<i>Drugs used in diabetes</i>	31 (96.9)	36 (97.3)	67 (97.1)	0.716
Metformin	25 (78.1)	34 (91.9)	59 (85.5)	0.101
Glibenclamide/ glicazide	27 (84.4)	32 (86.5)	59 (85.5)	0.535
NPH Human Insulin	30 (93.8)	23 (62.2)	53 (76.8)	0.002
Regular Human Insulin	29 (90.6)	23 (62.2)	52 (75.4)	0.006
<i>Sex hormones and modulators of the genital system</i>	32 (100.0)	33 (89.2)	65 (94.2)	0.076
Ethinylestradiol + levonorgestrel	27 (84.4)	28 (75.7)	55 (79.7)	0.370
Noretisterone+estradiol	24 (75.0)	25 (67.6)	49 (71.0)	0.497
Noretisterone	22 (68.8)	20 (54.1)	42 (60.9)	0.212
Medroxyprogesterone	14 (43.8)	20 (54.1)	34 (49.3)	0.393
Levonorgestrel	12 (37.5)	14 (37.8)	26 (37.7)	0.977
Estriol vaginal cream	02 (6.2)	01 (2.7)	03 (4.3)	0.445
Conjugated estrogens vaginal cream	02 (6.2)	01 (2.7)	03 (4.3)	0.445
<i>Antiinfectives for systemic use</i>	31 (96.9)	36 (97.3)	67 (97.1)	0.716
Fluconazole/itraconazole	29 (90.6)	29 (78.4)	58 (84.1)	0.166
Miconazole nitrate	25 (78.1)	28 (75.7)	53 (76.8)	0.810
Ciprofloxacin hydrochloride	24 (75.0)	22 (59.5)	46 (66.7)	0.172
Nystatin cream	10 (31.2)	11 (29.7)	21 (30.4)	0.891
Benzathine benzylpenicillin	13 (40.6)	11 (29.7)	24 (34.8)	0.343

<i>Analgesics</i>	29 (90.6)	36 (97.3)	65 (94.2)	0.254
Paracetamol	29 (90.6)	35 (94.6)	64 (92.8)	0.430
Dipyron oral solution	27 (84.4)	23 (89.2)	60 (87.0)	0.406
Ibuprofen	26 (81.2)	32 (86.5)	58 (84.1)	0.553
<i>Drugs for acid related disorders</i>	27 (84.4)	33 (89.2)	60 (87.0)	0.406
Omeprazole	21 (65.6)	27 (73.0)	48 (69.6)	0.508
Aluminum hydroxide	07 (21.9)	05 (13.5)	12 (17.4)	0.444
Ranitidine hydrochloride	16 (50.0)	22 (59.5)	38 (55.1)	0.431
<i>Drugs for obstructive airway diseases</i>	32 (100.0)	34 (91.9)	66 (95.7)	0.148
prednisolone sodium phosphate /prednisone	31 (96.9)	30 (81.1)	61 (88.4)	0.044
salbutamol sulfate	19 (59.4)	24 (64.9)	43 (62.3)	0.639
ipratropium bromide	10 (31.2)	13 (35.1)	23 (33.3)	0.733
<i>Antiparasitic products, insecticides and repellents</i>	32 (100.0)	34 (96.0)	66 (95.7)	0.148
albendazole	28 (87.5)	33 (89.2)	61 (88.4)	0.560
metronidazole/Teclozan	24 (75.0)	25 (67.6)	49 (71.0)	0.497
permethrin	13 (40.6)	23 (62.2)	36 (52.2)	0.074
<i>Antiepileptics and psychoanaleptics</i>	30 (93.8%)	22 (59.2)	52 (75.4)	0.002
amitriptyline hydrochloride	24 (75.0)	22 (59.5)	46 (66.7)	0.001
carbamazepine	22 (68.8)	21 (56.8)	43 (62.3)	0.002
fluoxetine	29 (90.6)	21 (56.8)	50 (72.5)	0.002
clonazepam	25 (78.1)	22 (59.5)	47 (68.1)	0.001
<i>Drugs for treatment of tuberculosis</i>	13 (40.6)	06 (16.2)	19 (27.5)	0.024
isoniazid 75 mg + rifampicin 150 mg +pyrazinamide 400 mg + ethambutol 275 mg	12 (37.5)	16 (16.2)	18 (26.1)	0.045
rifampicin 300 mg	08 (25.0)	04 (10.8)	12 (17.4)	0.121
<i>Other medicines</i>	31 (96.9)	37 (100.0)	68 (98.6)	0.464
salt for oral rehydration	31 (96.9)	32 (86.5)	63 (91.3)	0.136
ferrous sulfate	29 (90.6)	34 (91.9)	63 (91.3)	0.591
dexamethasone cream/ointment	28 (87.5)	28 (75.7)	56 (81.2)	0.210
folic acid	12 (37.5)	19 (51.4)	31 (44.9)	0.249
nicotine	18 (56.3)	06 (16.2)	24 (34.8)	<0.001

RFM: Rede Farmácia de Minas (*Pharmacy Network of Minas*); N: Number of samples

A significantly higher number of primary health care physicians of municipalities with the RFM program considered the availability of medicines ‘very good’ or ‘good’ versus non-RFM municipalities (65.6% versus 29.7%, $p = 0.005$). Moreover, when the medicines were not available in the pharmacies within the RFM program, physicians typically referred patients to the other program of SUS, the Popular Pharmacy program (Table 3).

The percentage of professionals responsible for dispensing medicines who reported that medicines shortages occur “always” or “repeatedly” in the three months prior to the interviewers was similar in the municipalities with and without the RFM program. The most frequently reported reasons for the lack of essential medicines among community pharmacies was the delay in the distribution of medicines. When a particular medicine was not available in the public pharmacy of primary health care, patients were typically directed to the federal programs of Popular Pharmacy (Table 3).

Table 3- Perception of patients, physicians, and medicine dispensers in primary health care services on the availability of medicines in Minas Gerais state

Actors	With RFM		Without RFM		ρ -value	
	N= 32		N=37			
	N	%	N	%		
Availability of medicines in the 3 months preceding the interview						
Physicians	Very good/Good	21	65.6	11	29.7	0.005
	Neither bad /Nor good	03	9.4	15	40.5	
	Bad/Very bad	04	12.5	08	21.6	
	Don't know/Not responded	04	12.5	03	8.1	
Conduct in situations of shortage of medicines in the municipal public network ^a						
	Analyzes the prescription substitution	20	62.5	28	75.7	0.160
	Forwards to the Popular Pharmacy Proper Place	25	78.1	30	81.1	0.871
	Recommends acquisition	24	75.0	25	67.6	0.162
	Private pharmacies accredited – Popular Pharmacy Program	18	56.2	22	59.5	0.903
Shortage of medicines in the 3 months preceding the interview						
	Always/Repeatedly	19	59.4	18	48.6	0.520
	Some times	08	25.0	14	37.8	
	Rarely/Never	05	15.6	05	13.5	
Reasons for the lack of medicines ^a						
Responsible for medicines dispensation	Inadequate scheduling	05	15.6	05	13.5	0.428
	Acquisition sector Disorganization	10	31.2	14	37.8	0.847
	Lack of medicines n in the pharmaceutical market	21	65.6	21	56.8	0.819
	Delay in the distribution by other instances of SUS	26	81.2	28	75.7	0.293
	Logistic problems of the municipality ^a	08	25.0	13	35.1	0.659
	Insufficient budget	15	46.9	23	62.2	0.399
Procedure adopted by the user when some medicines are not available^a						
	Looks for information about availability in another Pharmacy ^a	12	37.5	13	35.1	0.532
	Orient the patient to look for the Popular Pharmacy or the “Here you have Popular Pharmacy” program	29	90.6	34	91.9	0.288

	Record to contact the patient to notify when the medication arrives	09	28.1	06	16.2	0.241
	Existence of destocking periods, in the last 3 months?					
	Yes	25	78.1	29	78.4	
	No	06	18.8	07	18.9	1.00
	Don't know/No response	01	3.1	01	2.7	
Responsible for the pharmacies services coordination (manages)	Reasons for the existence of these periods of destocking^a					
	Disorganization of the acquisition sector	07	21.9	03	8.1	0.101
	Failures in the municipality scheduling	02	6.2	03	8.1	0.570
	Failures in the distribution	04	12.5	03	8.1	0.417
	Problems in the pharmaceutical market	10	31.2	15	40.5	0.423
	Problems of allocations	16	50.0	12	32.4	0.138
	Insufficient financial resources	14	43.8	10	27.0	0.146

^a The interviewed people could respond 'yes' for more than one alternative.

Regarding pharmacies services managers, there was no significant difference in the perception of no availability of essential medicines in the municipalities with and without the RFM program (78.1% versus 78.4%, $p = 1.00$). The main reasons for a stock out of a particular medicine in the municipalities with the RFM program were "problems of allocation financial resources" (50.0%) and "insufficient financial resources" (43.8%). In the municipalities without the RFM program, the main reasons for a stock out situation were the "problems in the pharmaceutical market" (40.5%) and "problems of allocation" (32.8%) (Table 3).

4. DISCUSSION

The availability of the 50 essential medicines in the public pharmacies of Minas Gerais primary health care was only 61.0% (Table 1), far lower than the 80% recommended by WHO⁴ as well as the 81.2% found in a study conducted among private Brazilian Pharmacies²³. Availability was also just lower than the national average of 62.5% previously verified by PNAUM⁹. However, encouragingly both values were higher than the 44.9% in a national study published in 2014 evaluating the availability of the same items among public ambulatory care pharmacies¹⁰.

Encouraging as well was that pharmacological or therapeutic groups relevant to primary health care, such as anti-hypertensive and anti-diabetic agents, analgesic and anti-inflammatory products, had availability above 75%, which is higher than seen in number of other LMICs³²⁻³⁴. High availability was also found in medicines such as analgesic/antipyretic/anti-inflammatory agents and salts for oral rehydration (>80%), with indexes that are higher than the national average. Such data, however, could be related to the dengue fever contingency in the State Plan, which included the distribution of these medicines to those regions in Minas Gerais with a high incidence of dengue during the study period⁹. Given the recurrence of this disease in Brazil, this result is important and we will be researching this further to help enhance the general availability of medicines among pharmacies in Minas Gerais. However, this does not exclude the necessity to investment in preventive measures against this vector (*Aedes aegypti*)³⁸. This can include a vaccine, but at an affordable price^{38,39}. Due to importance of contraceptives for the family planning, and patients dependent exclusively on SUS to obtain contraceptives, as well as the fact that these

medicines have federal funding, higher availability indexes were expected⁴⁰ and achieved (79.7%) (Table 1).

A concern though was the low availability for benzylpenicillin (34.8%), lower even than the national average (49.5%)⁴¹. This is a serious public health problem as benzylpenicillin is the first choice medicine for the treatment of syphilis and the prevention of its vertical transmission, which could be a contributing factor to the recent increase in the number of cases of this disease in Brazil⁴¹⁻⁴³. This low availability could be due to problems with the acquisition of raw material since 2014 with this situation still persisting⁴¹⁻⁴³. We will be following this up given the seriousness of the problem.

As seen, the municipalities opting to join the RFM program had a higher availability index of medicines and pharmacological or therapeutic groups. This increased availability together with the significantly higher rates of legal documentation, comfort for patients and employees, better conditions for storage of medicines, and conducting clinical activities in the pharmacies within the RFM program, can all contribute to improved access and use of medicines²³. Significant differences in the availability of medicines in municipalities with and without the program RFM program were seen with the psychotropic medicines, those for tuberculosis, as well as nicotine (Table 2). The higher availability of medicines for mental health in the municipalities with the RFM program could, in part, be associated with the requirement and incentive of the program for pharmaceutical professionals to remain full-time in pharmacies, which legally enables the dispensing of such medicines that are under special control in Brazil²³. Regarding the higher availability of medicines for tuberculosis and nicotine, this could be partially related to the presence of a pharmacist on the premise, which enables improvements in the scheduling and acquisition of medicines and a better follow-up and care for the patients⁴⁰. This higher availability could also enhance adherence among patients, reducing their complications, hospital admissions, and consequent public expenses⁴⁴⁻⁴⁸.

For diabetes, all evaluated medicines had an availability higher than 75%, similar to the findings of Helfer et al. (2016)⁸ who evaluated their average availability among public pharmacies in six municipalities in southern Brazil and verified availability higher than 80%. In the same way, Nascimento et al. (2017)⁹ verified an average above 80% for these medicines in a national study. Such results were expected considering the large investment in governmental programs to enhance the control of this chronic condition with a high prevalence as well as appreciable morbidity, mortality and burden to SUS⁴⁹. It should be also emphasized that insulins, which are also important in the treatment of diabetes, had higher availabilities in the municipalities with the RFM program. This is perhaps not surprising as physical characteristics including fridges are needed to store and dispense insulins, and the preliminary study stated that more than 80% of pharmacies in municipalities with RFM program had an exclusive refrigerator for the storage of thermolabile medicines with lower percentages observed in municipalities without RFM²³.

Regarding cases of medicines shortage, the higher frequency of patients being forwarded to the Popular Pharmacy program in all municipalities could be a reflection of the more frequent existence of these pharmacies versus private pharmacies accredited by the program in municipalities with a smaller populations⁵⁰. Substituting the requested medicines with another therapeutic option due to their unavailability was mentioned by more than 60% of professionals; however, such a practice could increase patients' risk of medication error and adverse reactions to medicines⁵¹. It may be that such practices become more common in Brazil and other countries in South America with increasing concerns regarding medicine shortages building on experiences in other countries⁵²⁻⁵⁴.

The better evaluation among physicians concerning the perceived availability of medicines in the municipalities with the RFM program is beneficial for patients. These findings corroborate the results demonstrating a higher availability index of medicines and pharmacological or therapeutic groups in these municipalities (Tables 1 and 2). This finding is also consistent with a previously published study, which demonstrated higher availability of medicines among patients in municipalities with RFM compared to municipalities without the RFM program (77.1% versus 61.4%) and better perceptions about pharmacy services by those responsible for dispensing medicines in those municipalities with RFM, physicians, and municipal managers²³.

Of concern is that the professionals responsible for dispensing medicines (pharmacists or attendants) and municipality pharmacy services managers reported a high frequency of medicine unavailability. Less than 20% reported that the unavailability of medicines rarely or never occurred, or even that there were no level of unavailability of the 50 medicines surveyed during the last three months, respectively. A similar situation was seen in the national research utilizing the same methodological approach⁹. These professionals listed financial reasons, insufficient budget, challenging characteristics of the pharmaceutical market, and delays in the distribution of medicines as the principal reasons for such situations. A possible explanation for this situation could be that municipalities with less than 100,000 inhabitants combine as inter-municipal health consortiums⁵⁵, and when there are medicine shortages the people responsible for dispensing medicines frequently tell their patients to look for the federal program Popular Pharmacy. This conduct illustrates knowledge about the existence of Popular Pharmacy program, which could reflect in part a contributive factor achieving an increase patients' access to medicines. However, it is noteworthy that an economic evaluation has shown that the dispensing of medicines in primary health care public pharmacies, besides possessing conditions to assure integrated care and universal quality, compared to the referred program of the federal government, was also more efficient⁵⁶. Further economic studies are necessary though to show whether the Popular Pharmacy program or RFM is better in terms of service delivery and overall efficiency in order that the government chooses one approach for all the country. Other considerations include the way pharmacists are remunerated under the various systems, which in a recently published article favoured a mixed model approach⁵⁷.

We accept that there are limitations with our study. The study design means it was not possible to establish the relationship of cause and effect. Consequently, we will seek to undertake a follow-up study in those pharmacies that were not part of the RFM scheme before and have joined since to try and ascertain the effect of their joining on subsequent availability of medicines as compared to other pharmacies. Moreover, the study has catalogued medicines evaluated according to RENAME; however, the states and municipalities have autonomy to make alterations in their lists of standardized medicines and this was not evaluated on the present study. Consequently, some medicines could not have been in the stock due to non-standardization at the municipal level. Besides, data collection was at one time point, and this could have occurred before or after the delivery of medicines. This could have led to under- or super-estimated indexes of availability, respectively. In addition, any medication was considered available if there was at least one unit in stock. Consequently, it was not possible to make inferences about the adequacy of amounts in stock for local demands. Despite these limitations, we believe that findings of the study present are robust providing direction for the future especially in places with drug availability problems.

5. Conclusion

This study provides important information to guide public policies aiming to enhance access to essential medicines as it evident in Brazil that availability is still a challenge. The low availability of medicines for epidemiologically important conditions such as tuberculosis and benzylpenicillin should be urgently addressed. However, the increased availability of medicines for highly prevalent chronic conditions such as diabetes and hypertension are encouraging. Future research projects should focus on the assessment of other dimensions to better understand the impact of financing the physical structure of public pharmacies on access to medicines, especially in LMICs.

Notwithstanding this, access to medicines demands constant monitoring in view of the importance of making essential medicines continually available and affordable to improve the care of patients. Consequently, strategies that reinforce the importance of access to essential medicines are important to persuade governments to adopt measures that are able to effectively enhance access. Such programmes can be monitored via our recently proposed indicator for access to medicines.

It is known that the development of public policies of such magnitude are not easy especially in countries with limited resources. This is exacerbated within a country such as Brazil with its appreciable regional disparities, size of the population and universal right to health. Strategies such as the program Pharmacy Network of Minas Gerais show potential relevance and ability to promote improvements to achieve agreed WHO targets for the availability of essential medicines. The results demonstrate that the financing of this program must be maintained in the State of Minas Gerais with concerns addressed. We will be monitoring this in the future to provide guidance to other states in Brazil as well as other LMICs.

Conflicts of interest and funding

The authors have disclosed that they have no conflict of interest.

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