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Economic evaluation of the Programs Rede Farmácia de Minas do SUS *versus* Farmácia Popular do Brasil

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Abstract *We conducted an economic assessment of the Pharmaceutical Assistance - Rede Farmácia de Minas Gerais-RFMG and Farmácia Popular do Brasil-FPB to ascertain which of the two models stands out as the most efficient. To do this, a model, which consisted of a study of incurred costs in both programs, up to the dispensing of medicine to citizens, was developed. The uncertainties of the proposed model were tested using the Monte Carlo method. If the entire population initially estimated in the RFMG were attended in the FPB, there would be an additional cost of R$ 139,324,050.19. The sensitivity analysis appeared to be favorable to the RFMG. A total of 10000 simulations were carried out, resulting in a median value of R$ 114,053,709.99 for the RFMG and R$ 254,106,120.65 for the FPB. The current National Drug Policy emphasizes the need to strengthen pharmaceutical services beyond the mere acquisition and delivery of pharmaceutical products. The public healthcare service model, consistent with the principles and guidelines of the SUS, seems to be more appropriate in ensuring complete and universal quality healthcare services to the citizens. The economic study conducted reinforces this fact, as it appears to be a more efficient alternative of the direct use of resources in the public health network.*

Key words *Public Health, Health economics, Access to medicines, Pharmaceutical care*

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Introdution

In Brazil, ensuring access to medicines has become one of the crucial issues within national health priorities and has set up in guiding principle of public policy. The challenge of enabling citizens' access to effective, safe and quality medicines is presented with highly relevant and high financial impact for the public sector.

Currently, the sum of public and private health expenditure stands at around 8.4% of gross domestic product – GDP[1]. It is estimated that 43% of costs are carried out directly by public sector. When considering universal health systems, as is the case of Brazil, the amounts spent on health appear to still be short of national needs and comparatively lower than per capita spending of many countries[2].

In last years, costs in three spheres of government with medicines have been growing at a faster rate than other spending in health[3]. In 2009, expenditures on final medicines consumption in Brazil were 1.9% of GDP[3]. By analyzing health spending (public and private) it was found that medicines were responsible for about 22.0%[4].

Efficiency of government action and consequent active involvement of State in production and regulation of services in economy has been the subject of debate for decades. Often, this active state involvement in the economy has been assessed as ineffective. After the fall of the Berlin Wall and the economic crisis that dominated the 1980s, it stood out liberal economic theories that eventually influenced intellectual formation of many Latin American economists[5,6]. Experiences supposedly successful in Chile in 1970 and 1980 encouraged financial institutions and international organizations based in the United States, from 1990, to recommend a set of neoliberal economic policies[5,6]. Among the main propounded aspects, stand out: fiscal discipline, tax reform and reduction of public spending; privatization of state-owned enterprises and deregulation; interest rates and foreign market exchange; rights to intellectual property, trade opening and foreign direct investment[5,6].

Brazil since 90s has adopted these recommendations, having as justification economic development acceleration. Privatization of companies and public services is one of the most controversial and debated points in Brazil. Even so, from 2004, Ministry of Health - MH started to privatize SUS' pharmaceutical care services to primary care through accreditation of private pharmacies, the Farmácia Popular do Brasil (FPB) program.

Paradoxically to privatizing policies adopted in the country and in the world, public programs and services in pharmaceutical care were created, as Dose Certa program, of São Paulo State, Rede Farmácia de Minas (RFMG) program, of Minas Gerais State and Farmácia da Bahia program, of Bahia State in 2012. In addition, the Farmácia Cidadã, in Espírito Santo State, which sought to structure public pharmacies for dispensing medicines that make up the primary care[7].

Health expenditures ever higher on a budget and tax limitation scenario brings to the fore the need to economically evaluate the best allocation of public resources. In this perspective, the dilemma presented, after the adoption of the liberal economic model of 1990s by the country, focuses on evaluating the efficiency and cost after the privatization of pharmaceutical care services defined by law, in face of state's alternative execute them directly in public pharmacies. So far, dominant political thought has been the privatization or destatization of public services, since the State pays to private sector to perform a service or action initially performed directly by him, under the motto of highest quality and efficiency in application of resources.

FPB and RFMG programs aim to allow medicines' access to users, through funding from public budgetary resources[8-10]. Access to health goods and services is an expression used in literature to determine the capacity of a health care system to respond to health needs of a population[7,11].

In Brazil, as in other countries, there has been a big debate about the efficiency in public services provision and on composition of a mix of public and private services in health. One perspective defended would be that SUS would act as private service buyer to meet population's health needs. In other, that SUS is constituted as a direct provider of these health services. In both scenarios, services should be universal and publicly funded.

Farmácia Popular do Brasil Program – FPB

In its first phase (2004) the FPB program had a strategy to provide access to essential medicines with commercialization at low cost (Rede Própria). That program provides a fixed cast, currently of 112 marketed drugs, mostly by lower values than CMED consumer prices set for sale in pharmacies and drugstores, in contraposition to the Aqui tem Farmácia Popular do Brasil program which is composed by a more restricted cast and to meet specific health conditions.

In 2006, the program was expanded and started to accredit private pharmacies and drugstores

to provide medicines for copayment system[8,9,12]. In 2013, there were 25,624 accredited pharmacies and drugstores. About 80% of the demand was for hypertension and diabetes medicines. In the same period, MS spending increased 2.5 times, going from R$ 763 million in 2011 to R$ 1.9 billion reais[13].

Rede Farmácia de Minas Program – RFMG

RFMG program was created by Department of Health of Minas Gerais State in order to structure in 853 municipalities public pharmaceutical care service, with high standards of sanitary quality and integrated to primary care services[14]. Its main objective is to ensure access to all medicines distributed by SUS to population. Initially, the program prioritized municipalities with population less than 10,000 inhabitants, which corresponds to 57.3%. As early as 2009, municipalities with up to 30,000 inhabitants (78.5%) and in 2011, the program expanded to all municipalities of Minas Gerais state. In 2013, there were more than 500 units of RFMG program inaugurated in the state of Minas Gerais.

In this program, drugs are set in Deliberation CIB-SUS/MG 1392 of February 20th, 2013 of basic component, besides it can be complemented with the list of medicines of the municipality. State cast consists by 153 medicines and supplies distributed by the state to municipalities, and of these, eight Women's Health Program medicines are procured centrally by Ministry of Health.

The choice of compared alternatives comes from discussions in context of Pharmaceutical Care Management as the best option of public funds investment. The debate brings up the question: it would be better to outsource the supply of medicines to private sector or would be more cost-effective providing in public pharmacies? A better understanding of these alternatives is shown to be essential due to significant amount allocated to "Aqui tem Farmácia Popular do Brasil" program, from the Ministry of Health, in addition to the growing number of private units accredited throughout the national territory.

Thus, this study's objective is to conduct an economic evaluation among the cost of pharmaceutical care programs RFMG and FPB to identify which model has a lower cost to provide access to medicines, from the perspective of public financing (SUS). It was not the object of this study the comparison with the Rede Própria do Programa Farmácia Popular.

Methods

Study Design and type of analysis

An economic evaluation was carried out from the list of common medicines to Rede Farmácia de Minas and "Aqui tem Farmácia Popular do Brasil." As FPB and RFMG programs aim to enable access with a consequential availability for users of essential medicines, this study conducted an economic evaluation to compare costs between the two alternatives.

In consonance with Methodological Guidelines for Economic Evaluations of Health Technology of Brazil[15], the estimative of costs incurred in both programs to dispensing medicines to citizens was carried out in stages:

I) identification of costs relevant to the assessment;

II) measurement of resources used and;

III) valuation of resources.

Identification of relevants costs to evaluation

In RFMG costs involved until final dispensation were identified, classified as:

1) *Programme management: planning, control, selection and programming;*

2) Acquisition: acquisition costs involving unit cost, cost per monthly treatment and acquisition process cost;

3) Logistics operation: storage, distribution and transportation, costs lossy;

4) Dispensing and pharmacies maintenance: costs associated to operation and maintenance of pharmacies, costs lossy.

Average cost per dispensation in public pharmacies was calculated by dividing the sum of the costs to the dispensation by the average number of dispensations day and the average number of drugs per prescription.

In FPB modality, SUS outsources dispensation to private sector. The repayment amount paid by SUS to accredited private pharmacies includes costs related to stages 2, 3 and 4.

Analogously to RFMG, there are also costs with the program management and losses related to fraud. Thus, costs have been identified and classified as:

1) *Programme management: planning, control, selection and programming;*

2) Dispensation: unit cost and cost per monthly treatment fixed based on repayment amounts by MS; cost of compensation operation; costs lossy.

FPB is also subjected to losses due to the payment of fraudulent or improper dispensations, as pointed out in *Operational Audit Report* in FPB - *Copayment System* from Court Union Accounts[16] that found billing of medicines to people who had never demanded the program or deceased people. Thus, there is also a cost associated with losses in FPB in its final dispensing step.

Origin of economic data

Economic resources consumed were collected in legislation and documents produced by public administration. Market values for cost of human resources were also consulted according to data from the Estação de Pesquisa de Sinais do Mercado de Trabalho (EPSM)[17]. The average number of dispensations in RFMG was obtained in SIGAF, Integrated system of Pharmaceutical Care Management. Data collection occurred in the period from January to August, 2013.

Measurement and valuation of used resources

Unit cost of medicines

Unit cost of medicines in RFMG was established by the registered value by SES/MG in last bidding procurement process conducted until December, 2012. For FPB, values considered were reference values to be paid to private pharmacies by dispensing to patient.

In this study, we adopted the average tax burden of 26.27% (8.83% to 33.14%) to discount values related to unit costs[18], since all medicines' suppliers for final consumption should collect taxes at the time of the sale. Thus, public financer to acquire or reimburse the cost of medicines gets back part of the value paid due to the tax burden on medicines sales in Brazil.

Monthly treatment cost

Estimated costs for treatment were established by multiplying the unit cost of acquiring the necessary amount of pharmaceutical units for a monthly treatment. In turn, the required number of pharmaceutical units for a treatment has been established from the defined daily dose parameters (DDD) multiplied by thirty days for each medicine, according to the Anatomic-Therapeutic Classification System of substances[19].

Monthly treatment cost was adjusted to aggregate the percentage figures relatives to cost of logistics operation, cost losses and cost of dispensation and maintenance of the units or compensation when necessary. In FPB, monthly cost of treatment was calculated from the reference value and the number of pharmaceutical units per month of treatment, added to cost losses.

Cost of logistic operator

The cost of logistic operation was set based on the amount contracted by bidding conducted by SES/MG in 2011 for the realization of integrated storage services and distribution/transportation to the dispensing units of RFMG which adds an average of 2% on the unit cost.

Cost of medicines losses

Costs of medicines losses include costs related to uncertainties in scheduling when these lead to an acquisition more than future demand. Also are related to problems in storage and transport, either for damage, fraud and misappropriation of goods or expiration date. Studies in literature on losses are scarce and do not show statistics in the country. Thus, it is inferred to be losses in public and private sectors of the country. The standard for pharmaceuticals losses in public sector varies from 2 to 5% in monetary units of annual volume handled, reaching 10% in specific situations[7,20]. In this study we adopted the value of 5% of loss in RFMG and 2% in FPB program, considering the possibility of fraud losses.

Average monthly cost of dispensing and maintenance in RFMG pharmacies

Average monthly costs of dispensing and maintenance in RFMG pharmacies were defined by the sum of all resources spent on service production (Table 02). Relative costs to property were valued based on the cost of m^2 built in 2012 and the estimated value of rental (0.5% to 0.7% of the property total value), released by Regional Council of Realtors of Minas Gerais. Market values for employees salary were taken from the base EPSM[17]. Remaining costs were raised from typical spending of RFMG units.

Unit's functioning was parameterized to twelve hours of service a day, five days a week for 22 days per month. The working day considered for employees was 40 hours per week and the average time of dispensation adopted was 6 minutes. RFMG units perform daily, on average, about 300 dispensations, resulting in 6,600 monthly dispensations. Average number of dispensations was extracted, average capacity of daily attendance, recorded in SIGAF, multiplied by 22 days and divided by the average number of medicines prescribed per patient.

The average of 2.2 drugs prescribed by patient was adopted[21,22]. The overall average monthly cost (dispensation+maintenance) in RFMG pharmacies was estimated from the ratio between the amount of consumed resources by the average number of dispensations held, available in SIGAF, Integrated system of Pharmaceutical Care Management.

Pharmaceutical units requested at RFMG and estimation of annual expenditure

The number of pharmaceutical units requested in Minas Gerais during 2012 was obtained from the SAF/2012 Management Report[14]. From this, the number of monthly treatments for each drug in 2012 was estimated and the estimation of total value spent by SES/MG for common medicines to the programs.

Sensitivity analysis

For sensitivity analysis, we sought to identify the main parameters subject to variability and uncertainty. Thus, univariate analyzes were performed in order to improve the reliability of results. Then, plausible variation ranges of factors related to uncertainty were verified and defined the ranges of measures. Different results from the variation of the parameters were calculated and presented. Uncertainties of the model were tested for their robustness through univariate sensitivity analysis and probabilistic, using Monte Carlo simulation.

Results

Medicines provided by the programs

FPB program provides 15 pharmacological subgroups, 24 medicines, 41 presentations and 1 supply in accredited private pharmacies and drugstores. In addition, RFMG program provides in public pharmacies of SUS in 853 municipalities, 74 pharmacological subgroups, 129 medicines, 240 presentations and 9 different supplies.

Table 1 shows the list with 22 common medicines to these two programs, according to therapeutic indication and its respective Defined Daily Dose (DDD).

Estimated cost of a dispensation in a unit of Rede Farmácia de Minas

Table 2 summarizes costs associated to fixed expenses and monthly variable in a unit of RFMG. Largest costs are associated to human resources and social charges, representing 86.4% of total monthly costs.

Average cost of a dispensation was estimated at R$ 2.71, taking the average number of 2.2 medicines prescribed per patient.

Monthly treatment cost per patient

Calculation of monthly treatment costs including other expenses for production of the service in the SUS revealed that seventeen of the 22 treatments are cheaper in RFMG. Three of five remaining medicines are part of Women's Health Program (Table 3). Women's Health Program is included in the National Policy of Integral Attention to Women's Health and covers the entire national territory[23]. Medicines and supplies in this program have been provided through centralized acquisition in MS, which enables scale gains and lower unit prices.

On the other hand, for the medicines Levodopa 100 mg + benzerazide 25 mg and hydrochlorothiazide 25 mg, treatment costs were equal and lower, respectively, in FPB. This is explained by the inclusion of expenses for dispensing in SUS, although unit costs of public acquisition are equal or inferior in RFMG.

Economic analysis between RFMG and FPB

From the estimated population met in 2012, in Minas Gerais, we calculated total annual cost in monetary units for each medicine common to the programs. If the population initially estimated in RFMG were all met in FPB, there would be an incremental cost of R$ 139,324,050.19 (Table 3).

It should be also accounted in the cost of FPB the amount paid by MS to Caixa Econômica Federal, related to hiring of banking services for managing financial transactions of reimbursement to accredited pharmacies and drugstores. According to MS, in 2012 this value was R$ 632,020.48.

Table 1. List of medicines listed in both programs and their respective use indication.

Use indication	Medicines	DDD (mg)
Asthma	Beclomethasone; Dipropionate 250 mcg oral aerosol	0.8
	Beclomethasone; Dipropionate 50 mcg nasal suspension	0.8
	Salbutamol; Sulfate 100 mcg aerosol	0.8
Contraceptives	Levonorgestrel + Ethinylestradiol; 0.15mg + 0.03 mg tablet	-
	Medroxyprogesterone; Acetate 150 mg/ml suspension for injection	1.67
	Norethisterone; 0.35 mg tablet	-
	Norethisterone enanthate + estradiol valerate; 50mg/ml + 5mg/ml injection	-
Diabetes		
Oral hypoglycemiant	Glibenclamide; 5 mg tablet	10
	Metformin; Hydrochloride 850 mg tablet	2000
Insulins*	NPH Human Insulin; 100 UI/ml 3 mL	40
	Regular Human Insulin; 100 UI/ml 10 mL	40
Cardiovascular Diseases		
Antihypertensives	Enalapril; maleate 10 mg tablet	10
	Propranolol; hydrochloride 40 mg tablet	160
	Hydrochlorothiazide; 25 mg tablet	25
	Losartan; potassium 50 mg coated tablet	50
	Captopril; 25 mg tablet	50
Hypolipemiant	Simvastatin: 10mg tablet	30
	Simvastatin; 40mg tablet	30
Parkinson's Disease	Levodopa; Benserazide; hydrochloride 100 mg +25mg tablet	600
	Levodopa+Carbidopa; 250mg + 25 mg tablet	600
Glaucoma	Timolol; maleate 5 mg/ml ophthalmic solution	-
Osteoporosis	Alendronate; sodium 70 mg tablet	10

Notes: * DDD in U. For items. Levonorgestrel + Ethinyl estradiol; 0.15 mg + 0.03 mg, Norethisterone; 0.35 mg, Norethisterone enanthate + Valerate Estradiol; 50mg / ml + 5mg / ml inj and Timolol; maleate 5 mg / ml Ophthalmic sol because it isn't available in DDD ATC / DDD, was used to calculate the information of the maximum daily dose of each medication, available in package insert.

Sensitivity analysis

Univariate sensitivity analysis were performed on variables showing greatest impact on results: monthly salary of a pharmacist, dispensations number per month, average number of prescribed medicines per patient, medicines unit cost, cost with logistical losses, cost for losses reimbursement and tax burden (Table 4).

In multivariate sensitivity analysis with an average number of prescribed medicines per patient versus average amount of monthly dispensations (Graph 1), we observed a greater efficiency of RFMG while there is an increase in number of medicine's prescription and the average number of monthly dispensations. Number of monthly dispensations was the only parameter with potential impact on ICER, favorable to FPB only in the scenario in which this number is less than 2,300. When analyzing cost with logistical losses versus average number of monthly dispensations, we observed a greater efficiency of RFMG even in the unlikely scenario up to 40% of losses in public sector (1.02 to 1.4).

Monte Carlo analysis showed favorable to RFMG. 10,000 simulations were performed resulting in an average value of R$ 114,053,709.99 for RFMG and R$ 254,106,120.65 to FPB program.

Discussion

In Brazil, right to health is guaranteed in Federal Constitution to all Brazilians. It is up to the State run through SUS integrated care, including pharmaceutical care. However, full realization of this duty is hindered by targeting observed in

Table 2. Monthly expenses for the operation of a Unit of Rede Farmácia de Minas.

Item	Parameter	Quantity (a)	Monthly Unit Cost (R$) (b)	Monthly Total Cost (R$) (a*b)	% of item	% of total
Human Resources (HR)	Pharmacist*	2	3,455.90	6,911.80	36.8%	17.6%
	Assistant - Pharmacy Technician*	6	1,832.48	10,994.88	58.6%	27.9%
	Training	8	106.62	852.96	4.5%	2.2%
Human Resources Subtotal				**18,759.64**	**100.0%**	**47.6%**
Social charges	13th salary (9.75%)	1	1,388.57	1,388.57	11.4%	4.4%
	Vacations (+1/3 of vacations) (13.00%)	1	1,851.42	1,851.42	15.2%	5.9%
	INSS, FGTS and food (57.00%)	1	8,117.78	8,117.78	66.8%	25.9%
	Transportation Vouchers**	8	116.60	932.80	6.1%	2.4%
	Benefits (uniforms)	8	100.00	66.67	0.4%	0.2%
Subtotal social charges HR				**15,280.04**	**100.0%**	**38.8%**
Consumables	General services, hygiene and cleaning materials	1	500.00	500.00	62.5%	1.3%
	Consumables	1	300.00	300.00	37.5%	0.8%
Subtotal consumables				**800.00**	**100.0%**	**2.0%**
Services	Telecommunications (internet/ phone)	1	150.00	150.00	15.3%	0.4%
	Corrective and evolutive software maintenance***	1	70.00	70.00	7.1%	0.2%
	Water and electricity	1	250.00	250.00	25.4%	0.6%
	Waste disposal****		512.95	512.95	52.2%	1.3%
Subtotal services				**982.95**	**100.0%**	**2.5%**
Property	Commercial Building*****	1	2,222.40	2,222.40	77.0%	5.6%
	Building maintenance (4%)		665.00	665.00	23.0%	1.7%
Subtotal Property				**2,887.40**	**100.0%**	**7.3%**
Furniture and equipment	Equipment maintenance (5%)		250.00	250.00	37.5%	0.6%
	Depreciation of furniture and equipment	1	416.67	416.67	62.5%	1.1%
Subtotal furniture and equipment				**666.67**	**100.0%**	**1.7%**
Total				**39,376.70**		**100%**

Notes: * Source: RAIS – Elaboration: Research Station of Market Signals – EPSM/NESCON/FM/UFMG ; ** Pass value: Round trip by bus to the city of Belo Horizonte; *** Value calculated from SES-MG contract for maintenance and development of SIGAF; **** Source: Bidding process carried out by FHEMIG and Contracts Report of the Secretariat of Comptroller General of the State of Pernambuco; ***** Source: Regional Council of Realtors – CRECI-MG

pharmaceutical care with the separation of medicines in different components: basic, strategic and specialized component of pharmaceutical care, as well as access rules in SUS, such as the release of cancer medicines, the private supplementary health system and, more recently, the co-pay/compensation of FPB system. Moreover, it is usual that the citizen needs to carry out personal outlay to purchase medicines. This situation tends to become more severe in case of chronic diseases. Also, due to high costs of new treatments, medicines can become unreachable[24].

Brazil, with its participation in globalized world, has been receiving influences of proposed and implemented thoughts and theories in other countries. In economic field, there is a set of policies with neoliberal characteristics, among them, privatization in order to strengthen the role of private sector in economy[5,25]. However, this debate on private sector participation in SUS

Table 3. Cost minimization analysis by medicine and annual expenditure estimate in both programs: RFMG and PFPB.

Medicine	Treatment (year)	RFMG			
		Unitary value (a) R$	Cost of monthly treatment per patient R$	Cost of monthly treatment per patient adjusted (b) R$	Total Cost (c) (R$)
NPH Human Insulin; 100 UI/ml 3 mL	655,522	4.5800	13.5073	17.1783	11,260,717.20
Captopril; 25 mg tablet	3,496,121	0.0093	0.4101	3.1511	11,016,614.46
Losartan; potassium 50 mg coated tablet	4,512,958	0.0279	0.6171	3.3728	15,221,440.53
Simvastatin; 40mg tablet	1,212,782	0.0902	1.4964	4.3145	5,232,529.32
Simvastatin; 10mg tablet	1,118,485	0.0378	2.5076	5.3976	6,037,097.18
Enalapril; maleate 10 mg tablet	1,576,560	0.0151	0.3336	3.0691	4,838,669.33
Metformin; hydrochloride 850 mg tablet	1,365,689	0.033	1.7175	4.5513	6,215,673.93
Salbutamol; Sulfate100 mcg aerosol	301,599	0.01	1.7695	4.6071	1,389,482.48
Regular Human Insulin; 100 UI/ml 10 mL	258,259	9	7.9628	11.2401	2,902,857.79
Propranolol; hydrochloride 40 mg tablet	854,170	0.009	0.7981	3.5666	3,046,490.57
Alendronate; sodium 70 mg tablet	358,114	0.2452	0.7749	3.5418	1,268,358.64
Glibenclamide; 5 mg tablet	1,155,875	0.0092	0.4063	3.147	3,637,564.07
Norethisterone + estradiol; 50mg+5/mL inj solution	784,260	3.05	2.2488	5.1203	4,015,663.36
Beclomethasone; 250 mcg oral aerosol	274,185	0.085	6.0164	9.1554	2,510,283.84
Beclomethasone; 50 mcg nasal suspension	51,725	0.095	33.6209	38.7199	2,002,800.72
Levodopa+Carbidopa; 250mg + 25 mg tablet	21,491	0.159	8.4406	11.7518	252,562.24
Timolol; 5 mg/mL ophthalmic solution	98,604	0.196	0.8671	3.6405	358,970.50
Levodopa + Benserazide; 100 mg +25 mg tablet	**7,249**	**0.99**	**131.3869**	**143.4272**	**1,039,660.10**
Norethisterone; 0,35 mg tablet	**187,963**	**0.0583**	**1.2893**	**4.0928**	**769,285.30**
Levonorgestrel + Ethinylestradiol; 0,15+0,03 mg tablet	**1,949,218**	**0.0191**	**0.295**	**3.0278**	**5,901,827.35**
Medroxyprogesterone; 150 mg/ml inj suspension	**902,284**	**7**	**1.7238**	**4.5581**	**4,112,695.39**
Hydrochlorothiazide; 25 mg tablet	**7,220,275**	**0.008**	**0.177**	**2.9014**	**20,948,976.68**
Total cost					**113,980,220.98**

it continues

is controversial. On one hand, it is argued that such participation would relieve the public sector of an unnecessary burden, it would be more efficient and would possess greater capacity and speed of innovation. On the other hand, adoption of a mixed model introduces irrationality in organization of actions and in spending, in a context of scarce resources, as spraying public resources in concomitant shares offered in same places, in private and public pharmacies[25,26]. Thus, financial resources allocated by MS to private sector, via FPB, for the supply of 22 medicines reviewed here is equivalent to the budget transferred to public sector for the supply of 129 medicines members of the State Relationship of basic Medicines of Minas Gerais.

One aspect often related to FPB deployment refers to increasing access to medicines by population. It is important to understand that ensuring access means focusing in all its dimensions, which is equivalent to say that it is not sufficient having only availability. Medicines must be prescribed and used rationally, they must be affordable and provide the adequate standard of quality[27]. However, the supply of these products in general is not associated with the necessary

Table 3. continuation

Medicine	FPB			
	Unit reference value (d) R$	Cost of monthly treatment per patient R$	Cost of monthly treatment per patient adjusted (e) R$	Total Cost (f) (R$)
NPH Human Insulin; 100 UI/ml 3 mL	26.55	78.3013	79.8673	52,354,742.56
Captopril; 25 mg tablet	0.28	12.3866	12.6344	44,171,293.96
Losartan; potassium 50 mg coated tablet	0.32	7.0781	7.2196	32,581,941.72
Simvastatin; 40mg tablet	0.89	14.7644	15.0597	18,264,155.39
Simvastatin; 10mg tablet	0.23	15.2621	15.5674	17,411,848.20
Enalapril; maleate 10 mg tablet	0.39	8.6264	8.7989	13,872,054.01
Metformin; hydrochloride 850 mg tablet	0.16	8.3272	8.4937	11,599,746.42
Salbutamol; Sulfate100 mcg aerosol	0.1	17.6952	18.0491	5,443,594.73
Regular Human Insulin; 100 UI/ml 10 mL	26.55	23.4904	23.9602	6,187,937.56
Propranolol; hydrochloride 40 mg tablet	0.08	7.0781	7.2196	6,166,800.66
Alendronate; sodium 70 mg tablet	3.37	10.6487	10.8617	3,889,728.65
Glibenclamide; 5 mg tablet	0.12	5.3086	5.4147	6,258,752.43
Norethisterone + estradiol; 50mg+5/mL inj solution	10.17	7.4983	7.6483	5,998,261.89
Beclomethasone; 250 mcg oral aerosol	0.15	10.6171	10.8295	2,969,280.66
Beclomethasone; 50 mcg nasal suspension	0.13	46.0075	46.9277	2,427,353.30
Levodopa+Carbidopa; 250mg + 25 mg tablet	0.58	30.7896	31.4054	674,946.54
Timolol; 5 mg/mL ophthalmic solution	0.86	3.8045	3.8806	382,639.12
Levodopa + Benserazide; 100 mg +25 mg tablet	**1.05**	**139.3497**	**142.1367**	**1,030,305.46**
Norethisterone; 0,35 mg tablet	**0.1274**	**2.8186**	**2.875**	**540,384.04**
Levonorgestrel + Ethinylestradiol; 0,15+0,03 mg tablet	**0.1795**	**2.7796**	**2.8352**	**5,526,330.54**
Medroxyprogesterone; 150 mg/ml inj suspension	**11.12**	**2.7384**	**2.7932**	**2,520,223.89**
Hydrochlorothiazide; 25 mg tablet	**0.08**	**1.7695**	**1.8049**	**13,031,949.44**
Total cost				**253,304,271.17**

it continues

pharmaceutical monitoring integrated to health service.

In traditional model, commercial pharmacy has its compensation based on a percentage of the value of dispensed medicines. However, availability of drugs, although it is essential, it do not imply in quality in use and consequent effectiveness. In turn, pharmacies belonging to public health system have as a guideline integral attention, in a multidisciplinary approach, which requires proper monitoring of the patient. Often, this monitoring represents recommending to prescribers and patients nonpharmacological therapies, substitution of treatment and even the suspension of use when unnecessary. Measures in private sector mean reduction in revenues and, therefore, they are economically discouraged. Thus, ensuring access is essential since drugs are considered essential and with due pharmacotherapeutic monitoring.

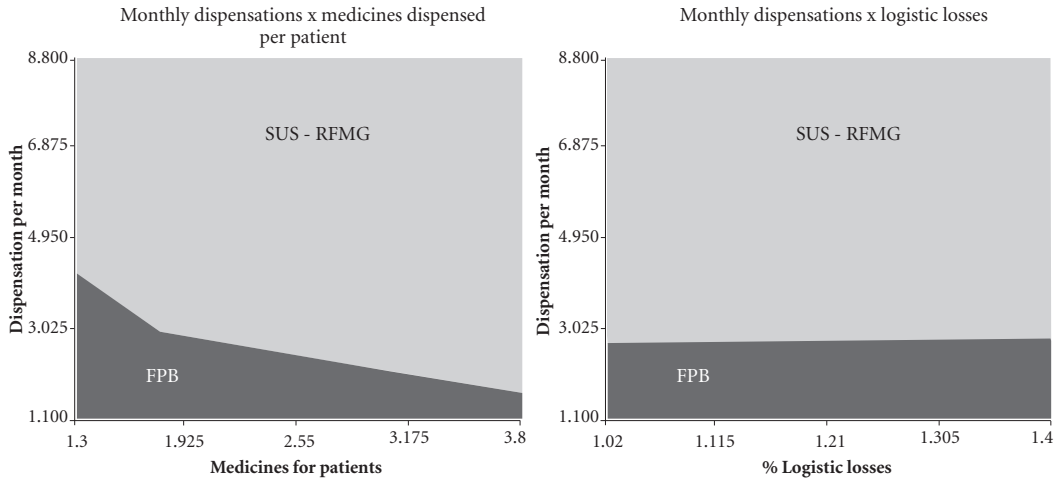
This study considered that access to medicines carefully selected by SUS is the benefit that justifies allocation of economic resources in public drug programs. It is known that FPB program, in some cases, allows the patient to access different brands as prescription. In dispensation carried out by SUS, the prescription is satisfied with the product available, as a result of bidding contest. Potential therapeutic differences were not analyzed. This study assumes that drugs pre-

Table 3. continuation

Medicine	FPB x RFMG		
	Δ Unitary value Acquisition =(d-a)/d	**Δ Cost of monthly treatment per patient adjusted =(e-b)/e**	**Incremental Cost Δ=(f-c)**
NPH Human Insulin; 100 UI/ml 3 mL	82.8%	78.5%	41,094,025.36
Captopril; 25 mg tablet	96.7%	75.1%	33,154,679.50
Losartan; potassium 50 mg coated tablet	91.3%	53.3%	17,360,501.19
Simvastatin; 40mg tablet	89.9%	71.4%	13,031,626.07
Simvastatin; 10mg tablet	83.6%	65.3%	11,374,751.02
Enalapril; maleate 10 mg tablet	96.1%	65.1%	9,033,384.68
Metformin; hydrochloride 850 mg tablet	79.4%	46.4%	5,384,072.49
Salbutamol; Sulfate100 mcg aerosol	90.0%	74.5%	4,054,112.24
Regular Human Insulin; 100 UI/ml 10 mL	66.1%	53.1%	3,285,079.77
Propranolol; hydrochloride 40 mg tablet	88.7%	50.6%	3,120,310.10
Alendronate; sodium 70 mg tablet	92.7%	67.4%	2,621,370.01
Glibenclamide; 5 mg tablet	92.4%	41.9%	2,621,188.36
Norethisterone + estradiol; 50mg+5/mL inj solution	70.0%	33.1%	1,982,598.53
Beclomethasone; 250 mcg oral aerosol	43.3%	15.5%	458,996.82
Beclomethasone; 50 mcg nasal suspension	26.9%	17.5%	424,552.58
Levodopa+Carbidopa; 250mg + 25 mg tablet	72.6%	62.6%	422,384.30
Timolol; 5 mg/mL ophthalmic solution	77.2%	6.2%	23,668.62
Levodopa + Benserazide; 100 mg +25 mg tablet	**5.7%**	**-0.9%**	**-9,354.64**
Norethisterone; 0,35 mg tablet	**54.3%**	**-42.4%**	**-228,901.26**
Levonorgestrel + Ethinylestradiol; 0,15+0,03 mg tablet	**89.4%**	**-6.8%**	**-375,496.80**
Medroxyprogesterone; 150 mg/ml inj suspension	**37.1%**	**-63.2%**	**-1,592,471,51**
Hydrochlorothiazide; 25 mg tablet	**90.0%**	**-60.8%**	**-7,917,027.24**
Total cost			**139,324,050.19**

Table 4. Univariate sensitivity analysis of parameters.

Parameter	Base value	Interval	ICER (FPB - RFMG/SUS) R$
Monthly salary per Pharmacist (R$)	3,455.90	(990.00 – 5,921.24)	(156,636,856.12 ;122,011,263.31)
Amount of Dispensation per month	6,600	(1,100 – 8,800)	(-245,268,232.22 ; 158,553,674.31)
Amount of Medicines per Patient	2.20	(1.30 – 3.80)	(86,072,819.29 ; 171,710,779.04)
Variation Coefficient of Unit Cost	1.00	(0.35 – 1.65)	(163,414,165.30 ; 115,233,954.13)
Logistic Losses Coefficient	1.05	(1.02 – 1.40)	(140,382,965.46 ; 126,970,159.42)
Losses in Reimbursement Coefficient	1.02	(1.005 – 1.05)	(135,598,997.67 ; 146,774,183.80)
Tax Burden Coefficient	0.2627	(0.0883 – 0.3314)	(190,473,788.67 ; 119,175,055.25)



Graph 1. Multivariate sensitivity analysis of selected parameters.

viously selected by SUS have standard quality, efficacy and similar safety, since they are compulsorily acquired after evaluation and registration by ANVISA. However, in this study, we adopted the assumption that other dimensions are equivalent.

Another limitation is related to program management, where we assumed equivalent costs in planning activities, control, selection, programming and acquisition (in RFMG) or operating costs involved in payment processes/compensation by MS to accredited pharmacies (in FPB). In addition, costs associated to advertising and marketing were not identified and valued.

Results are robust when demonstrating economic dominance of pharmaceutical care provided by SUS pharmacies when compared to current model of outsourcing these services to private pharmacies. In economic modeling it was observed that public institutions become dominated by private only when performing an amount of less than 2,300 monthly dispensations, by placing the challenge of proper organization of actions for capacity utilization installed in public pharmacies. It is also worth noting that, despite having not been the subject of this study, also undertakes access any supply failures that result in unavailability of products to population. Facing these situations is related to the volume of budgetary funds available to purchase products and the quality of structure and logistics operations adopted.

We also emphasizes that this economic evaluation was carried out taking into account the financial resources necessary to ensure provision of pharmaceutical services with high quality standards under SUS. Therefore, values used in the model for public sector refer to a much higher level of quality to the precarious situation found in many public health units.

Conclusion

Brazil presents an advanced formulation of public policies for health, including pharmaceutical care area. However, government action, which should comply with the guarantee of the right to health, shows weaknesses in the face of market forces. This paper sought to present subsidies to debate in the context of the Pharmaceutical Care Management in SUS on public funds investment options to provide access to medicines in the country. Direct production of services by public sector on a public itself pharmacies proved to be economically more favorable than outsourcing services to private sector in the "Aqui tem Farmácia Popular do Brasil" program. As shown, economic advantage in public sector is directly related to their patient care skills. What demands attention is the low productivity of the units, which directly affects the average cost of services provided and may reverse results. Investing in an integrated public model with the principles and

guidelines of SUS is in a suitable condition to ensure full and universal pharmaceutical care with quality to users. The economic assessment carried out reinforces this statement, since greater efficiency in the alternative of resources application directly to public was found.

Collaborations

MM Garcia and AA Guerra Júnior contributed substantially to the design, planning, analysis and interpretation of the data; preparation and approval of the final version of the manuscript. FA Acúrcio contributed substantially to the design, planning and interpretation of data; critical revision and approval of the final version of the manuscript.

References

1. Organização Mundial da Saúde (OMS). *Relatório da Organização Mundial de Saúde de 2010: Financiamento dos Sistemas de Saúde*. [acessado em 2014 maio 15]. Disponível em: http://www.who.int/eportuguese/publications/pt/
2. Oliveira MA, organizador. *Direito Sanitário: Oportuna discussão via coletânea de textos do 'blog Direito Sanitário: Saúde e Cidadania'*. Brasília: ANVISA, CONASEMS, CONASS; 2012.
3. Vieira FS. Gasto do Ministério da Saúde com medicamentos: tendência dos programas de 2002 a 2007. Rev Saude Publica 2009; 43(4):674-681.
4. Conta-Satélite de saúde: Brasil 2007-2009. Rio de Janeiro: IBGE; 2012. (Contas nacionais, n. 37). [acessado em 2014 maio 15]. Disponível em: http://www.who.int/nha/country/bra/brasil_satellite_accts_2007-2009.pdf
5. Perry A. Balanço do neoliberalismo. In: Perry A. *As políticas sociais e o Estado Democrático Pós-neoliberalismo*. São Paulo: Editora Paz e Terra; 1996. p. 9-23.
6. Washington Consensus. Center for International Development at Harvard University. [acessado em 2014 maio 30]. Disponível em: http://www.cid.harvard.edu/cidtrade/issues/washington.html
7. Guerra Júnior A, Acúrcio F. Políticas de Medicamentos e Assistência Farmacêutica In: Acúrcio F, organizador. *Medicamentos: Políticas, Assistência Farmacêutica, Farmacoepidemiologia e Farmacoeconomia*. Belo Horizonte: Coopmed; 2013.
8. Brasil. Ministério da Saúde (MS). *Manual Básico. Farmácia Popular do Brasil. Ampliando o acesso aos medicamentos*. Brasília: MS; 2004.
9. Brasil. Ministério da Saúde (MS). Portaria 971 de 15 de maio de 2012. Dispõe sobre o Programa Farmácia Popular do Brasil. *Diário Oficial da União* 2012; 16 maio.
10. Minas Gerais. Secretaria de Estado de Saúde (SES). Superintendência de Assistência Farmacêutica (SAF). *Plano estadual de estruturação da rede de assistência farmacêutica: uma estratégia para ampliar o acesso e o uso racional de medicamentos no SUS.* Belo Horizonte: SES; 2008.
11. Donabedian A. *Aspects of medical care administration*. Boston: Harvard University Press; 1973.
12. Santos-Pinto C, Costa N, Osório-de-Castro C. Quem acessa o Programa Farmácia Popular do Brasil? Aspectos do fornecimento público de medicamentos. *Cien Saude Colet* 2011; 16(6):2963-2973.
13. Brasil. Ministério da Saúde (MS). *Programa Farmácia Popular do Brasil Saúde Não Tem Preço beneficia 14 milhões de pessoas no país.* Publicado em 14 de fevereiro de 2013. [acessado em 2013 fev 21]. Disponível em: www.saude.gov.br.
14. Minas Gerais. Secretaria de Estado de Saúde (SESMG). *Relatório de Gestão 2012. Farmácia de Minas*. Belo Horizonte: SESMG; 2013.
15. Brasil. Ministério da Saúde (MS). Secretaria de Ciência, Tecnologia e Insumos Estratégicos. Departamento de Ciência e Tecnologia. *Diretrizes Metodológicas: estudos de avaliação econômica de tecnologias em saúd*e. Brasília: MS; 2009.
16. Brasil. Tribunal de Contas da União (TCU). *Programa Farmácia Popular: sistema de copagamento*. Ministro Relator: José Jorge de Vasconcelos Lima. Brasília: TCU, Secretaria de Fiscalização e Avaliação de Programas de Governo; 2011. (Relatório de auditoria operacional).
17. Estação de Pesquisa de Sinais de Mercado (EPSM). NESCON. Faculdade de Medicina. Universidade Federal de Minas Gerais. [acessado em 2013 abr 30]. Disponível em: http://epsm.nescon.medicina.ufmg.br/epsm3/Rais_Tabela5_2011.aspx
18. Perillo E, Amorim MCS, Brito A. *Tributos e Medicamentos*. São Paulo: Interfarma; 2012.
19. World Health Organization (WHO). WHO Collaborating Centre for Drug Statistics Methodology. *Guidelines for ATC classification and DDD assignment 2013*. Geneva: WHO; 2013.
20. Management Sciences for Health (MSH). *Managing drug supply: the selection, procurement distribution, and use of pharmaceuticals.* 2nd ed. West Hartford: Kumarian Press for MSH, WHO; 1997.
21. Cunha M, Zorzatto J, Castro L. Avaliação do uso de medicamentos na Rede Pública Municipal de Saúde de Campo Grande/MS. *Rev Brasileira de Ciências Farmacêuticas* 2002; 38(2):215-227.
22. Santos V, Nitrini S. Indicadores do uso de medicamentos prescritos e de assistência ao paciente de serviços de saúde. *Rev Saude Publica* 2004; 38(6):819-826.
23. Brasil. Ministério da Saúde (MS). *Política Nacional de Atenção Integral à Saúde da Mulher - Princípios e Diretrizes.* Brasília: MS; 2004.
24. Pinto CBS, Miranda ES, Emmerick ICM, Costa NR, Castro CGSO. Preços e disponibilidade de medicamentos no Programa Farmácia Popular do Brasil. *Rev Saude Publica* 2010; 44(4):611-619.
25. Bahia L. A privatização no sistema de saúde brasileiro nos anos 2000: tendências e justificação. In: Santos NR, Amarante PDC, organizadores. *Gestão Pública e Relação Público Privada na Saúde*. Rio de Janeiro: CEBES; 2011.
26. Carvalho G. Avaliação do atual modelo da gestão pública do SUS quanto ao financiamento público da saúde. In: Santos NR, Amarante PDC, organizadores. *Gestão Pública e Relação Público Privada na Saúde*. Rio de Janeiro: CEBES; 2011.
27. Guerra Júnior AF, Acúrcio FA, Gomes CAP, Miralles M, Girardi SN, Werneck GAF, Carvalho CL. Disponibilidade de medicamentos essenciais em duas regiões de Minas Gerais, Brasil. *Rev Panam Salud Publica* 2004; 15(3):168-175.

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