



Indicator of access to medicines in relation to the multiple dimensions of access

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Aim: Creation of a single indicator of access to medicines. **Methods:** Data collection was performed with individuals who obtained their medication from either public and/or private pharmacies. A Likert scale was used to measure the importance and satisfaction in relation to various access dimensions. **Results:** A total of 580 individuals were interviewed. Overall, participants attributed very similar importance scores to the dimensions of access to medicines. The results of the mean score of each dimension showed a statistically significant difference according to the type of pharmacy that the participant visited. **Conclusion:** This developed indicator will enable a review of access to medicines, making comparisons possible as well as improving decision making about public policies in the field of Pharmaceutical Services.

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Access to essential medicines is one of the five indicators related to guaranteeing the right to health according to the United Nations, and one of the great challenges for public health across countries [1]. Access to medicines is currently problematic in many lower and middle income countries (LMICs), with expenditure on medicines accounting for up to 70% of total healthcare expenditure, much of which is out of pocket [2,3]. Consequently, family members becoming ill can potentially be catastrophic for the rest of the family [2–5]. Access to medicines can also vary within a country and between sectors in a country [6,7], as well as be an issue among Central and Eastern European (CEE) countries where despite typically universal healthcare there are concerns with access to higher costs medicines because of issues such as affordability and copayments [8,9]. For instance, there has been limited utilization of biological medicines for rheumatoid arthritis and inflammatory bowel disease among many CEE countries due to differences in reimbursement criteria and high copayments [8–10]. A similar situation was seen among a number of CEE countries with the statins and proton pump inhibitors before widespread availability of low cost generics easing prescribing restrictions [11–13]. There have also been concerns regarding access to medicines for orphan diseases and cancer across many countries enhanced by high prices [14–19]. However, limiting access to medicines can impact on morbidity, mortality and healthcare costs for patients with infectious and non-infectious diseases as well as healthcare systems [14,20–25]. Access to medicines is also seen as a central component of social inclusion as well as a component to seek equity and to strengthen healthcare systems. The possibility or not to have access to medicines is one of the clearest manifestations of inequality between countries, especially LMICs such as Brazil [26]. However, the legal system can be used in Brazil to enhance access to medicines that are not currently funded or available within the healthcare system [27–29].

Usually, medicines across countries are made available through a combination of public and private supply routes, and subject to regulations regarding their quality, safety and supply. A number of determinants and barriers relating to access to medicines have been identified according to the health system perspective of each country to provide future guidance [30,31]. There is also ongoing research surrounding the availability essential medicines which are part of essential medicines lists as a starting point for appraising potential initiatives to enhance future access where concerns [27,32].

The WHO defines access to medicines as the availability and the affordability, and to obtain those equitably [33]. As mentioned, affordability is a key issue in LMICs, and we are now seeing access programs growing across countries to seek to address this [34,35]. However, such definitions do not necessarily take into account the complexity of access to medicines, which can exist in countries. Access typically involves a network of public and private actors, who play different roles taking account of the economic, political and social contexts within countries [36].

Penchansky and Thomas [37] and Aday and Andersen [38] pointed out that the mere discussion of the availability of services and resources is insufficient to determine whether or not the population has guaranteed access. For Penchansky and Thomas [37], access would be the search for health services by the population and to what extent the supply is adjusted to effectively meet their needs. As mentioned, access to medicines is a complex and multidimensional issue that must consider the structural elements of the healthcare system in addition to national, regional and international contexts as they can all interfere with access [39]. Consequently, access is given by the set of dimensions that contemplate not only the availability, but also includes affordability, geographical accessibility and acceptability, as well as the convenience and adequacy of services [37].

Due to the complexity and difficulty of measurement, studies involving all of these dimensions of access to medicines are scarce, and they are often restricted to particular dimensions such as the provision of specific services and/or medicines or disease tracers. Some examples in Brazil include the study of Guerra *et al.* (2004) [40], which evaluated the availability and affordability of medicines in Brazil, as well as other studies that have evaluated only one of the dimensions of access [41–43]. Other authors have used different criteria to discuss and evaluate access to medicines in Brazil such as user satisfaction and the infrastructure of the pharmaceutical care services [44–46]. Satisfaction to healthcare services has also been researched in other LMICs as this is seen as a key area to enhance adherence to medicines and their effectiveness [47–49]. Issues of access to medicines are different to drug shortages where there are available funds to cover the cost of medicines but they are just unavailable [50]. They are also different to issues of incentives and other factors to address concerns with shortages of medicines [50,51].

The definition and measurement of access to health, especially access to medicines, has been a subject of great interest. This is because these aspects are fundamental for the development of plans and investment in health, as well as a fundamental strategy to improve the quality of healthcare and subsequent patient outcomes [52]. We have seen LMICs such as South Africa address issues of access to medicines, especially those for chronic diseases, via a number of initiatives. These include the Central Chronic Medicines Dispensing and Distribution program, whereby medicines are packaged and distributed free of charge to patients' nearest pick-up point [53].

One challenge and potential contribution to public policy would be the development of a unique access to medicines indicator that simultaneously addresses the five dimensions as proposed by Penchansky and Thomas [37]. In view of this, the research topic should be 'would it be possible to simultaneously measure the score of each of the dimensions from the perspective of the individuals to whom public policies regarding medicines are destined?

Consequently, we sought to develop a method capable of grouping the access to medicines dimensions proposed by Penchansky and Thomas [37] into a unique indicator from the user perspective. This includes the measurement of the values assigned by users to each of the five dimensions including access, geographical accessibility, availability, acceptability, accommodation/adequacy and affordability.

We believe this new indicator will make it possible to measure and compare inequalities in access to medicines in different places and in different situations. As a result potentially become an important instrument that could be used to direct future public health policies to improve access. To date, in Brazil, the orientation of public policies has been on availability and affordability as a priority. We have started with Brazil because this country has a dual public and private healthcare system allowing simultaneous research with some patients able to can access both systems. The national healthcare system (Sistema Único de Saúde [SUS]) provides free healthcare to patients for approved complex and/or expensive technologies including medicines for Alzheimer's disease, biological medicines for rheumatoid arthritis as well as medicines for cancer, schizophrenia and multiple sclerosis [27,29,54–60]. In addition to this, there is also the Basic Component of Pharmaceutical Service in primary care which is available to all

citizens through primary healthcare centres and outpatient facilities. In this situation medicines for chronic diseases including statins, insulins, metformin and certain sulphonylureas, are available free of charge [58].

However, some patients may well go to private pharmacies to obtain their medicines in view of the ease of access enhanced if they purchase supplemental private health insurance; otherwise 100% copayment [57]. This though can lead to issues of affordability if patients do not have private insurance. Overall, approximately 23% of citizens in Brazil have private insurance to help with access in ambulatory care while still having access to public healthcare facilities [59,60]. This is very different to the situation in many LMICs where approximately 50% or more of revenues come from patient copayments as typically no universal healthcare, appreciably higher if the shadow economy is taken into consideration [2,3,61]. Similar to many countries with universal healthcare systems, Brazil provides access to medicines with public funding but the model is dual. There is a public model, in which the government currently undertakes the entire logistic process and dispense medicines in its own pharmacies – called public pharmacies. In addition, there are private community pharmacies accredited by the government under ‘Aqui tem farmácia popular,’ introduced to improve the Brazilian population’s access to medicines with associated copayments. There are also purely private pharmacies where people pay 100% the price of the medicines. Some people prefer to obtain their medicines in private pharmacies or by means of the program ‘Aqui tem farmácia popular’ because these pharmacies typically have better geographic accessibility and extended opening times. The dual system allows research into key issues of access to medicines among patients who have access to both systems to compare and contrast their perceptions. This is important to help further develop public health policies in Brazil to improve access to medicines in the public system where there are concerns.

Methods

Theoretical framework

The study was designed by adapting methods documented in the literature to measure the importance and satisfaction of people regarding situations that impact on their life [62,63].

Access is an important and complex parameter in health policy and health services research since it is a concept that has not been defined or employed precisely. Some authors refer to ‘access’ only as availability, while others include factors influencing the use of medicines including affordability [62–66]. Consequently, in this study, we used Penchansky and Thomas’ concept [37] that access should be assessed using a wide scope covering all five dimensions:

- Availability: pertinent medicines are available from current pharmacy stock;
- Geographic accessibility: pharmacy with an accessible location (proximity and/or easiness to reach the place);
- Accommodation/adequacy: agility in the pharmacy service, comfortable, organized and quality service;
- Affordability: economic conditions to obtain the medicine at the pharmacy;
- Acceptability: pharmacy with a service that meets the habits, customs and expectations of users (with reference to other existing services considered acceptable).

Data collection instrument design

The subsequent instrument was, as mentioned, developed from a literature review of studies in the field of psychology and health [62,63,66]. A research instrument with questions pertinent to each cited dimension was subsequently constructed and applied to the general population in order to obtain a unique access indicator.

The final version of the questionnaire contained 36 questions subdivided into: questions regarding sociodemographic data (n = 8); one related to importance and one to measure satisfaction for each of the five dimensions and 18 questions related to the preference of individuals. These issues were correlated with the five dimensions. Consequently for each question, two different dimensions were compared. For example, the interviewee preferred a pharmacy with employees who always treat them with respect, courtesy and privacy (acceptability) or a pharmacy that is open when you need it (affordability). Respondents could still respond: “*whatever*”, “*I do not know*” and “*I do not want to respond*”.

The instrument typically presented interviewees with 5 possible alternative answers to each of the questions depending on the degree of importance. The only exceptions were to the questions about “*Where do you get your medicines*” and “*Where did you get your medicines in the last time*,” in which the interviewee could state more than one option. The mean length of time to complete the questionnaire was 15 min (Supplementary Material).

In order to measure importance and satisfaction in relation to the access dimensions, a five point Likert scale was used ranging from 'Not Important' to 'Extremely Important' or 'Very Unsatisfied' to 'Very Satisfied' for each dimension of access [67].

A pilot study was undertaken in Belo Horizonte to evaluate the average time to complete the questionnaire in order to identify possible difficulties with understanding the questions, and to address these where pertinent before undertaking the full study. Belo Horizonte is the capital of Minas Gerais, Brazil, covering 331,401 km², with more than 2.5 million inhabitants. Consequently, due to its size and population diversity, Belo Horizonte can be considered a good proxy for Brazil [68,69].

The research was approved by the Ethics Committee in Research no. CAAE 62024016.4.0000.5149 and all participants agreed to sign the Informed Consent Term (Termo de Consentimento Livre e Esclarecido [TCLE]).

Sample & study population

Individuals 18 years old or older who agreed to respond to all items of the questionnaire were included in the survey. Potential interviewees were taken from areas of high circulation in the metropolitan area of Belo Horizonte, similar to previous studies that ascertained patient beliefs in Belo Horizonte [68,69]. The exclusion criteria included individuals less than 18 years of age and people with no interest to participate. The interviews were conducted by trained interviewers.

We believed we would be able to estimate the relative importance of each of the five dimensions based on the fact that the respondent could give grades from 1 to 5 for the degree of importance of each of the dimensions; that the scores of the five dimensions would be estimated for the general population (residents in BH, older than 18 years), separately by gender (men and women), age (up to 54 and 55 years or more) and health insurance (yes or no). Based on this and with no intention to estimate scores separately in the eight categories formed by the combination of these variables; that the distribution of probabilities of these scores was unknown at the time of the study with no information available from previous studies, and that a margin of error of estimation of the score averaged at most 1/5th of the standard deviation of scores in the population in each estimation (considering a 95% confidence level), the sample should contain at least 462 interviewees, distributed by male (n = 213) and female (n = 249); age: 18–54 (n = 362) and 55 or more (n = 100); and health insurance: yes (n = 250) and no (n = 212). The sample calculation was conducted to guarantee the statistical power to answer the research question, be representative and avoid possible bias.

Data collection

Data collection was performed with individuals who obtained their medication from public and/or private pharmacies and with the necessary sociodemographic characteristics including age, gender, education and monthly family income (stratification by value of minimum wages in Brazil – R\$998.00 or U\$1,981.03 converted by purchasing power parities [PPP]) – similar to previous studies [68,69]. As mentioned, all the interviewers were trained to conduct interviews through a course provided by the Brazilian Association of Interviewers (Associação brasileira de empresas de pesquisa [ABEP]). Face-to-face interviews were conducted with a semi-structured paper-based questionnaire, administered by the interviewers. Subsequently, the data were tabulated in order to identify key trends and the implications.

Data analysis

The score of each dimension was calculated by the ratio of the assigned score to the sum of the total. From the values for importance and satisfaction, in relation to each of the five dimensions, a score for the dimension was defined correlating to these two variables:

Notation:

$$\text{score of dimension} = \frac{(\text{score of importance (W)} * \text{score of satisfaction (I)})}{5 \text{ (number of dimensions)}}$$

For the calculation of the unique access indicator, it was proposed:

$$\text{Indicator of access} = \frac{(W_b * I_b) + (W_c * I_c) + (W_d * I_d) + (W_e * I_e) + (W_f * I_f)}{5 \text{ (number of dimensions)}}$$

The relative mean of score in the study population was calculated where:

Dimension:

- 1) Availability (b);
- 2) Geographic accessibility (c);
- 3) Adequacy/accommodation (d);
- 4) Affordability (e);
- 5) Acceptability (f);
- 6) Relative mean of score in the study population: mean calculated after questionnaire application.

The calculation was stratified according to the place where the interviewees obtained their medicine (public pharmacy and/or private or exclusively private) and their gender.

For the statistical analysis, absolute and relative frequencies (with 95% CIs for the relative frequencies) were calculated. The proportions were compared using the chi-square test. The linear correlations between the variables were made using the non-parametric *Spearman* test. Data analysis was performed using Minitab® software version 17.1.0 [70].

To better understand the application of the single access indicator, total access values were calculated in hypothetical scenarios with fictitious access dimensions. We proposed hypothetical scenarios A, B and C. In scenario A, we proposed one population with two dimensions of access higher than 50% (e.g. geographic accessibility and acceptability with 70%). In the scenario B, we proposed one population with four of five dimensions around 90% and one dimension of 50%. In scenario C, we proposed one population with three dimensions higher than 70% and two dimensions equal or lower than 50%.

Ethics approval & consent to participate

This study was submitted to the National Research Ethics Committee of Brazil, with approval registered the CAAE number: 62024016.4.0000.5149 Process number: 1.901.611.

Consent for publication

All participants who agreed to participate in the research signed the Informed Consent Form authorizing the disclosure of the data. However, the data were anonymized for confidentiality.

Results

Of the total number of people approached, only 2.1% refused to participate or did not complete the interview. A total of 580 individuals, predominantly female (56.0%), aged between 18 and 54 years (81.9%) were interviewed. A total of 56.9% of the participants had less than 12 years of education and 45.2% had a monthly family income equal to or less than three-times the minimum wage (R\$2994.00 or U\$5943.09 PPP). Just over half of the participants reported having health insurance at the time of the research. Among the participants, 33.45% reported not working and 12.76% reported they were receiving some social assistance including government grant-aids (Table 1).

Regarding the places where the medicines were obtained by the individuals, 56.9% reported that they used to obtain their medicines exclusively in private establishments. In general, the search for pharmacies (public or private) was higher among women, both for those who accessed both public and private pharmacies (62.8%) and those that reported using exclusively private ones (50.9%). Individuals aged 55 or over, for the most part, reported using both public and private pharmacies. Only 14% of the participants reported being dependent on public facilities for their medicines (Table 2).

Overall, participants attributed very similar scores to the five dimensions of access to medicines. However, a greater score was given to the availability dimension, followed by affordability, geographic accessibility and accommodation, and, finally, acceptability (Table 3).

The stratification of the sample by location where the medicines were obtained showed that the interviewees who reported using exclusively private services considered availability as the most important dimension, and showed statistically significant differences between the scores attributed to the dimensions of access higher than those interviewees who reported using both public and private pharmacies. However, regardless of the place where medicines were obtained, the ranking of the importance of the scores for the various dimensions was maintained (Table 3).

Table 1. Sociodemographic characteristics of the participants.

Variables	General population		Private		Public-private	
	N	%	N	%	N	%
Gender						
– Male	255	43.97	162	49.09	93	37.20
– Female	325	56.03	168	50.91	157	62.80
Age						
– Up to 54 years	475	81.90	293	88.79	181	72.40
– 55 or more	105	18.10	37	11.21	69	27.60
Health insurance						
– Yes	306	52.76	216	65.45	90	36.00
– No	267	46.03	109	33.03	158	63.20
– Do not know/did not answer	07	1.21	05	1.52	02	0.80
Education						
– Incomplete primary school	66	11.38	16	4.85	50	20.00
– Primary school	242	41.72	112	33.93	130	52.00
– Secondary school	209	36.03	154	46.67	55	22.00
– Higher education	56	9.66	43	13.03	13	5.20
– Do not know/did not answer	07	1.21	05	1.52	02	0.80
Total household income						
– Up to 1 minimum wage	32	5.52	13	3.94	19	7.60
– ≤2 minimum wages	106	18.28	37	11.21	69	27.60
– 2≥3 minimum wages	125	21.55	49	14.85	76	30.40
– 3≥5 minimum wages	122	21.03	79	23.94	43	17.20
– 5≥10 minimum wages	83	14.31	68	20.61	15	6.00
– ≥10 minimum wages	33	5.69	31	9.39	02	0.80
– Do not know/did not answer	79	13.62	53	16.06	26	10.40
Working						
– Yes	374	64.49	234	70.91	140	56.00
– No	194	33.45	91	27.58	103	41.20
– Do not know/did not answer	12	2.07	05	1.51	07	2.8
Social security						
– Retirement	60	10.34	15	4.55	43	17.20
– Absence from work	01	0.17	01	0.30	00	0.00
– No	519	89.48	314	95.15	207	82.80
Government grant aid						
– Yes	74	12.76	46	13.94	28	11.20
– No	492	84.83	276	83.64	216	86.40
– Do not know/did not answer	14	2.41	08	2.42	06	2.40

Table 2. Place where individuals usually get their medicines.

Variables	N	%
Private pharmacy	330	56.9
– Exclusively out-of-pocket expenses	275	83.3
– Exclusively from Farmácia Popular	05	1.5
– Exclusively through covenant of the employing company	07	2.1
– Out-of-pocket expenses + Farmácia Popular	24	7.3
– Out-of-pocket expenses + covenant of the employing company	19	5.8
Public and private pharmacy	250	43.1
– Exclusively Public Pharmacy	35	14.0
– Farmácia Pública + out-of-pocket expenses	140	56.0
– Public Pharmacy + Farmácia Popular	20	8.00
– Public Pharmacy + out-of-pocket expenses + Farmácia Popular	55	22.00

Table 3. Mean relevance stratified by gender and place of obtaining medicines.

Dimension	Total population			Private			Public-private		
	General	Female	Male	General	Female	Male	General	Female	Male
Availability	4.447	4.465	4.421	4.448	4.446	4.478	4.424	4.484	4.323
Affordability	4.379	4.154	4.134	4.403	4.476	4.354	4.328	4.331	4.323
Geographic accessibility	4.147	4.083	4.059	4.115	4.089	4.168	4.184	4.223	4.118
Adequacy/accommodation	4.072	4.406	4.343	4.015	4.077	3.975	4.128	4.089	4.194
Acceptability	3.826	3.858	3.780	3.730	3.798	3.683	3.932	3.924	3.946

Table 4. Spearman's nonparametric linear correlation coefficient (p-value) of relevance weights between access realms (n = 580).

Access dimension	Availability	Geographic accessibility	Adequacy	Affordability
Geographic accessibility	-0.055			
	0.183			
Adequacy	-0.363	-0.146		
	0.000	0.000		
Affordability	0.088	-0.170	-0.335	
	0.033	0.000	0.000	
Acceptability	-0.407	-0.365	-0.003	-0.403
	0.000	0.000	0.935	0.000

Table 5. Values of the mean weight of each dimension stratified by place of obtaining the medicines.

Dimension	Location				Related difference	
	General	Private sector	Private and public sector	Public sector	Exclusively public x exclusively private (%)	Public + private x exclusively private (%)
Availability	0.5753	0.6238	0.5074	0.5100	-8.2	-8.7
Geographic accessibility	0.5761	0.6153	0.5226	0.5300	-3.9	-5.1
Accommodation	0.5605	0.5771	0.5356	0.4900	-5.1	-7.2
Affordability	0.5260	0.5891	0.4398	0.4386	-25.6	-25.3
Acceptability	0.5204	0.5283	0.5076	0.5771	9.2	-3.9
Relative Weight	0.5517	0.5867	0.5026	0.5091	-18.2	-18.7

In stratification by gender, there was an inversion of the ranking of scores attributed to the access dimensions. Women who reported using only private pharmacies attached greater importance to affordability than availability, while men who reported using both public and private pharmacies attached equal importance to these two dimensions, followed by adequacy/accommodation, geographic accessibility and acceptability (Table 3).

From the analysis of the correlations between the dimensions, some inverse relationships were identified (Table 4). These correlations, although weak, were statistically significant. For example, interviewees who placed greater emphasis on affordability placed less emphasis on accommodation/adequacy. Interviewees who placed greater emphasis on availability attributed less importance to acceptability. Interviewees who gave more importance to acceptability gave less importance to geographical accessibility.

With the exception of the acceptability dimension, all other satisfaction scores were higher in interviewees who reported using only private pharmacies when compared with those who reported using public pharmacies or public and private pharmacies.

The results of the mean score of each dimension showed a statistically significant difference according to the type of pharmacy that the interviewees reported to use. The average score of affordability was 25.6% lower for interviewees who reported using only public pharmacies compared with those who reported using only private pharmacies (Table 5).

Table 6 presents the hypothetical scenarios mentioned in the Methods section that showed how the access

Table 6. Unique access to medicines indicator from three different hypothetic scenarios.

Hypothetic Scenarios	Access					General population access (%)	Private access (%)	Public + private access (%)	Public access (%)
	Availability	Geographic/ accessibility	Accommodation/ adequacy	Affordability	Acceptability				
A	0.40	0.70	0.50	0.50	0.70	55.9	55.7	56.2	56.7
B	0.85	0.90	0.95	0.50	0.95	83.3	82.8	84.1	84.2
C	0.35	0.70	0.80	0.70	0.50	61.0	60.9	61.0	60.4

Scenario of hypotheticals locals A: users of territories with dimension access: 40% in availability, 70% in geographic/accessibility, 50% in accommodation/adequacy, 50% in affordability and 70% in acceptability.
 Scenario of hypotheticals locals B: users of territories with dimension access: 85% in availability, 90% in geographic/accessibility, 95% in accommodation/adequacy, 50% in affordability and 95% in acceptability.
 Scenario of hypotheticals locals C: users of territories with dimension access: 35% in availability, 70% in geographic/accessibility, 80% in accommodation/adequacy, 70% in affordability and 50% in acceptability.

indicator would behave in three different simulations (A, B and C) to illustrate how the indicator is used in practice. In Scenario B, for example, in which the availability of medicines was only 85%, geographic accessibility was 90%, accommodation and acceptability was 95%, and affordability was 50%, the unique access indicator proposed would be 82.8% in the private sector and 84.2% in the public sector.

Discussion

Currently, we believe there is no method capable of comparing access in different services, localities, regions or countries, simultaneously contemplating the five dimensions proposed by Penchansky and Thomas [37]. We believe this lack of this indicator leads to heterogeneity in access measures and difficulties with comparing the results of different studies, making it challenging to comprehend the reality about access to medicines [64]. As a result, we believe health service managers tend to make their decisions based on only one of the dimensions of access: availability. In this context, a tendency to encourage health policies has been observed aiming primarily at increasing the availability of medicines leaving the other dimensions in the background, which we also believe are necessary to reach effective access to medicines for all citizens in a locality [65].

Our results found a small difference between the scores given by interviewees to the five access dimensions. The results suggest that for users, full access to medicines is better when all five dimensions are met. Consequently, public policies around access to medicines must not be restricted to just one or two of the five dimensions.

In addition, when analyzing the various dimensions, it was possible to conclude that the majority of the interviewees who gave less importance to geographical accessibility, gave greater importance to acceptability, justifying the need to reassess public policies that, for the most part, prioritize more the regionalization dimension to the detriment of the quality of the service and training to improve the service.

The overall measurement of access to medicines can be used as an indicator of the quality of public and private care services [66]. However, defining a single access indicator is a complex task, especially since the measurement of the five dimensions is very different, and for example, the degree of subjectivity of affordability is considerably greater than availability.

In addition, whenever an index or indicator is proposed, it is subject to limitations on the variables selected for its composition. One of the most used indicators for the classification of the level of development of a country – Human Development Index, despite being an important public policy leader in the world since 1990, still suffers from many criticisms [71,72].

The proposal to create a unique access indicator also showed that only a small proportion of individuals in Brazil currently depend exclusively on public pharmacies to obtain their medicines. This small number can be justified by the increase in self-medication in the country, which is strongly influenced by companies to enhance overall drug consumption [73]. In 2013, medicines for human use were 1.5% of gross domestic product as a household expenditure item, and only 0.2% of gross domestic product in public spending. This reinforces the current supremacy of the private sector as a source for citizens obtaining their medicines in Brazil [73].

However, another hypothesis for this low dependency on public pharmacies could be the difficulty in accessing medical care in SUS and the need for a prescription for medicines to be dispensed in public pharmacies. Consequently, patients often resort to the private sector either through additional supplemental health insurance or 100% copayment to obtain their medicines [74–76]. This scenario, in which a large proportion of medicine costs

comes from patient's direct out-of-pocket payments is similar to other LMICs [76]. However, Brazil is different in that there is a public healthcare system (SUS) where patients can access treatment and medicines; however, as mentioned, there are challenges with accessing the public system including medicines. A nationwide study showed that the total availability of medicines in SUS was 45.2% while it was 88.5% in private pharmacies [76]. However, for chronic diseases with a high prevalence in Brazil, such as hypertension and diabetes, the public sector provides a higher proportion at 57.2 and 60.1%, respectively, of the essential medicines needed [76].

Bigdeli *et al.* [39] discussed the existence of fragmentation of access to medicines among LMICs, which has harmed and isolated other significant components of health systems, sometimes providing access barriers. As an example, the constitution of segmented access, dissociating pharmaceutical care from other sectors of the health and economic systems.

When analyzing the profile of the interviewees, a greater proportion of those 55 years or older resort to public pharmacies to obtain their medicines. This is expected since, with increasing age, health spending increases considerably, leading to greater use of public health services [77]. Consequently, there is a need to improve access to medicines in this age group where there are identified concerns.

As most individuals reported using private pharmacies, it becomes clear that more research is needed on access to medicines in these pharmacies. In Brazil, a possible reason for the lack of studies in this area may be due to people culturally considering private pharmacies just a commercial establishment even with the recent regulation in Brazil defining private pharmacies and drugstores as health establishments [76,77].

In addition, the results showed that individuals who accessed private pharmacies were more rigorous about the quality of care, possibly because they were more satisfied with the pharmaceutical care services when compared with individuals who accessed both private and public services or exclusively public pharmacies [78,79]. Again, this is important for planning future services in Brazil.

We are aware of a number of limitations with this study. While we believe the sample is representative, there may be some peculiarities with interviewees only taken from the metropolitan area of Belo Horizonte, Minas Gerais. In addition, there may be variations concerning the types of pharmacies available in different locations. We are also aware this study was a cross-sectional study so it was not possible to establish the relationship of cause and effect of changes in the importance and satisfaction data. In addition, the efficiency of public pharmacy management and its influences on importance and satisfaction data were not evaluated. Despite the limitations, we believe this work is innovative being we believe the first study attempting to create a single multifaceted access indicator. The absence of similar studies makes it difficult to compare our findings with others.

Overall, we believe our findings are robust providing future direction to both public and private pharmacies in Brazil as well as the public healthcare system in Brazil.

Conclusion

Although there is still considerable debate about the concept of access to health, most authors agree that access is not simply equivalent to the use of services. It should cover a far wider range of considerations. We believe the unique access to medicines indicator proposed based principally on the concept proposed by Penchansky and Thomas will allow a better evaluation of the quality of pharmaceutical care services as it now encompasses all dimensions of access. Consequently, we would recommend this refined measure going forward.

Our findings showed the importance given by interviewees to the various access measures as well as similarities and differences between the various dimensions depending on issues such as gender, age and current pharmacies used. We believe these points to the need for new public policies to prioritize actions directed to all five dimensions of access. This is unlike the current situation in which the principal focus in Brazil has been on increasing the availability and/or greater geographical accessibility. In addition, our findings makes it clear that there is a need for further studies on access to medicines in private pharmacies and drugstores in Brazil as well as different countries to help refine and compare access to medicines across countries.

Overall, we believe this indicator will enhance research and diagnoses about access to medicines in different services and countries, making possible future comparisons to help improve public policies in the field of Pharmaceutical Service. This is difficult currently without such a comprehensive measure. These are considerations for the future in further research that we and others should conduct comparing access to medicines across countries.

Summary points

- Access to at least essential medicines is a key indicator related to guaranteeing the right of patients to healthcare.
- To date, there has not been one comprehensive indicator capturing all five dimensions of access which include availability, geographic accessibility, adequacy, affordability and acceptability.
- Research was undertaken in Brazil to assess medicine availability in a dual healthcare system (private and public) which includes private and public pharmacies to provide future guidance.
- All five dimensions of access were important in Brazil, although overall greater importance was given to availability followed by affordability, geographic accessibility, accommodation and finally acceptability.
- However there were differences whether patients access just public pharmacies, private pharmacies or a mixture of both.
- There were also differences in gender as well as age, for example, those aged 55 or older typically resort to public pharmacies to obtain their medicines with increases in healthcare spending.
- Interviewees using exclusively private pharmacies considered availability a key dimension, higher than those using both public and private pharmacies.
- This newly developed indicator enables a greater consideration with analyzing access to medicines, which is important for countries in the future where access is a concern..

Supplementary data

To view the supplementary data that accompany this paper please visit the journal website at: www.futuremedicine.com/doi/suppl/10.2217/cer-2019-0031

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