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ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Intermunicipal inequities in access and use of secondary health services in the metropolitan area of Curitiba

Iniquidades intermunicipais no acesso e utilização dos serviços de atenção secundária em saúde na região metropolitana de Curitiba

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ABSTRACT: The aim of this study was to identify and analyze inequities in the access to specialized services in the municipalities of the metropolitan area of Curitiba, Paraná, Brazil. This is an ecological study. In its preparatory stage, this study focused on the socioeconomic, epidemiologic, healthcare network and sectoral financing network profiles of the 26 municipalities comprising this area. Factor analysis was employed to obtain the six principal components, and a synthetic index was calculated from them, allowing municipalities to be ranked according to living conditions and health situation. Primary data was collected from 24 municipalities, regarding their capacity, directed and repressed demand of specialized healthcare services. The context analysis revealed accentuated intermunicipal inequities. The synthetic index allowed municipalities to be classified in four relatively homogeneous groups regarding living and health conditions. Municipalities located in Vale do Ribeira obtained the worse outcomes for the Living Conditions and Health Situation Synthetic Index, as well as the higher repressed demand for specialized healthcare services. The geographical distance from the capital showed to contribute to worse living and health conditions and greater difficulties in access to healthcare services.

Keywords: Health services accessibility. Health public policy. Health management. Health services evaluation. Referral and consultation. Equity in health.

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RESUMO: O objetivo deste estudo foi identificar e analisar iniquidades intermunicipais no acesso à atenção especializada nos municípios da região metropolitana de Curitiba, Paraná. Trata-se de estudo ecológico. Na etapa preparatória deste estudo, trabalhou-se com os perfis socioeconômico, epidemiológico, da rede de cuidados à saúde e de financiamento setorial, dos 26 municípios que compõem essa região. Foi realizada análise fatorial, pela qual foram obtidos seis componentes principais, e a partir desses foi calculado um índice sintético, que permitiu ordenar os municípios segundo condição de vida e situação de saúde. Dados primários foram coletados de 24 municípios, referentes à capacidade instalada, demanda encaminhada e demanda reprimida de serviços de atenção especializada. A análise de contexto revelou acentuadas iniquidades intermunicipais e o índice sintético permitiu classificar os municípios em quatro grupos relativamente homogêneos quanto às condições de vida e situação de saúde. Os municípios localizados no Vale do Ribeira obtiveram os piores resultados para o Índice Sintético de Condições de Vida e Situação de Saúde, assim como apresentaram maior demanda reprimida para os serviços da atenção especializada. A distância geográfica do município polo demonstrou contribuir para piores condições de vida e saúde e maiores dificuldades no acesso aos serviços de saúde.

Palavras-chave: Acesso aos serviços de saúde. Políticas públicas de saúde. Gestão em saúde. Avaliação de serviços de saúde. Referência e consulta. Equidade em saúde.

INTRODUCTION

Secondary care (SC), often referred to in official documents and decrees of the Brazilian Ministry of Health as attention of medium complexity, comprises a specialized set of outpatient and hospital services and actions. It aims to care for the health problems of the population that are not resolved at the primary care level[1]. It uses technological features of higher density in the diagnosis and therapy support, which require large scale production to acquire visibility and economic sustainability[2].

This level of care has become a major bottleneck in the public health network. The managers of the Unified Health System (SUS) live with great pressure from the demand for specialized services to it which fails to respond satisfactorily, generating long queues and concentrating a considerable share of public expenditure on health[3,4].

Such a phenomenon related to access and use has been observed in most Brazilian cities, being a point of discussion in instances of local, regional and national management. Such is the case in the 26 municipalities in the metropolitan region of Curitiba (MRC)[3,5,6].

Access, accessibility and utilization of health services involve complex formulations, which change over time and according to context. They appear as characteristics of the multidimensional relationship between need/demand/supply of health services and actions, very relevant to the interpretation of the pattern of effective use of healthcare resources, as well as for research on equity in health systems. Access covers concepts often

used inaccurately, and with unclear planning and operationalization procedures in everyday services[7,8]. It is one of the elements of health systems related to the organization of services and that refers to the facilitated entry, effective care and continuity of care. Donabedian[9] goes further in the scope of the concept of access to beyond the entrance into services, since for him, access should also indicate the degree of (un)adjustment between the needs of patients and the services and resources used. It would not be restricted only to the use or nonuse of health services, but it would include the adequacy of professional and technological resources used to the health needs of patients. Access would then be an important service provision characteristic for explaining the pattern of utilization of health services. Finally, Donabedian opted for the term "accessibility" and reported two dimensions: the socio-organizational and the geographical, noting that both are interrelated. The first includes all the features of service provision, with the exception of geographic features that block or enhance people's ability to have access to them. The geographical accessibility can be measured by the linear distance, commute time, expense of travel, among others.

To Starfield[7], access is the way people know and recognize the characteristics of services and attributes that qualify the care provided by professionals in their health service of reference.

Access may influence the use of services through the interaction of demographic, socioeconomic and psychological factors, and morbidity profiles, and the effects and relevance for each factor are affected by cultural background, the current health policies and attributes of the health system[5,8,10,11].

SUS still has accentuated social inequalities, characterized by the fact that the people most in need are less likely to receive care[5]. Travassos and Martins[12] claim that the individual's position in the social structure is a relevant indicator of health needs and the observed pattern of risk tends tend to be unfavorable for those individuals belonging to less privileged social groups.

The analysis of this dimension of health problems in urban areas has been restricted, conditional on the absence of an information system that presents real and potential indicators of the needs and coverage/effective use of services. This becomes evident, for example, when analyzing the population residing in various areas of a hub city and the relationship established with the cities in its surroundings[4,13].

It should be considered that metropolitan complexes consist of municipalities with additional functions, independent management and unequal financial capacity. These characteristics prevent and condition the attendance of social and urban infrastructure demands that, in most cases, arise from the dysfunctional relationship between municipalities and rely on solutions that go beyond their political-administrative boundaries, balancing on the regional scale[14].

Given the above, it is necessary to understand how to give citizens/users access to specialized services in metropolitan areas, supporting the development of health policies and programs that are more equitable and appropriate to the different realities. Thus, this study aimed to identify and analyze intermunicipal inequities in access and use of specialized care services in the MRC.

METHOD

This is an ecological study involving 26 municipalities of the MRC. In the initial stage, aiming at a better recognition of the metropolitan context, the socioeconomic and epidemiological profiles, as well as the profile of the health care network and sectoral financing in the 26 municipalities that make up the MRC, were identified. Secondary data were obtained from query to databases from the Brazilian Institute of Geography and Statistics (IBGE), the Atlas of Social Exclusion in Brazil[15], the United Nations Children's Fund (UNICEF), the United Nations Development Programme (UNDP), the Department of Health of the State of Paraná (SESA-PR) and the Department of Information Technology of the Ministry of Health (DATASUS) (Figure 1).

Then, primary data were collected from 24 municipalities, since two of them did not provide the information requested. For the analysis of access/use of specialized care services, information was gathered on the installed capacity (services funded by the municipality), the directed demand (regional reference services – Medical Appointments Central) and the repressed demand (users who are waiting for service) of the major specialized services through a questionnaire answered by technicians from municipal health departments. These professionals were purposively selected for coordinating sectors of specialized medical appointments with in the cities studied.

The variables used in this step were installed capacity, directed demand and repressed demand, consultations in cardiology, general surgery, vascular surgery, endocrinology, gastroenterology, high-risk obstetrics, nephrology, neurology, dentistry/maxillofacial surgery, ophthalmology, otorhinolaryngology and urology; and diagnostic support services such as radiology, endoscopy and ultrasound. That is, the specialized services that had greater supply in the Medical Appointments Central of Curitiba were selected for this study.

Descriptive statistics were used to analyze such data. The project was approved by the Ethics Committee of PUCPR, under protocol no. 0003278/09, on 09/16/2009 and followed the requirements proposed by the Declaration of Helsinki.

The indicator variables chosen are described in Chart 1.

Considering the large number of variables listed and required to understand a multidimensional phenomenon such as the one proposed in this study, a principal components factor analysis (PCFA) was performed. The PCFA is indicated in situations like this, especially with exploration of factors (or constructs) underlying a given reality, to help measure phenomena that cannot be directly observed[16].

In the next step, the values of each component were calculated for each municipality, corresponding to factor scores. From the factor scores obtained for the six components, it was possible to characterize the relatively homogeneous municipalities, calculate the final factor score and get a synthetic final index, which allowed the classification of municipalities into four groups and their hierarchical organization. For the clustering of the municipalities, the k-means method was used, which is a non-hierarchical clustering method. This method is based on two basic assumptions: internal cohesion of observational units and external isolation between the groups, that is, minimize the variance within the group and maximize the variance among groups[17].

Chart 1. List of indicators and variables used, according to the source and year.

Indicators		Variables	Source	Year
1st step: factor analysis	Demographic	Population	IBGE	2008
		Level of urbanization	IBGE	2000
	Geograpic	Linear distance from municipality to capital	IBGE	2010
	Living condition	Human Development Index Municipal Human Development Index (MHDI)	IBGE	2000
		Child Development Index (CHI)	UNICEF	2004
		Social Exclusion Index	Pochman and Amorin	2003
		Gini Index	IBGE	2000
		Poverty Index	Pochman and Amorin	2000
		Formal Employment Index (%)	Pochman and Amorin	2003
		Illiteracy Rate	PNUD	2000
		Education Index	Pochman and Amorin	2003
		Population with water supply	PNUD	2000
		Population with access to garbage collection	PNUD	2000
		Population with access to sewage system	PNUD	2000
	Epidemiologic	Coefficient of Infant Mortality	DATASUS	2008
		Coefficient of Maternal Mortality	DATASUS	2008
		Rate of hospitalization for diarrhea and gastroenteritis of infectious origin	DATASUS	2008
		Rate of hospitalization for heart failure	DATASUS	2008
		Rate of hospitalization for diabetes	DATASUS	2008
		Rate of hospitalization for hypertension	DATASUS	2008
		Rate of hospitalization for stroke	DATASUS	2008
		Hospitalization rate (Unified Health System) per inhabitant	DATASUS	2008
	Health Care Network	Coverage of the Family Health Strategy	DATASUS	2008
		Average of consultations in primary care/ inhabitant	SESA	2008
		Number of general practitioners in the Unified Health System/1,000 inhabitants	DATASUS	2008
		Number of dentists in the Unified Health System/1,000 inhabitants	DATASUS	2008
		Tetravalent vaccine coverage	DATASUS	2008
	Financing	Total expenditure on health per capita	DATASUS	2008
		Own resources spent on health	DATASUS	2008
		Federal transfers inhabitant/year	DATASUS	2008
2nd step	Secondary Care	Number of secondary care consultations and examinations offered	Technicians from the Departments of Health	2008
		Number of secondary care visits and tests referred to hub municipality	Technicians from the Departments of Health	2008
		Number of users waiting to access secondary care services	Technicians from the Departments of Health	2008

RESULTS

CONTEXTUALIZATION OF THE MUNICIPALITIES STUDIED

The analysis of selected variables showed marked intermunicipal inequities (Table 1), especially regarding the degree of urbanization, access to sewerage and Poverty Index. Indicators of education, formal employment and social exclusion present a difficult situation for 75% of the municipalities.

Cases of maternal mortality were concentrated in 25% of municipalities, revealing a strong polarization. The data from infant mortality coefficient showed that 57.7% of the municipalities had worse ratios than the state average in 2008 (coefficient of 13.0)[18]. The highest rates of hospitalization for gastroenteritis, heart failure, cerebral vascular accident, hypertension and diabetes were concentrated in 25% of municipalities.

Strong inequalities were found in the provision of medical consultations in primary care, in the coverage of the Family Health Strategy and in the availability of doctors and dentists.

Considering the number of doctors per thousand inhabitants, a higher concentration was observed in 25% of municipalities.

A high variability of values was identified for the data analyzed, especially in relation to federal transfers. It was also possible to observe that 75% of the municipalities of the MRC invest between 20.0 and 41.8% of their own resources in health. The total health expenditure showed striking inequities in the financial capacity of municipalities.

OBTAINING A SYNTHETIC INDEX

Initially, the Pearson correlation matrix was used. Based on this matrix, the interrelationships and multicollinearities between the 30 initial variables were examined to identify a smaller number of factors that presented approximately the same total of information expressed by the original variables.

In the next phase, the technique of factor analysis was applied, setting the number of factors by means of "eigenvalues", keeping factors whose value was greater than 1.0. To identify the component variables of each factor, the matrix of factors rotated by Varimax method (orthogonal rotation was used, allowing the correlation coefficients between the variables and factors to be as close as possible to zero, 1 or -1, thus facilitating their interpretation). This array indicated which variables had high factor loadings for retention of six main components. The principal component analysis explained 70.61% of the total variance of the distribution of 30 variables.

The next step was to calculate the values of each component for each municipality based on factor scores. From these scores, it was possible to calculate the final factor score for each municipality and to get a synthetic final index, the Index of Living Conditions and Health

Table 1. Descriptive statistics of the variables of socioeconomic, epidemiological, geographical, financial and health care network conditions of municipalities in the metropolitan region of Curitiba.

Indicator	Minimum	P_{25}	Mean	P_{75}	Maximum
Population	6,137	13,004.25	23,230	100,253	1,828,092
Urbanization (%)	12	23.67	52.60	90.20	100
Distance (km)	0	21.64	36.47	72.33	134.9
Municipal Human Development Index (MHDI)	0.63	0.71	0.75	0.77	0.86
Child Development Index (CHI)	0.45	0.61	0.69	0.75	0.80
Social Exclusion Index	0.37	0.43	0.49	0.54	0.73
Gini Index	0.45	0.50	0.54	0.57	0.64
Poverty Index	0.30	0.50	0.67	0.73	0.85
Formal Employment Index (%)	0.047	0.068	0.12	0.23	0.85
Rate of illiterate people (%)	3.38	7.19	9.15	14.03	28.09
Education Index	0.28	0.40	0.50	0.57	0.87
Water supply system (%)	71.44	83.67	90.23	95.44	99.12
Garbage collection (%)	78.53	92.57	97.10	99.09	99.91
Sewage system (%)	8.62	26.65	50.41	68.52	92.13
Infant mortality/1,000 live births	6.02	11.71	14.43	16.56	37.04
Maternal Mortality/100,000 live births	0.00	0.00	0.00	11.55	85.20
Hospitalization for gastroenteritis (%)	0.00	0.03	0.30	0.67	2.17
Hospitalization for heart failure (%)	0.87	1.74	2.15	2.88	11.67
Hospitalization for diabetes (%)	0.17	0.41	0.76	1.34	3.90
Hospitalization for hypertension (%)	0.00	0.13	0.37	0.72	2.32
Hospitalization for stroke (%)	0.00	0.05	0.32	0.68	1.31
Hospitalizations in the Unified Health System/100 inhabitants/year	3.94	5.47	6.46	8.28	10.34
Coverage of the Family Health Strategy (%)	0.00	29.45	52.26	93.09	100.00
Consultations in primary care/inhabitants/year	0.50	1.48	1.80	2.30	2.90
Doctors of the Unified Health System/1,000 inhabitants	0.04	0.13	0.20	0.42	1.08
Dentists of the Unified Health System/1,000 inhabitants	0.00	0.06	0.16	0.29	0.74
Vaccination coverage	71.51	87.28	97.40	108.14	162.65
Total health expenditure (ammount in Brazilian real/inhabitant/year)	139.61	224.21	266.23	360.12	614.79
% of own resources allocated to health	14.69	20.00	22.71	27.62	41.76
Federal transfers (ammount in Brazilian real/inhabitant/year)	27.55	49.00	60.94	91.39	244.19

P_{25}: percentile 25; P_{75}: percentile 75.

Situation (ILCHS) (Table 2) and classify them into four groups, on an ordinal scale, ranging from 1.03 (optimum conditions) to -0.96 (very low conditions).

It was found that 57.6% of the municipalities had an index below 0.50, showing poor performance for the living and health conditions. The classification of the four groups is arranged in Figure 2, to show the geographical distribution of intraregional inequalities for the proposed index. Municipalities located north of the MRC, in Vale do Ribeira, had the worst rates, demonstrating the vulnerability of this region.

ACCESS TO SECONDARY HEALTH CARE SERVICES

Access to specialist consultations within the municipality does not happen to 50% of the municipalities, due to lack of supply. Ophthalmology and oral and maxillofacial surgery (OMFS) were the specialties with the highest and lowest offer, respectively. As for the tests, it was observed that 75% of municipalities offered imaging, mainly simple radiology. Only two municipalities offered high-risk obstetrics, revealing a difficulty in access to such service when considering the territorial extension of the MRC.

Similarly, ophthalmology and OMFS showed the largest and the smallest directed demand, respectively. Simple radiology was the most directed examination followed by ultrasound and endoscopy, all of which showed marked variation.

The repressed demand showed needs that were not met, particularly for orthopedics, cardiology and neurology (Figure 3). At the opposite end of that list are OMFS and nephrology. Access to high-risk obstetrics proved difficult for 75% of the municipalities. The importance of such information must be stressed, as the delay in care can pose risks to pregnant women and the baby. When pregnant women cannot access this service, they are also left without the backing of hospital facilities, necessary to their condition.

Deviations (or outliers) show municipalities with strong repressed demand for selected specialties, demonstrating a marked difficulty for municipalities with low financial capacity, especially for those located in Vale do Ribeira.

DISCUSSION

The context analysis showed marked inequities in the MRC. As the distance between the municipalities and the capital increases, poorer living and health conditions and greates inequities in access to health services are evidenced[7,19]. This phenomenon is probably due to the difficulty experienced by the more distant municipalities in the hub municipality in hiring and retaining health professionals, the low solvability in primary care, the absence of clinical protocols and regulation, lack of qualified staff to work in the management of services and restricted access to the Medical Appointments Central of Curitiba[5]. Furthermore, we highlight the lack of planning actions by the state government

Table 2. Final factor score, classified by rating homogeneous group and Living and Health Conditions Index (LHCI).

Municipality	Final score	Homogenous group	Index
Doutor Ulysses	-0.96	1	0.00
Cerro Azul	-0.90	1	0.03
Quitandinha	-0.49	2	0.24
Tijucas do Sul	-0.36	2	0.30
Itaperuçu	-0.36	2	0.30
Agudos do Sul	-0.35	2	0.31
Tunas do Paraná	-0.27	2	0.35
Contenda	-0.11	2	0.43
Almirante Tamandaré	-0.10	2	0.43
Rio Branco do Sul	-0.09	2	0.44
Balsa Nova	-0.09	2	0.44
Adrianópolis	-0.03	3	0.47
Fazenda Rio Grande	-0.02	3	0.47
Campo Magro	0.02	3	0.49
Lapa	0.03	3	0.49
Piraquara	0.06	3	0.51
Campina Grande do Sul	0.06	3	0.51
Bocaiúva do Sul	0.08	3	0.52
Campo Largo	0.17	3	0.57
Colombo	0.19	3	0.58
Mandirituba	0.29	3	0.63
São José dos Pinhais	0.49	4	0.73
Quatro Barras	0.52	4	0.74
Pinhais	0.53	4	0.75
Araucária	0.67	4	0.82
Curitiba	1.03	4	1.00

and a policy of equitable allocation of resources in the MRC[12,20]. This could be minimized from the technical cooperation between the hub municipality and other municipalities, mainly due to the fact that Curitiba is a protagonist in successful experiences in healthcare.

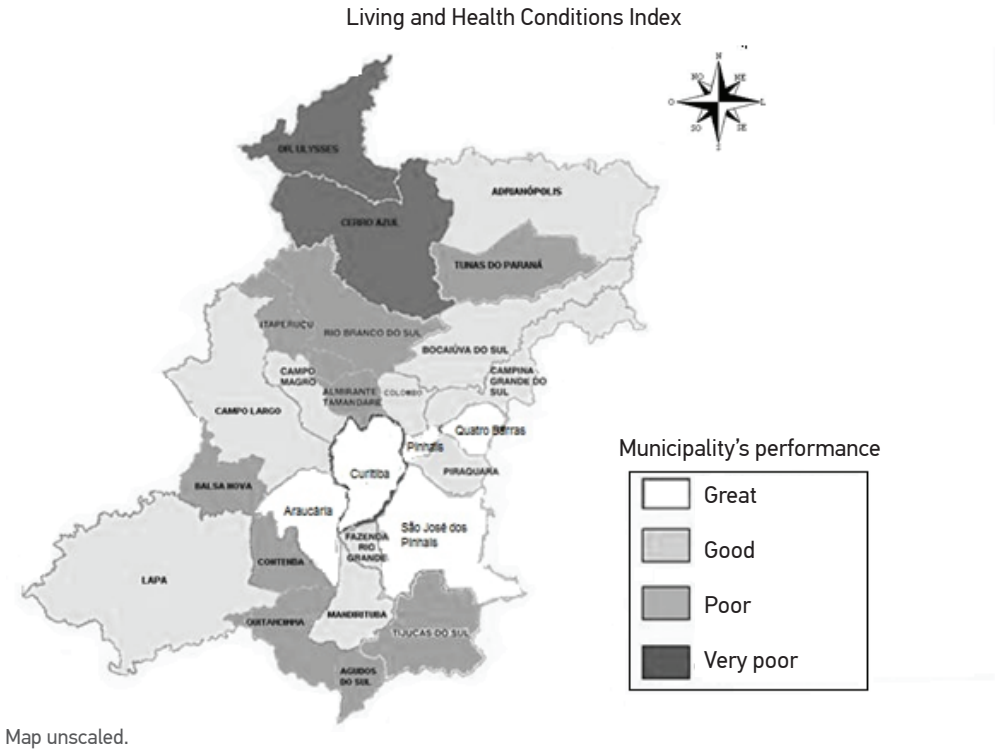
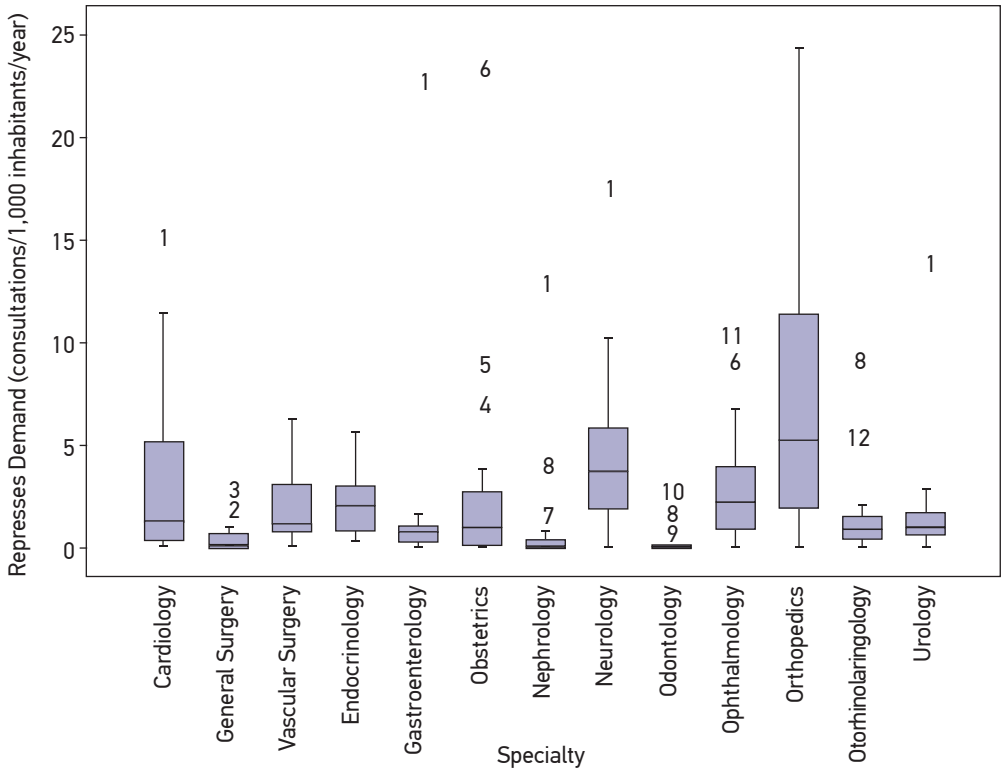


Figure 2. Groups of municipalities according to the performance in the Living and Health Conditions Index.

This partnership can result in an increase in the solvability of health services and, consequently, the reduction of referral to specialized care services. However, it is observed that the centralized technical capacity in the hub municipality prints hegemony over the other municipalities and, in a sense, inhibits the emergence of initiatives to improve the management of health systems in the metropolitan area.

This study demonstrated the complexity of the political interactions, which make the successful experiences of the hub municipality city unable to cross borders to its surroundings. The situation ends up negatively impacting the metropolitan health system itself, as it allows access to users who should be cared for in their own municipalities by emergency care, and especially aggravates clinical conditions that could be resolved much earlier and with utmost respect and dignity for the citizens[5,6,21].

The heterogeneity and inequality in technical capacity of municipalities hinder the process of discussion and articulation required for metropolitan management, and once again, impose a certain state of subservience of most surrounding municipalities in relation to the hub municipality[14].



1 – Doutor Ulisses	5 – Fazenda Rio Grande	9 – Campo Magro
2 – Quitandinha	6 – Adrianópolis	10 – Araucária
3 – Almirante Tamandaré	7 – Rio Branco do Sul	11 – Quatro Barras
4 – Agudos do Sul	8 – Tunas do Paraná	12 – Mandirituba

Figure 3. Repressed demand for specialist consultations selected in the municipalities of the metropolitan region of Curitiba, in 2008.

It was observed that the municipalities in the group with optimal living and health conditions were those that offered greater access to health services both in primary care and in specialized care. Studies such as the National Survey by Household Sample (PNAD) of 1998, 2003 and 2008, have reported that people living in more developed regions use more health services than those living in less favored areas[8,19,21].

This situation is associated with a fragmentation of services, even in cities with a large installed capacity. The health care services are offered without a conception of integrated network, that is, a secure referral to specialized levels and counter-referral to the primary health care units. The institutionalization of a system of referral and counter-referral is still a relevant challenge for health managers and professionals[2,22].

Similarly, the low solvability of primary care, the lack of regulation protocols for referrals and the difficulty in hiring medical professionals impact on the increase of referrals to specialized care services, sometimes erroneous, and consequently the on difficulty of access to these services[3,6,23]. The regionalization becomes crucial in the organization of services. In this sense, we stress the need to deploy health care networks connected by a single mission.

Inequities in the epidemiology profile and in the health care network suggest that municipalities have different realities in the quantity and quality of primary care services provided, especially when considering the differences between the supply of primary care consultations, the availability of professionals and infant mortality rates[5]. High-risk obstetrics is in limited supply in the Appointments Central of the hub municipality, resulting in repressed demand, which raises worries about the health of the mother and baby[5,21].

The poorest municipalities had higher repressed demand, especially those located in Vale do the Ribeira, such as Doutor Ulysses. This situation confirms the studies that showed that individuals with the lowest socioeconomic levels have greater difficulty in accessing health services[24]. Moreover, it points to the economic and financial dependence on other spheres of the government, faced by small municipalities, which do not have their own sources of financing to fund the deployment of specialized care services and, not having an alternative, become dependent on the actions provided by the hub municipality, which cannot always meet the demands.

Similar condition was found in other metropolitan areas, which is the case of the study by Cerqueira and Pupo[3] in communities with poor living conditions and access to health services in the metropolitan area of Santos. The biggest obstacle identified by users was the low capacity of the health system to respond in an agile and adequate way to the population's health demands and needs. This situation can be exemplified by the insufficient supply of specialized care services, long waits for tests and delays in obtaining care. Campos et al.[25] studied the socioeconomic and development conditions in the metropolitan region of Belo Horizonte and found that these can be decisive in the identification of the cities with the best and worst indicators of primary care. It should not be forgotten that the numbers for repressed demand stated in this case refer to citizens who have faced some difficulty in access to primary care and who, in order to obtain access to specialized services, will have to go to another municipality. The waiting time for this service plus the waiting time generated for specialized study will likely result in the worsening of this citizen-user's health situation.

In this sense, strategies that are already in place should be used, but they need to be better supported and used, such as the Metropolitan Health Consortium, which may prove to be a great alternative to solve much of the demand for specialized health care services.

It is worth noting that Paraná has a Master Plan for Regionalization, which could guide investments in the regions of the MRC, allowing greater access to users in the most outlying municipalities to specialized services closer to their homes, also favoring the fixation of professionals in these municipalities[5,14].

One limitation of this study relates to the complexity of analyzing the access, as it requires multidimensional measures and cannot be explained only by their use. Likewise, the absence

of an information system that presents indicators of needs and coverage of health services is a limitation to this study and also to the planning and organization of services. There is a lack of literature that addresses access from the use of health services and its repressed demand, since most studies on access refer to the perception of the user.

CONCLUSION

The metropolitan region is shown as a heterogeneous space, marked by inequities in living conditions and in the coverage of simple services such as vaccination. The health condition of populations from municipalities more distant to the hub municipality proved vulnerable due to poor access to health services, even primary care, and which becomes much more difficult in specialized care. Finally, differences in health funding reflect larger inequities in these municipal health systems.

It becomes evident that the centralization of financial, human and technological resources in one hub municipality failed to reach populations living in the surroundings of the region. If anything, it affected populations from troubled neighboring areas. It appeared that the adoption of a new action strategy that can cope with the challenge of granting the right to health to the citizens of the metropolitan area with quality and solvability, and especially respecting the principles of universality, comprehensiveness, fairness, is required.

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