

Assistance Gaps in Physical Rehabilitation: Spatial Analysis of Physical Therapy Services and Users' Households in a Brazilian Capital

Vazios assistenciais na reabilitação física: análise espacial dos serviços de fisioterapia e dos domicílios dos usuários em uma capital brasileira

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ABSTRACT: *Objective:* The aim of this study was to analyze the spatial distribution of outpatient physical therapy rehabilitation services and associate it with the geographic location of users' households. *Methods:* The public physical therapy rehabilitation services and addresses of users' households in Campo Grande (MS) were georeferenced in 2017-2019. *Results:* Five physical therapy clinics were identified to supply the demand of 31,774 scheduled users. Most services are in the most central regions of the city, while most users reside in peripheral areas. *Conclusion:* An assistance gap in Physical therapy care was identified, with a restricted supply of services to meet demands and a geographic barrier, since the services are far from the users' households. Physical rehabilitation must be a priority in the country's public health, especially nowadays, where demands for rehabilitation of a significant number of Brazilians who evolved with sequelae of COVID-19 are so present.

Keywords: Access to health services. Physiotherapy. Rehabilitation. Primary health care. Geographic mapping.

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RESUMO: *Objetivo:* O objetivo deste estudo foi analisar a distribuição espacial dos serviços ambulatoriais de reabilitação em fisioterapia e associá-la à disposição geográfica dos domicílios dos usuários da rede pública de reabilitação em uma capital brasileira. *Métodos:* Foi realizado um georreferenciamento dos serviços públicos de reabilitação fisioterapêutica e dos endereços dos domicílios dos usuários desses serviços em Campo Grande (MS) durante o período de 2017 a 2019. *Resultados:* Foram identificados cinco serviços de fisioterapia para atender à demanda de 31.774 usuários agendados no período estudado. A maioria dos serviços está nas regiões mais centrais da cidade, enquanto a maioria dos usuários reside nas regiões periféricas. *Conclusão:* Evidenciou-se um vazio assistencial na reabilitação fisioterapêutica, com oferta restrita de serviços em função das demandas, e barreira geográfica, uma vez que os serviços estão distantes dos domicílios dos usuários. A reabilitação física deve ser colocada na agenda prioritária da saúde pública no país, especialmente no momento atual, com as demandas por reabilitação de um número expressivo de brasileiros que evoluem com sequelas da COVID-19.

Palavras-chave: Acesso aos serviços de saúde. Fisioterapia. Reabilitação. Atenção primária à saúde. Mapeamento geográfico.

INTRODUCTION

Changes in the health of populations and demographic profiles are evident across the world. Population aging is accompanied by chronic conditions¹⁻⁴, contributing to a rapid increase in the number of people with disabilities or functional decline for substantially longer periods of their lives⁴. Health systems are required to respond to such emerging challenges. Rehabilitation, however, has not been prioritized worldwide and presents with few resources⁴, especially in middle and low-income countries^{1,2}, despite the consensus that demands for rehabilitation services will continue to grow based on global health and demographic trends^{2,4}.

Musculoskeletal disorders are one of the most demanded services identified in a study⁴ on rehabilitation needs, while cerebral palsy strongly contributes to the need for rehabilitation worldwide. These conditions are fundamentally related to physical rehabilitation services, which enable functional gain and impact people's quality of life. In a singular way, individuals with functional disabilities face greater obstacles when accessing health, education and work while also having more needs related to health care; therefore, their demands are often unmet compared to the general population⁵.

To the broader extent, access to health services is often a critical point of efficiency and effectiveness of health systems. Access involves aspects that go beyond assistance and the provision of slots; it also refers to ease of access, that is, the relationship between the service offering rehabilitation and users' households, commuting and costs⁶. The distance between services and users who need physical therapy rehabilitation's homes can be a geographic barrier. This is one of the most worrying factors, as these users usually have reduced mobility and face difficulties in commuting to rehabilitation services^{7,8}.

Georeferencing health studies are designed to investigate the spatial distribution of diseases in different territories and to plan the distribution of services across health care networks (HCN)⁹. This strategy also allows to assess the spatial distribution of users seeking treatment¹⁰.

A single study¹⁰ using georeferencing to analyze the spatial distribution of users of the Unified Health System (SUS) in search of physical therapy treatment in a specific service in Parnaíba (PI) was found. According to the analysis, 1,476 users came from 32 different districts of the city, which reflects the need to commute from different geographic locations.

Studies on access to rehabilitation services contribute to the expansion and qualification of offer of this type of care within SUS. Spatial analysis and the crossing of geographic information about residential location of users and physical therapy services from SUS can help identify barriers to access to these rehabilitation services, enabling managers to better plan, monitor and evaluate actions and public policies to improve physical therapy care within the health system.

The objective of this study was to analyze the spatial distribution of outpatient physical therapy services and check for associations with the geographical layout of the households of users scheduled for outpatient physical therapy rehabilitation services from SUS in Campo Grande (MS).

METHODS

This is a retrospective, descriptive study based on secondary data carried out by means of the georeferencing of the residence of users scheduled for SUS outpatient physical therapy services in Campo Grande, from January 2017 to February 2019. Both public and private outpatient services in the capital were georeferenced.

SOURCES OF SECONDARY DATA FROM OUTPATIENT PHYSICAL THERAPY SERVICES

The georeferencing of services was based on data from the National Registry of Health Establishments (CNES)¹¹. A survey of all outpatient physical therapy services in the municipality was carried out on May 22, 2019. We identified services offering physical therapy exclusively to SUS users, services exclusively assisting users of private health plans, and mixed services, which received SUS, supplementary health and private health users. Based on this information, the “mixed” services were contacted to confirm the offer of physical therapy for SUS users in the studied period.

Mixed services that reported not performing physical therapy care through SUS, services that were duplicated in the CNES list, services sharing the same address, and philanthropic institutions were excluded – the latter for not receive users through the Slots Regulation System (SISREG), the database used in this study.

After exclusions, we collected information regarding street, number and neighborhood of the services.

SOURCES OF SECONDARY DATA OF USERS SCHEDULED FOR SUS OUTPATIENT PHYSICAL THERAPY SERVICES

Information regarding scheduled users was extracted from the SISREG database. Users residing in rural areas and in other municipalities were excluded from the analysis. Information about age, sex and diagnosis was collected from the International Classification of Diseases (ICD 10). The diagnoses consisted of an expressive number of ICD, and, to help in the analysis, they were categorized into three groups: orthopedic, neurological and other conditions.

For the georeferencing of service users' households, their addresses were also collected.

CONSTRUCTION OF GEOREFERENCING

The addresses of users and physical therapy services were organized in Microsoft Excel 2010 spreadsheets, entered in the Batchgeo¹² online system, and geocoded.

Kernel density maps were prepared with the spatial distribution of the addresses of users scheduled for SUS physical therapy services and mixed services through SISREG. The outpatient services in the municipality were also identified on the map, which allows a spatial view of services and users.

For the elaboration of maps and estimation of Kernel density—a resource used to create a raster map of density (heat map) based on a vector layer of the type point—, the software QGIS¹³ was used. Density was calculated based on the number of points in the studied area; thus, the greater the number of points grouped (cluster), the greater the perception of density. These types of maps allow to pinpoint “hot spots” in areas of high concentration and clustering of points.

All maps were generated at the same cartographic scale (1:2.5 km), as to identify areas with high concentrations of physical therapy users and services. Regarding georeferencing, we emphasize that, in very close addresses, more than one point can overlap and give the impression of being only one; however, they can be easily visualized when fully zooming in the map system.

We chose to use a density of 600 points because of the number of points in the area. The wider density significantly expanded the areas of concentration. Thus, the density was able to show the regions of points clustering, allowing to identify areas of lower and higher concentration.

The georeferencing shown here was constructed using a map in shape file format, made available by the Health Department of Campo Grande (SESAU) and containing the

seven urban regions of the municipality: Imbirussu, Segredo, Prosa, Centro, Bandeira, Anhanduizinho and Lagoa.

Based on the geographic coordinates of users' and services' addresses, the distances between points were calculated using the vector analysis tool "distance to the nearest center". Distances were calculated separately for each unit. Means, interquartile range (25 and 75%), 95% confidence intervals (CI) of mean and minimum/maximum distances were calculated.

This research was approved by the Ethics Committee of Universidade Federal de Mato Grosso do Sul, CAEE 02617418.7.0000.002.

RESULTS

A total of 32,085 addresses were obtained from users scheduled for outpatient physical therapy in SUS for the study period. Of these, 311 records (1.03%) were excluded because they were located in other municipalities or in rural areas, remaining 31,774 (99.03%) urban addresses.

Two exclusive SUS services were identified—one in Imbirussu and other in Segredo; three mixed services were pinpointed in the Central region (due to proximity, there were overlapping points). Private services were mostly located (31) in the Central region. There was no service in the Anhanduizinho and Bandeira regions. The highest concentration of scheduled users was in the Anhanduizinho region (26.6%), followed by Segredo (16.7%), Lagoa (16.3%), Imbirussu (14.9%), Bandeira (13.0%), Prosa (7.1%) and the center (5.3%) (Figure 1).

In Figure 2, only the SUS and mixed services and the concentration of users' household locations are shown. We can see a high concentration of users scheduled in regions without services and an important assistance gap when it comes to the offer of physical therapy rehabilitation within SUS (Figure 2).

As for users, 59.40% were females, with mean age of 50.61 years. Most (89.00%) were referred for physical therapy due to orthopedic disorders, 9.00% due to neurological disorders and 1.77% due to other conditions (ophthalmologic, respiratory, cardiovascular, oncologic, urogynecologic, pediatric musculoskeletal disorders, and burn injuries).

The verification of the average distances between each user address and the services showed that the shortest distance traveled (4.13 km) was to an exclusive SUS service located in Imbirussu and the longest distance was to a mixed service (6.62 km) located in the Central region (Table 1).

DISCUSSION

The results point to insufficient offer and inadequate spatial distribution of SUS outpatient physical therapy services compared to user demand.

Two problems that constitute important barriers to users' access to public services of physical therapy rehabilitation with SUS were evident:

1. Spatial organization of services, most concentrated in the central region, while the greatest concentration of users is in peripheral regions;
2. Limited offer of rehabilitation physical therapy services from SUS, unable to meet the high demand.

The matter of access to health is complex, multifaceted and has different analytical approaches⁶. Authors¹⁴ highlight five dimensions of access: availability, accessibility, functional adequacy, financial capacity, and acceptability. The results of this study are related to two of them: availability and accessibility. Regarding the access barriers identified, the spatial organization of services is directly associated with accessibility, that is, the distance between services and users. The limited offer of public physical therapy rehabilitation services is related to availability, characterized by the volume and type of existing services, volume of users and specific needs¹⁴.

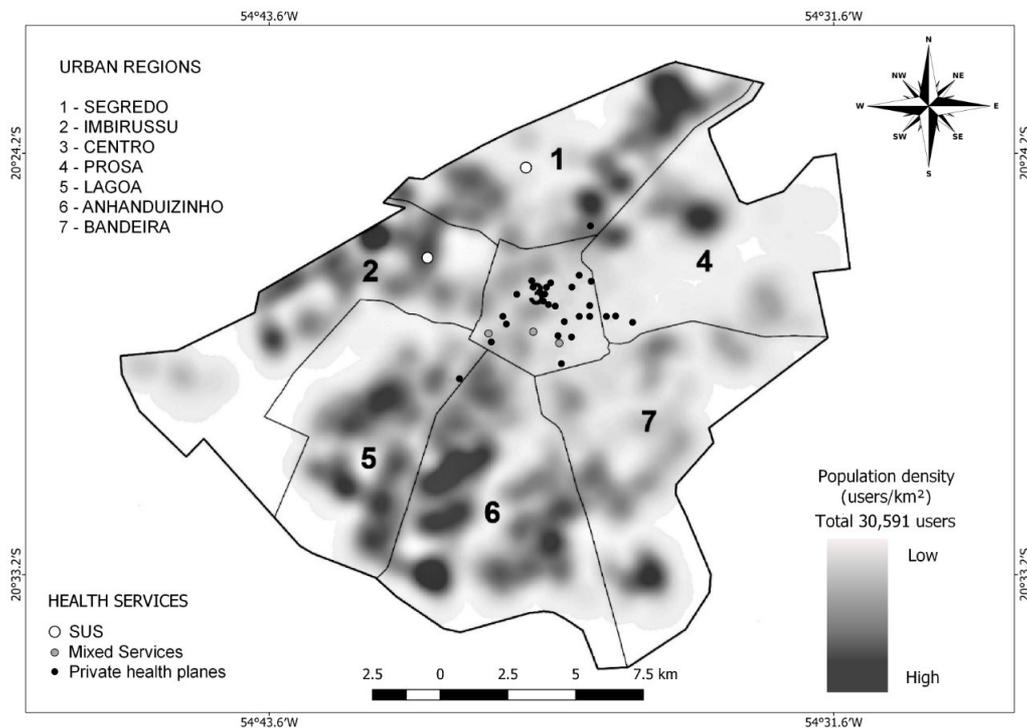


Figure 1. Map representing the spatial distribution in Kernel of all users referred to SUS outpatient physical therapy services, and distribution in points of all outpatient physical therapy services in Campo Grande (MS).

Spatial organization showed a concentration of specialized services in the most central regions of the city, a characteristic also seen in different national and international realities^{8,15-17}.

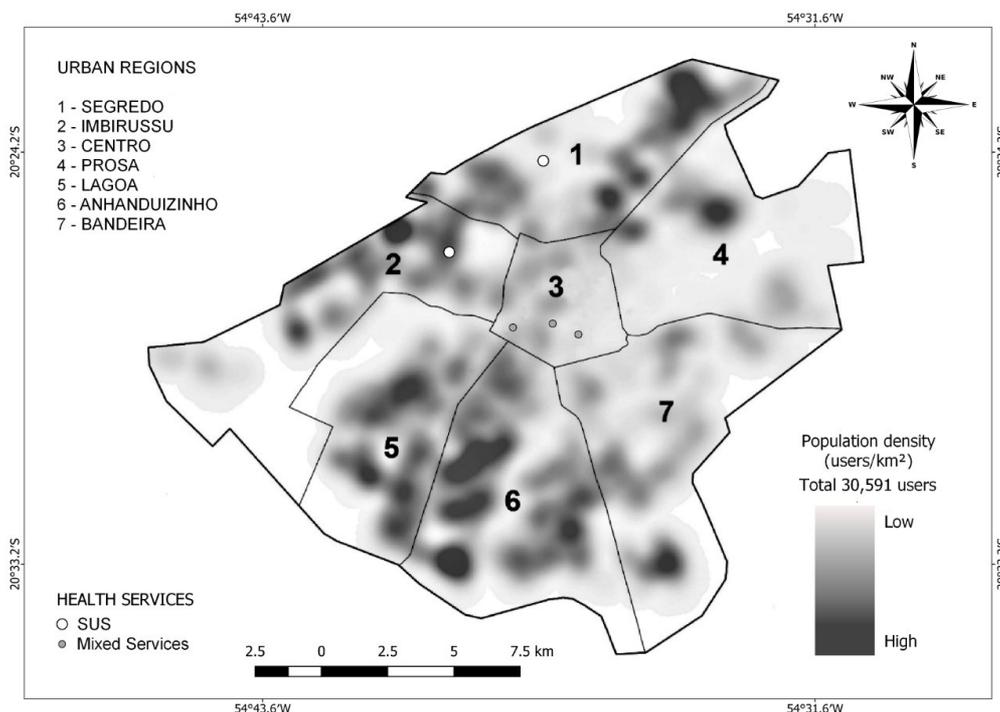


Figure 2. Map representing the spatial distribution in Kernel of all users referred to SUS outpatient physical therapy services, and distribution in points of SUS and Mixed outpatient physical therapy services in Campo Grande (MS).

Table 1. Distances between users' households and the nearest SUS physical therapy rehabilitation service, in kilometers – Campo Grande (MS).

Care unit (urban region of the unit)	Mean	IQR 25%	IQR 75%	95%CI		Minimum	Maximum
Mixed Service 1 (Center)	5.61	3.80	7.34	5.51	5.72	0.28	12.84
Mixed Service 2 (Center)	6.35	4.84	8.08	6.31	6.39	0.06	15.33
Mixed service 3 (Center)	6.62	5.00	8.58	6.57	6.67	0.14	14.50
SUS Service 1 (Segredo)	5.14	2.63	6.36	5.02	5.26	0.24	15.67
SUS 2 Service (Imbirussu)	4.13	1.81	6.03	4.03	4.22	0.04	14.04

IQR: interquartile range

The distance between users' households and the services is a geographic barrier that limits access to and use of health services, also interfering with access to physical therapy services¹². The more specialized the services, the more distant they are from the users' living regions¹⁵, which makes it difficult for users from peripheral regions to access care.

The results reinforce the trend seen in the literature: the shortest average distance traveled by users was to a service located away from the central region, and the longest distance was to a service located in the Center—a worrying fact, considering that three out of five SUS physical therapy rehabilitation services in the municipality are in the central region. The highest concentration of scheduled users resided in Anhanduizinho, where this type of service does not exist and where the highest rate of social exclusion in the municipality can be found¹⁸. In an investigation of absenteeism and waiting times for access to physical therapy services in Campo Grande, users from Anhanduizinho were the ones who missed the most appointments at the services¹⁹.

This result is disturbing, as the most socially vulnerable regions are made up of the population that has the most difficulty in accessing health services⁵. More vulnerable urban regions had higher percentages of people with disabilities²⁰, who are potential users of rehabilitation services.

Some factors intensify the geographic barriers, such as reduced number or absence of sanitary transport¹⁵, lack of adapted public transportation, limited hours or absence of bus lines where users reside, dependence of public transportation or ambulances, functional limitations from health problems¹⁷, travel costs^{3,8,21,22}, the need to withdraw from work activities to dedicate to treatment³, absence of a social support network that helps in overcoming physical limitations and weather conditions on days of appointments²².

Such situations directly interfere with access to health services—and in a more relevant way for some groups such as the elderly, users with disabilities or reduced mobility^{7,17,23}. These groups are an expressive clientele of physical therapy services. Thus, even if users manage to schedule an appointment at public services, there are several obstacles that behave synergistically and become barriers to access, which can contribute to absenteeism or treatment discontinuation^{19,24}.

Overcoming these challenges is no trivial task, especially considering that, in general, rehabilitation is medium to long-term, with weekly frequency²⁴. All these aspects can explain the geographic barriers reported by people with disabilities as important obstacles to accessing health services^{8,25,26} and transport costs as insurmountable or very serious problems⁸.

The results show a substantial demand for physical therapy rehabilitation in SUS: 31,774 users were scheduled in the 26-month period. It is necessary to problematize the difference between the number of SUS services compared to private services available in the studied capital. At the time of data collection, the number of private services was six times larger, while the number of residents in Campo Grande with a health insurance corresponded to roughly one third of the population, according to data from the National Supplementary Health Agency²⁷.

There is an imbalance of supply and demand when it comes to public and private services and number of SUS users and users with health insurance plans, which points to inequalities in access to physical therapy services in the municipality, as well as a limited offer of rehabilitation services by SUS that is far below demand, compromising care equity, universality and comprehensiveness.

It is important to assess the service offer model, with the contracting of private clinics to service SUS users. This model depends on bureaucratic procedures and the interest of private services in serving this population. Thus, offers fluctuate: at times being available, at times not. In 2021, when this article was being produced, according to information from SESAU, there was no outpatient physical therapy service contracted by SUS, which meant the care was being provided by two services for all the demand in the capital.

This is a reality not restricted to Campo Grande. In Brazil, elderly users⁷, users with disabilities²⁸ and physical sequelae after traffic accidents³ faced waiting lines or access problems as public rehabilitation services were scarce, revealing an assistance gap that can lead to prolonged or permanent functional disabilities. Despite the expansion of access to health provided by SUS, the continuity of care in rehabilitation after acute events remains a serious problem to be faced.

There is a clear mismatch between the global need for rehabilitation and the availability of services². Historically, rehabilitation has been a low-priority issue in many governments²⁻⁴, which results in insufficient service provision^{4,24}, especially in middle and low-income countries^{1,2}, irregular geographic distribution and devaluing of physical rehabilitation by managers^{3,29}.

There are many challenges in the way of quality rehabilitation implementation, and, given the current and growing demand, the World Health Organization (WHO) has prioritized this agenda and placed rehabilitation as an investment in human capital that contributes to health, economic and social development².

As a strategy to face these challenges, the strengthening of primary health care (PHC) as a privileged and powerful space for rehabilitation has been reinforced by national^{10,19,24} and international^{1,4} authors, and by WHO².

This is an essential model change required to overcome the gap in service supply, especially in middle and low-income countries, with possibilities of effective care in the surroundings of people's residence locations^{4,30}, with the power to provide greater adherence to treatment in the medium and long term³¹.

The lack of clarity on the role of the physical therapist in rehabilitation actions in PHC may be related to the culture that this type of care must be provided in specialized care only^{10,32} and that rehabilitation is an expensive clinical service that must be performed in secondary/tertiary care⁴. It is estimated that an expressive percentage of users who are referred to specialized care can be decisively cared for by physical therapists in PHC^{24,32,33}. Low-cost, minimal-resource rehabilitation interventions have been effective and can be considered successful³⁰.

It is worth mentioning the power of Brazil to incorporate this agenda, with an interconnected and broad coverage PHC, having the teams of the Expanded Family Health Centers (EFHC) and expertise to act in rehabilitation in the territory. However, expanding the scope of these practices in PHC requires reorganization of primary health care as whole, with increase in professional staff to incorporate this agenda without losing the characteristics of care within the territory. This must be user-centered, carried out by a multiprofessional team, with bonding and listening, use of light care technologies, low technological density tools, continuing health education, unique therapeutic projects, among other strategies. This construction of multidisciplinary care in the Brazilian territory would enhance the results of rehabilitation. Obviously, such actions do not replace the provision of specialized physical therapy services for more complex cases, which must be offered in regions closer to users as to minimize barriers to access.

Despite the need to consolidate physical therapy within PHC³⁴, the current Brazilian political context puts us in incessant attacks to the National Primary Care Policy, including the dismantling and precariousness of EFHC performance³⁵, which potentially weakens access to physiotherapeutic care in SUS even further.

Addressing these challenges is more urgent in light of the COVID-19 pandemic. After the acute phase, a significant number of people affected by the disease may develop sequelae and require long-term rehabilitation, a fact that increases the demands for rehabilitation worldwide⁴.

The greater demand for treatment by users with orthopedic disorders found in this study possibly stems from the fact that users with neurological disorders are submitted to different flows, being referred to services specialized in neurological rehabilitation in Campo Grande. At the same time, the great demand for rehabilitation due to orthopedic disorders is in line with the findings of the global estimate of need for rehabilitation services⁴, in which musculoskeletal disorders were the majority of conditions that required rehabilitation. These are intrinsically related to physical therapy care.

Although focusing on specific localizations, this study raises important matters of assistance gaps in rehabilitation and gives visibility to the relevant problem of access to health that has impacted the lives of a significant portion of the population. The methodology used can be adapted to other realities, enabling the production of new knowledge through different forms of organization of the health networks. Information such as outcomes, treatment dropouts, waiting times, origin of referrals, continuity of care in PHC and other information that support the reformulation of policies to expand/qualify access to physical therapy rehabilitation within SUS can be incorporated in future investigations.

The results put the spotlight on a significant demand from users, insufficient services and assistance gaps, especially in peripheral and more vulnerable regions, within the scope of SUS physical therapy rehabilitation services in Campo Grande.

Although these access barriers are important, they are also modifiable. Through public policies, they can be diminished or suppressed by reorganization, expansion and qualification of service offer in areas of high concentrations of users who require physical therapy

rehabilitation in SUS. Therefore, a promising path lies in the formulation of functional health care, with articulated actions of promotion, prevention and rehabilitation for the different life cycles.

Finally, it is necessary to reflect on the current model of offering rehabilitation services in specialized care in the central regions of cities, its limitations and impacts for those who need it, and to think about new possibilities such as public policies. It is a complex reality that requires, therefore, careful actions to be designed based on the demands of users and the potential of local networks, with implementation of intersectoral actions, which require decisions and interventions that go beyond the health sector.

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