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# Spatial analysis of specialized care in the Network for People with Disability: the case of Minas Gerais, Brazil

## *Análise espacial da atenção especializada na Rede de Cuidados à Pessoa com Deficiência: o caso de Minas Gerais*

### ABSTRACT

**Purpose:** To map the Care Network for People with Disabilities in Minas Gerais, based on the identification of the points of care in the rehabilitation specialized care component, its modalities and distribution according to the population. **Method:** Cross-sectional descriptive study. We used geoprocessing techniques to describe the distribution of the specialized care devices of the Network Care, as surveyed in April 2014. The regions of the state described in the State Regionalization Master Plan were adopted as analysis units. We analyzed data from National and state legislations and data available in the management reports of the Minas Gerais State Health Department. The presence of points of care in the territory, the type of service offered and its relationship with the population density were selected as variables. We performed a descriptive spatial analysis of the distribution of the points care considering the selected georeferenced variables and the type of service as well as the modalities of disability. **Results:** The Network Care is composed of 183 points of care with the higher concentration in the south of the state: 135 (73.8%) Specialized Services in Rehabilitation of Intellectual Disability, 18 (9.8%) Physical Rehabilitation Services, 15 (8.2%) Auditory Rehabilitation Services, 3 (1.6%) Visual Rehabilitation Services and 12 (6.6%) Specialized Rehabilitation Centers with two or more modalities. We observed greater concentration of services in the most populous regions. **Conclusion:** The Network Care presents great disproportion between rehabilitation modalities, with a greater number of services aimed at intellectual rehabilitation, and unequal distribution reflected in the care gap.

### RESUMO

**Objetivo:** mapear a Rede de Cuidados à Pessoa com Deficiência em Minas Gerais, com base na identificação dos pontos de atenção do componente de atenção especializada em reabilitação, suas modalidades e distribuição segundo a população. **Método:** estudo observacional transversal descritivo. Foram utilizadas técnicas de geoprocessamento para descrição da distribuição dos dispositivos da atenção especializada da Rede de Cuidados, conforme levantamento em abril de 2014. Adotaram-se como unidades de análise as regiões do estado descritas no Plano Diretor de Regionalização do estado. Foram analisadas legislações nacional e estadual e dados disponíveis nos relatórios de gestão da Secretaria de Estado de Saúde de Minas Gerais. Como variáveis, foram selecionadas a presença de pontos de atenção no território, o tipo de serviço ofertado e sua relação com a densidade populacional. Foram realizados: análise descritiva da distribuição espacial dos pontos de atenção, considerando as variáveis selecionadas, e georreferenciamento destes pontos, considerando tipo de serviço e modalidades de deficiência. **Resultados:** a Rede de Cuidados é composta por 183 pontos de atenção com maior concentração ao sul do estado: 135 (73,8%) Serviços Especializados em Reabilitação da Deficiência Intelectual, 18 (9,8%) Serviços de Reabilitação Física, 15 (8,2%) Serviços de Reabilitação Auditiva, 3 (1,6%) Serviços de Reabilitação Visual e 12 (6,6%) Centros Especializados em Reabilitação com duas ou mais modalidades. Observou-se maior concentração de serviços nas regiões mais populosas. **Conclusão:** a Rede de Cuidados à Pessoa com Deficiência possui grande desproporção entre as modalidades de reabilitação, com maior número de serviços voltados para reabilitação intelectual e distribuição não equânime, refletindo em vazios assistenciais.

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## INTRODUCTION

The constitution of regionalized and integrated health care networks is an indispensable condition for care qualification and continuity. The networks represent an instrument for guaranteeing the right to health, by expanding access and reducing inequalities, and allow overcoming gaps in care, rationalization and optimization of available care resources<sup>(1)</sup>. Since 2006, with the Pact for Health and, later, with the publication of a specific ordinance, the Ministry of Health has been seeking to coordinate actions to structure health care networks that favor the integrality of care<sup>(2)</sup>. The concept of networks covers actions and services of different technological densities, which are integrated through technical, logistical and management support systems, with the sole objective of ensuring comprehensiveness and continuity of care<sup>(2)</sup>. In the field of collective health, decentralization plays an organizational role, establishing an important relationship with the regionalization process that should be understood as a strategy for the organization of health actions and services in a region. The decentralization aims to ensure comprehensive care, rational expenses, resource optimization, and equity to guarantee the right to health. In addition, its role in the integration of the units and services that make up the network is essential, considering their different technological densities<sup>(3,4)</sup>.

Historically, assistance to people with disabilities took place in a context in which the state failed to ensure their educational and social rights, forcing their families to resort to charities, which subsequently also assumed health care actions<sup>(5)</sup>.

In 2011, the National Disability Plan– Living without Limit Plan was established and, in 2012, the Disability Care Network was created in SUS (Unified Health System). The Network, in addition to establishing new points of care, seeks to expand its role and promote the articulation between services, in order to offer comprehensive attention to people with temporary or permanent disabilities; progressive, regressive or stable; intermittent or continuous. This network includes three components: (1) primary care; (2) specialized care in auditory, physical, intellectual, visual rehabilitation and multiple disabilities, and Specialized Centers in Dentistry (SCD); and (3) hospital and emergency care<sup>(6)</sup>.

Specialized care in the SUS, understood as a set of actions, knowledge and care techniques marked by work processes of higher technological density, still presents regional inequities in the country. Thus, this level of care has been highlighted as a critical aspect in integral access to health, especially with the expansion of primary care and consequent increase in demand for specialized procedures<sup>(7)</sup>.

The formation of a network should consider the demographic and epidemiological profile of its population. According to the CENSUS 2010, in Brazil more than 45 million people declared to have some type of disability. In Minas Gerais there are more than 5 million people with disabilities, with the following distribution by type: visual (15.7%), motor (6.2%), auditory (3.9%) intellectual impairment (1.0%)(8). In the state of Minas Gerais, the Disability Care Network was established in 2012

and has been demanding a new conformation of operation and articulation between services.

Due to the recent implementation and organization, permanent assessment of the configuration and functioning of this network are necessary, with the objective of deepening the understanding of its structure, analysis of access, population distribution and specialized attention in the territory. This information can help identify territorial inequalities and gaps in care, enabling new approaches and strategies to reorganize the network.

Thus, this study aims to map the Disability Care Network in Minas Gerais, based on identifying the points of care of the rehabilitation specialized care component, its modalities and distribution, according to the population living in the state.

## METHODS

A cross-sectional observational descriptive study, using geoprocessing techniques to describe the distribution of devices that make up the Disability Care Network structure in Minas Gerais. To this end, the analysis units included the expanded regions and health regions, according to the Master Plan for Regionalization of Minas Gerais, considered an organizational guideline of health care in the Unified Health System.

In Minas Gerais, the Health Region comprises the continuous geographic space consisting of a group of neighboring municipalities, delimited through cultural, economic and social identities, and communication and transport infrastructure shared networks. The purpose of the Health Region is to integrate the organization, planning and execution of health actions and services. The Enlarged Health Regions, in turn, constitute the regional level (grouping of Health Regions) corresponding to the tertiary level of care, considering the concepts of scale and scope economy, depending on technological density, and they are the territories covered by health care networks.

The territory of this study is the state of Minas Gerais, which has a territorial extension of 586,519.73 km<sup>2</sup>, 853 municipalities, population of 19,597,330 inhabitants, 18% to 58% of the population with incomes below half a minimum wage. Of the 853 municipalities that make up the state, 92.2% have a population of less than 50,000 inhabitants, most of which are populations below 10,000 inhabitants<sup>(8)</sup> (Table 1).

The research was developed in the context of the Disability Care Network in the state of Minas Gerais, specifically in the rehabilitation specialized care component.

Specialized care in rehabilitation of the Disability Care Network occurs in health facilities of a single rehabilitation modality, in Specialized Rehabilitation Centers (SRC) or in Specialized Centers in Dentistry (SCD). Also, according to the Network's organization, orthopedic workshops and specialized services in the rehabilitation of the ostomized person can be linked to physical rehabilitation services or SRC with physical rehabilitation modality<sup>(9)</sup>.

We used information regarding the network's situation in April 2014. We analyzed national and state legislation related to the Care Network and data available in the management reports of the Persons with Disabilities Health Care Coordination of

the State Department of Health of Minas Gerais. As variables, we selected the presence of care service points in the territory, the type of service offered and its relationship with population density.

**Table 1.** Distribution of the population living in the expanded health regions and proportion of population with income smaller than half a minimum wage, Minas Gerais, 2014

Enlarged Health Region	Population (2012)	% Population with income lower than 1/2 minimum wage (2010)
Jequitinhonha	374,945	54
Northeast	661,677	30
East South	669,999	41
Southern Triangle	714,106	18
Center-South	731,435	33
Northeast	813,103	58
Northern Triangle	1,200,794	18
West	1,212,770	20
East	1,465,039	38
Southeast	1,584,338	28
North	1,594,353	53
South	2,641,132	24
Center	6,191,641	23
Total	19,855,332	28

Source: IBGE data, population estimate for 2012 and low-income population ratio, 2010 (available in Datasus/Tabnet)

Regarding the type of service, we considered Rehabilitation Services in a single modality and Specialized Rehabilitation Centers. Rehabilitation Services in a single modality were qualified by the Ministry of Health or accredited by the State Department of Health before the formation of the Care Network (2012), and are responsible for the rehabilitation of only one disability modality: hearing, physical, visual or intellectual. Specialized Rehabilitation Centers are the main specialized points of Care Network. They are classified as to the type according to the number of disability modalities they serve (auditory, physical, intellectual and visual rehabilitation). SRC II is responsible for two care modalities, SCR III for three modalities and SCR IV for all disability modalities.

For the analysis, the specialized care points were georeferenced to their municipalities, considering the type of service and disability modalities.

A descriptive analysis of the spatial distribution of care service points was performed in the state, considering the selected variables. The 13 expanded health regions were considered as spatial units of analysis.

The results were presented in thematic maps of points and proportions, representing the spatial distribution of the Network devices in the state. Data were organized into excel® software spreadsheet, and the information processed and analyzed in the SPSS IBM Statistics 19 and MapInfo 10.0 program.

This project was approved by the Research Ethics Committee of the Federal University of Minas Gerais under opinion 33703914.8.0000.5149. Informed consents were not necessary because the study analyzed the distribution of services based on a database and did not involve data collection with human beings.

## RESULTS

In Minas Gerais, the following rehabilitation services involve a single rehabilitation modality: Physical Rehabilitation Services, Hearing Rehabilitation Services, Visual Rehabilitation Services and Specialized Services in Rehabilitation of Intellectual Disability (SSRID). The SRC follow the same characteristics and classification defined by the Ministry of Health.

The Disability Care Network consists of 183 points of care service: 135 (73.8%) Specialized Services in Rehabilitation of Intellectual Disability (SSRID), 18 (9.8%) Physical Rehabilitation Services (PRS), 15 (8.2%) Hearing Rehabilitation Services (HRS), 3 (1.6%) Visual Rehabilitation Services and 12 (6.6%) Specialized Rehabilitation Centers (SRC) with two or more modalities (Table 2).

When considering the disability modalities, regardless of whether organized in single-modality services or SCR, the composition of the Network has 74.5% of points responsible for rehabilitation of intellectual disabilities, 14.8% for rehabilitation of physical impairment, 8.2% for rehabilitation of hearing loss and 2.5% for rehabilitation of visual impairment.

**Table 2.** Description of the number of care service points of the specialized component of the Disability Care Network by type of service, Minas Gerais, 2014

Type of Service	n	%
Specialized Rehabilitation Center (SRC)	12	6.6
SRC II (Physical and Intellectual Rehabilitation)	08	66.7
SRC II (Hearing and Physical Rehabilitation)	01	8.3
SRC II (Hearing and Intellectual Rehabilitation)	01	8.3
SRC III (Physical, Intellectual and Visual Rehabilitation)	01	8.3
SRC IV (Hearing, Physical, Intellectual and Visual Rehabilitation)	01	8.3
Specialized Service in Rehabilitation of Intellectual Disability	135	73.8
Physical Rehabilitation Service	18	9.8
Hearing Rehabilitation Service	15	8.2
Visual Rehabilitation Service	3	1.6
Total	183	100

Figure 1 shows the location and distribution of care service points by type of disability in the expanded health regions of the state. We observe irregular distribution with higher concentration of care service points for rehabilitation of intellectual disability and great disproportion between this modality and visual rehabilitation. We also observe a higher concentration of services, regardless of the type of disability, in the south, central, southeast and northern triangle regions.

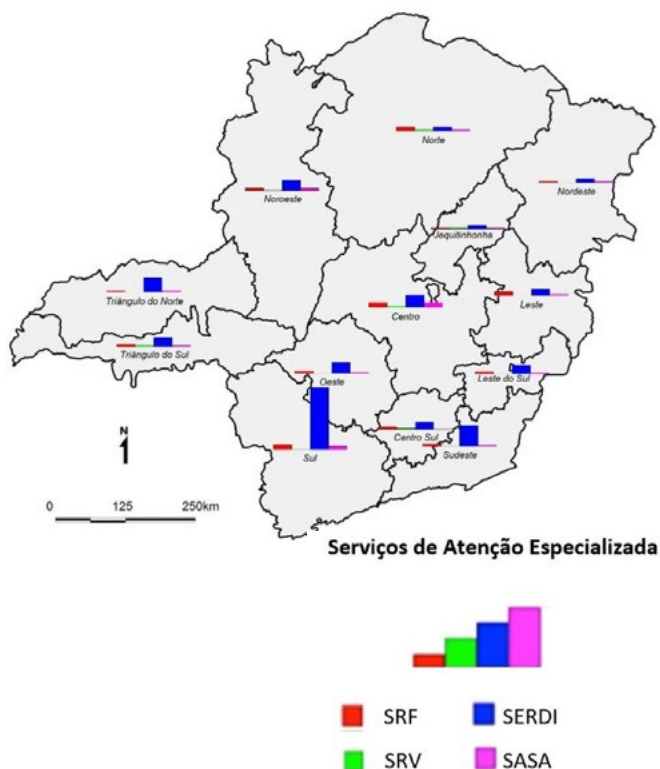


Figure 1. Distribution of specialized care services according to type of disability in the expanded health regions of the state of Minas Gerais, 2014

Figure 2 shows the distribution of the care service points of the Care Network in the territory of Minas Gerais. We can see unequal distribution in the regions of the state. We observe a large concentration of care service points in the central, south, southeast and northern triangle regions, with gaps in care in the north, northeast and Jequitinhonha.

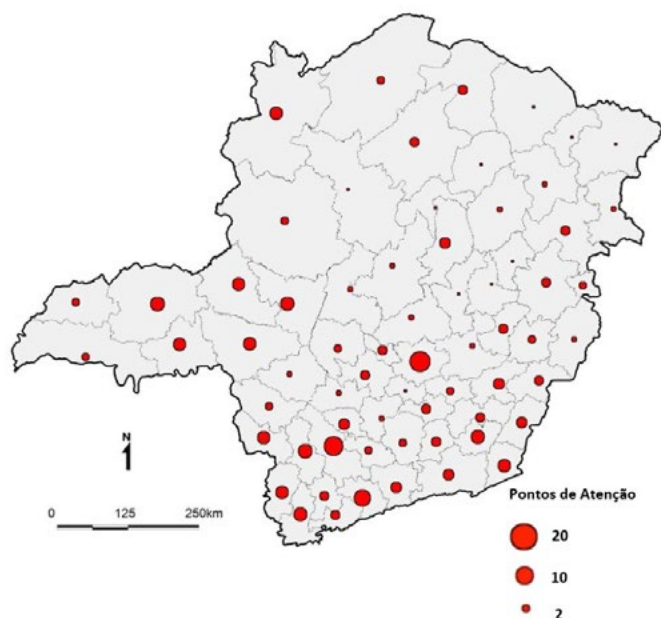


Figure 2. Distribution of the care service points of the specialized care component of the Disability Care Network in the territory of the state of Minas Gerais according to health region, 2014

Figure 3 shows that the highest concentration of care service points occurs in the most populous health regions of the state, such as the regions of Belo Horizonte, Uberlândia, Juiz de Fora, Ipatinga, Alfenas, Varginha, Montes Claros.

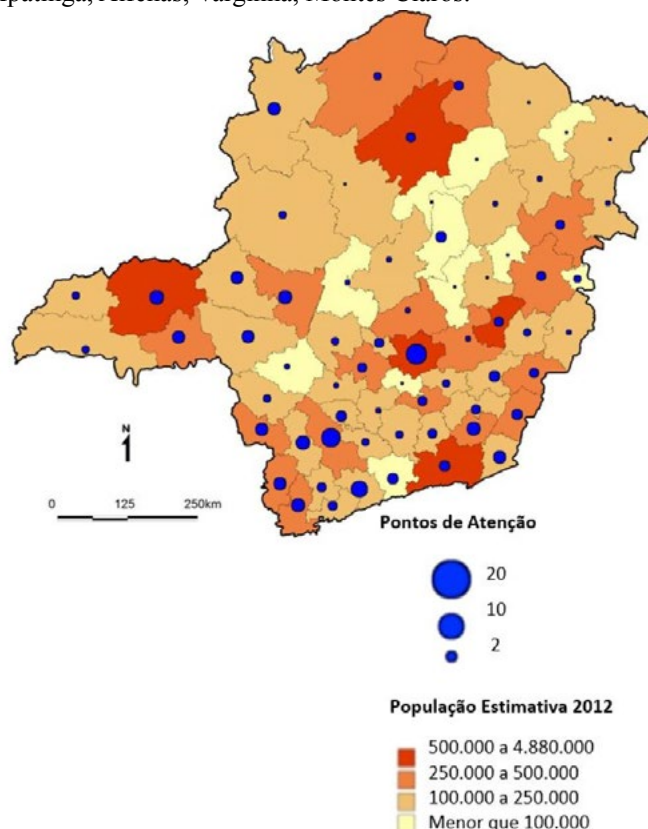


Figure 3. Distribution of the care service points of the specialized care component of the Disability Care Network and population living in the territory of the state of Minas Gerais according to health region, 2014

## DISCUSSION

In Minas Gerais, there is a predominance of rehabilitation services in a single modality. The Specialized Rehabilitation Centers were created to act as integrators of the Care Network, to articulate with other components and services and to break with the fragmentation of disability rehabilitation<sup>(9)</sup>.

Among these services of a single modality, few of them focus on care for people with hearing and visual impairment in all expanded health regions. Services focused on hearing health care were implemented in twelve of the thirteen enlarged regions, and are responsible for the evaluation, diagnosis, selection and adaptation of Individual Sound Amplification Device (ISAD), speech therapy and follow-up in all segments of the population for rehabilitation and hearing habilitation<sup>(10)</sup>. However, further analysis on the need and sustainability of new services should be investigated, considering the complexity and cost of diagnostic actions, ISAD adaptation, rehabilitation, alternatives for transporting users in the territory and necessary funding to support such units.

Most of the expanded regions has no single-modality visual rehabilitation services, which demonstrates the persistence of gaps in care, although initiatives to improve eye health care have

taken place, especially with the creation of a specific national policy in 2008<sup>(11)</sup>.

In this study, the significant number of services for intellectual disability modality (Figure 1) may be related to the historical organization of these services by civil society<sup>(5)</sup>. Another factor that may have contributed is that the Ministerial Ordinance did not require the qualification procedure and did not establish care guidelines, which allowed the states autonomy to establish care guidelines according to their needs and installed capacity. Thus, in 2003, the State Department of Health accredited some of these institutions. More recently, in 2013, 135 of these services were incorporated into the Care Network (Table 2) as Specialized Services in Rehabilitation of Intellectual Disability or SRC, after restructuring care service, when the services already accredited were qualified.

The literature<sup>(12)</sup> points out a proposal for care design that suggests greater capillarity to the rehabilitation services of intellectual disability and physical rehabilitation when considering the ease of access to these users. However, given this premise, physical rehabilitation services did not have similar frequency to intellectual disability rehabilitation services. The need for higher technological density in physical rehabilitation also makes it difficult to identify units for qualification. Surveys by the Persons with Disabilities Health Care Coordination show that general physiotherapy outpatient clinics in the municipalities are assuming the responsibility for rehabilitation of physical disability, without articulating actions with the Care Network and therefore without organizing information at a state level.

The disparities observed between the enlarged regions are also expressed in the distribution of specialized care services in the 77 health regions, when comparing the state from an imaginary axis that divides it into two major territories – north and south. This study observed higher density of care service points of this Network to the south, with evident gaps in care in several health regions in the north of the state. The spatial distribution of the observed equipment seems to indicate, therefore, better Network structure to the south and worse to the north. This fact reproduces state regional development data. UNDP data indicate that the Enlarged Regions of Health of North, Jequitinhonha and Northeast, places with gaps in care identified in this study, have the lowest per capita incomes of Minas Gerais, while the south and southeast regions have higher incomes<sup>(13)</sup>. Thus, the disparity evidenced in other social indicators is reproduced in the provision and access to health services of the Disability Care Network in the State of Minas Gerais. The heterogeneous geographical distribution of rehabilitation services is observed in other locations of Brazil with predominance in urban and economically favored regions<sup>(14,15)</sup>.

This scenario of lower service supply in places with worse socioeconomic indicators becomes even more worrying when considering that the population with higher education tends to use public health services for preventive activities. Thus, places with lower education populations would use more services for treatment and rehabilitation, which would generate greater demand for specialized care<sup>(16)</sup>.

This concentration of rehabilitation services in the most economically favored areas (Figure 2) might be related to the

participation of organizations linked to people with disabilities in the construction of SUS in the 1980s, which led to the creation of services in these locations<sup>(17)</sup>.

Considering the existing services in the Network, it is important that the regional articulations already organized, and the elements that contribute to the strengthening of regional identity, are used in the process of structuring and implementing the set of services<sup>(18)</sup>.

The heterogeneous distribution of health services observed in Figure 2 refers to the iniquity of access to the Care Network. According to the literature, access, taken as accessibility to health services, is the ability of a health care system to respond to the health needs of a population, which includes socio-organizational and geographical dimensions<sup>(19)</sup>. Characteristics related to the logistics systems of health care networks, such as service provision, regulated access and health transportation systems, influence the operational conformation of services and, consequently, the access of the population. Thus, it is essential the users, managers and workers participate to comply with the guarantee of access, overcoming political, financial, technical and management difficulties<sup>(20)</sup>. Moreover, from the perspective of the person with disabilities, it is important to consolidate support networks, whether with the family or in the community, to facilitate access to health services in a more comprehensive way<sup>(21)</sup>.

Health Care Networks have guidelines, such as comprehensive care and regionalization, considering their territorialization, population and health action needs, with carefully characterized and organized care service points through regulated access and a defined governance system<sup>(22,23)</sup>. The state has great distances between the various municipalities and expressive socioeconomic diversities, which can influence the implementation of services with higher technological density.

Regionalization, as a guideline for the organization of SUS, must be achieved in regional management spaces, as a political and organized process, in response to restrictions on access to services<sup>(4,23)</sup>. Thus, other aspects need to be better understood at the local and regional level in a more detailed analysis process regarding the adequacy of the structure of the Care Network in Minas Gerais.

Matrix support is one of the strategies for the qualification of health care networks. The exchange of knowledge among professionals of the different points and levels of care expands the organization of therapeutic projects, provides an expanded clinical approach and favors the integration between specialties or professionals. Matrix actions add knowledge resources, enhance the resolute capacity of teams, improve primary care performance and give sustainability to build integral and universal networks<sup>(24,25)</sup>. More recently, within Minas Gerais, the implementation of decentralized services that make up the state's hearing health policy, with the creation or qualification of services with lower technological density at the municipal level, has brought advances in bringing people with disabilities closer to local resources and realities. Such services promote hearing health, prevention and therapeutic follow-up for cases that do not require technical supervision of reference services. This network formation focused on the territory and that supports the creation of unique therapeutic

projects favors access, comprehensive care and the possibilities of equity<sup>(9,26)</sup>.

This study presented the distribution of specialized service care points of the Disability Care Network. However, it is worth mentioning that the use of secondary data, coming from different sources of information, and the non-inclusion in the analysis of the ostomized patient due to lack of consolidated information during the study period, are limitations to be considered.

Further studies are needed to evaluate the other aspects related to the operationalization of a care network such as care flows, logistic systems, care model, satisfaction of users, managers and professionals in order to produce more complete data to improve the implementation of these networks.

## CONCLUSION

The current study contributes to the discussion of the spatial configuration of the Disability Care Network and infers about access to specialized rehabilitation services. The analysis also points out a significant number of single modality specialized care services and with non-equitable distribution, reflecting in gaps in care.

When analyzing the distribution of care service points by types of services offered, we observe a great number focused on the attention of people with intellectual disabilities compared to other disabilities. We also observe an important regional disparity, evidenced by the high concentration of services to the south when compared to the regions in the north of the state.

Services are concentrated in the modality of intellectual rehabilitation, allocated mainly in the Enlarged Health Regions of South, Center and Southeast, with gaps in care and low supply of care in other rehabilitation modalities. Thus, it is observed that the Disability Care Network is still in the implementation phase, with adequacy needs to achieve equity in access to specialized services. The integration between the care service points, the guarantee of integrality and access to all citizens of the state, with rehabilitation services allocated according to reality and local demand, is still a challenge to be achieved.

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### **Authors' contributions**

*FJM participated in the conception, design, analysis and interpretation of the data, article writing and critical review; AALF, subcoordinator of the project, participated in the design, analysis, interpretation of the data, article writing and critical review; MFNS participated in the interpretation of the data, article writing and critical review; GCJ participated in the interpretation of the data, article writing and critical review; RAR participated in the interpretation of the data and critical review of the article; RON participated in the interpretation of the data, writing and critical review of the article; SMAL, project coordinator, participated in the design, interpretation of the data, article writing and critical review.*