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# Space-temporal analysis of the Specialized Services of the Health Care Network for Persons with Disabilities in Brazil

## Análise espaço-temporal dos serviços especializados da Rede de Cuidados à Pessoa com Deficiência no Brasil

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**Abstract** *Considering the institution of the Care Network for People with Disabilities (RCPD) in Brazil, this study analyzed the spatial distribution and the temporal trend of implementing specialized services that received financial support in the first eight years of this policy. We realized an ecological study based on the National Register of Health Facilities data from April/2012 to March/2020. A joinpoint regression was used for temporal trend analysis, and thematic maps were produced for spatial analysis of rehabilitation modalities and types of services. The most available services were physical and intellectual rehabilitation. The Southeast and Northeast regions had a higher concentration of specialized services. Despite the lower number of services, there was an average annual growth between 9.6% and 41.3%. This finding indicates an increase in specialized services for people with disabilities in the period analyzed, but care gaps are still being verified in the macro-regions of Brazil.*

**Key words** *People with disabilities, Rehabilitation, Public health policies, Brazilian National Health System, Health services*

**Resumo** *Considerando a instituição da Rede de Atenção à Pessoa com Deficiência (RCPD) no Brasil, o estudo analisa a distribuição espacial e a tendência temporal da implantação de serviços especializados que receberam apoio financeiro nos primeiros oito anos dessa política. Realizamos um estudo ecológico com base nos dados do Cadastro Nacional de Estabelecimentos de Saúde no período de abril/2012 a março/2020. Uma regressão joinpoint foi usada para análise de tendência temporal e mapas temáticos foram produzidos para análise espacial de modalidades de reabilitação e tipos de serviços. Os serviços mais disponíveis foram reabilitação física e intelectual. As regiões Sudeste e Nordeste apresentaram maior concentração de serviços especializados. Apesar do menor número de serviços, houve crescimento médio anual entre 9,6% e 41,3%. Esse achado indica aumento de serviços especializados para pessoas com deficiência no período analisado, mas ainda se verificam lacunas assistenciais nas macrorregiões do Brasil.*

**Palavras-chave** *Pessoas com deficiência, Reabilitação, Política de saúdes Sistema Único de Saúde, Serviços de saúde*

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## Introduction

Brazil presents its public health system, the Unified Health System (SUS), organized in Health Care Networks (RAS)[1]. The RAS are organized based on the needs of people and/or population groups, with a focus on the coordination between the different levels of care, the establishment of active information systems, the articulation of service providers and managers, the provision of incentives to align health actions and services, and in the qualification of professionals and work processes[2]. The Brazilian regionalization system is based on services of lower technological density disseminated in defined territories, aligned and in constant communication with higher-density reference services, accessed when necessary by a patient[3].

The health regions are constitutive elements of the RAS[1], always composed of a pole municipality with more resources and services of greater technological density, receiving patients from the smaller neighboring municipalities to use health services offered[4]. The Ministry of Health of Brazil has created, through inductive policies with financial and technical support, thematic RAS directed to specific populations and with services distributed among states, macro, and micro-regions; among these networks, one directed to the person with disabilities[2].

It is known that people with disabilities are, in general, poorer and confront more social stigmas and exclusions than those without disabilities[5]. In low- or middle-income countries, the use of health services is greater among people with disabilities when compared to the rest. In these countries, their access to rehabilitation services is low[6]. In Brazil, it is estimated that 6.7% of the population had at least one disability in 2010, as defined by the Washington Group[7]. Recent studies have shown low accessibility of people with disabilities to primary health care[8] and strong evidence of social inequities in access to rehabilitation services in the country[9]. Despite this scenario, historically, people with disabilities in Brazil have been excluded from discussions on health and State incentives, their care being restricted to fragmented actions and provided by philanthropic or non-governmental organizations, often with limited quality[10].

Discussions in Brazil about the rights of people with disabilities began to be debated more frequently in the early 2000s with the publication of the National Health Policy for People with Disabilities[11,12]. In order to achieve articulations of government policies that would guarantee better access to education, social inclusion, accessibility, and health care for people with disabilities, the Plan 'Viver sem Limite' was launched in 2011, which provided for a government budget for the interministerial development actions[13]. Specifically, in the area of health, in 2012, the Ministry of Health of Brazil instituted the Care Network for People with Disabilities (RCPD) within the scope of the Unified Health System, whose actions are aimed at people with permanent or temporary physical, intellectual, hearing, visual or multiple disabilities, with services of different levels of care integrated by defined flows, and organized according to the health regionalization of each Brazilian state[14]. Within this proposal, the federal government also foresaw the financing and transfer of resources for constructing and expanding service structures and training professionals[15].

The RCPD comprises primary health care, specialized care, urgency, and emergency and hospital care[14]. Specialized care is mainly composed of the Specialized Rehabilitation Centers (CER), which provide services for people with physical disabilities, intellectual disabilities, hearing impairments, and visual impairments. Such services were built or enabled when they already existed and started to play the 'network node' role, articulating with other points and components of the RCPD, guaranteeing quality service to this population[10]. The services are qualified as CER II, III, or IV, according to the number of rehabilitation modalities they offer, two, three, or four[14]. In addition to the CERs, specialized attention comprises the Orthopedic Devices Workshops and the Dental Specialties Centers (CEO). According to Ordinance 1,341 of 2012, CEOs who joined the RCPD would receive financial support due to their participation in adapting their space and professional training[16].

The proposal of RCPD in the Unified Health System is for an integrated network coordinated among all points of care, and expansion should take place equally throughout the country, guided by the demand in each macro-region, each state, and geographic region[10]. The RCPD's specialized service expansion process does not follow population-based criteria. It takes place from the adherence of each Brazilian state through the situational diagnosis, elaboration of an organizational plan, and compliance with the pertinent legislation. New services or services already in operation can be enabled, regardless of the number of the resident population. The implementa-

tion process is currently being evaluated, one of the stages of the network management strategy.

Leite et al.[2], when evaluating the process of implementing thematic networks in 39 metropolitan regions of Brazil, found the Care Network for People with Disabilities only in two, with its implementation processes classified as 'incipient' and 'under construction'. The study by Pereira and Machado[17], in a micro-region of a Brazilian state, identified that the integration of the points of the care network for users with physical disabilities is still fragile, relying on informal mechanisms of reference and counter-reference. Regarding the distribution of services in the Brazilian territories, a study carried out in the state of Minas Gerais showed a higher concentration of CERs in the state's most populous regions and significant variability in this distribution, indicating assistance gaps. In addition, the state has more physical and intellectual rehabilitation services and few visual rehabilitation services[18].

Knowing the continental dimension of the Brazilian territory and the variations between geographic regions and states and health macro-regions within them, it is necessary to assess the distribution of specialized RCPD services in the national territory, seeking to identify possible care gaps. Another important point regarding the analysis of the expansion process of these services since the financial induction of the federal government, in 2012, to the present day (2020), in an attempt to relate to the political and social milestones.

Thus, the objective of the present study was to analyze the spatial distribution and the temporal trend of implementing specialized services that received financial support in the first eight years of the institution of the RCPD in Brazil.

## Methods

### Study design

It is a population-based ecological study with a mixed design, temporal trend, and spatial analysis based on secondary data registered in the National Register of Health Establishments (CNES) Department of Informatics of the Unified Health System (DATASUS).

### Study variables

For the study, information was obtained regarding the specialized services that received financial support to compose the RCPD. The variables selected for analysis were: the CER rehabilitation modality (CER – Physical Rehabilitation, CER – Auditory Rehabilitation, CER – Visual Rehabilitation, or CER – Intellectual Rehabilitation); the CERs, according to the type, being CER II with two, CER III with three and CER IV with four rehabilitation modalities; Orthopedic Devices Workshops (fixed and itinerant); CEO, according to type I with up to 4, type II with four to six and type III, with at least seven dental offices; and Hospital Rehabilitation Beds.

### Analysis period

The month of April/2012, the month of creation of the RCPD, was considered the baseline, and from then on, information regarding the implementation of specialized services that received financial support until March/2020 was analyzed.

For the analysis period, interstices of 12 months from the baseline were established, and the final year of each interval was considered the reference year. Therefore, eight periods were analyzed from 2013 to 2020, between April of the initial year to March of the following year.

### Statistical analysis

To analyze the trend of implementing specialized services that received financial support to compose the RCPD, a joinpoint regression was used, in which services were considered a dependent variable and reference years as an independent variable. The methodological option was based on the fact that joinpoint regression is a statistical modeling technique that seeks to elucidate the relationship between two variables through regression lines and that it assumes a linear trend.

For the analysis of the temporal trend, the annual percentage variation (APC) was estimated for each specialized service that received financial support for implementation, and the final model selected refers to the most adjusted one, based on the trend of each segment and estimating whether these values are statistically significant ($p < 0.05$). The average of the annual percentage changes (AAPC) was calculated based on the cumulative geometric mean of the APC trends, with equal weights for each segment of the analysis period and estimating whether the results are statistically significant ($p < 0.05$) to quantify the trend in the cohort of the years analyzed. For both measurements, the respective confidence intervals were presented.

The definition of the number of joinpoints for the establishment of the final model was performed using the software's default mode by the Grid Search method, and the significance tests were based on the Monte Carlo permutation method and the calculation of the percentage variation ratio, using the logarithm of the ratio[19,20].

Time-series analyses were performed using the Joinpoint Regression Program software (National Cancer Institute, Bethesda, Maryland, USA), version 4.6.0.0, considering all the country and its geographic regions. For spatial analysis, thematic maps were produced using the GeoDa software 1.14.0.24, and the cartographic base of Brazil by Health Macroregions was obtained from the Brazilian Institute of Geography and Statistics website.

### Ethical Statement

The data used in this research are in the public domain and are available on public websites. Research using in the public domain is exempt from consideration by the Committee of Ethics in Research, according to Resolution CONEP/CNS No. 510/2016.

## Results

Currently, in Brazil, 893 specialized services received financial support to compose the RCPD from Ordinance 793/12, which are distributed in CER (with first records of 82 in 2014 and reaching 251 in 2020), CEO (198 in 2013 and reaching 597 in 2020) and fixed and itinerant orthopedic devices workshops (2 in 2013, totaling 45 in 2020).

Assistance for physical rehabilitation is the most available service in Brazil (n = 226), followed by intellectual (n = 214), auditory (n = 105), and visual (n = 62). Regarding the quantity of CER with financial support for implementation, there are 164 CER II, 59 CER III, and 28 CER IV. Currently, there are 37 fixed and eight itinerant orthopedic device workshops. There are 207 services for CEO I, 278 for CEO II, and 112 for CEO III. The Brazilian regions with the most CER, orthopedic devices workshops, and CEO are the Southeast and the Northeast, while the South region has the lowest offer of CER services and the North region has the lowest offer of CEO.

Figure 1 shows the distribution, by health macro-regions, of the CER's type and orthopedic devices workshop that received financial support in the analyzed period. 2013 there was no record; in 2016, there was a visually perceptible increase in the registration of services, and in 2020, there was a slight change. The highlight is the more offer of CER II and lesser CER IV services; however, verifying the care gaps in health macro-regions is still possible.

The modalities of rehabilitation of CERs in the health macro-regions in Brazil are shown in Figure 2. In the period analyzed, there is a greater arising of specialized services with financial support to assist people with physical and intellectual disabilities, followed by services for people with hearing impairment, and rarely services for people with visual impairment.

The distribution of CEO, especially types I and II, and hospital rehabilitation beds were already evident in Brazilian health macro-regions in 2013 and slightly varied in the last eight years (Figure 3).

Considering all RCPD's specialized care equipment, in the period from April/2012 to March/2020 (2013 to 2020 for CER), there was an average annual growth of 9.6% (95%CI: 8.0%-11.2%) from hospital rehabilitation beds and 41.3% (95%CI: 31.1%-52.3%) from orthopedic devices workshops. The growth of the CER II, CER physical and intellectual rehabilitation modalities, and CEO I, II, and III and orthopedic devices workshop was more significant in the first segment of analysis concerning the second (Table 1).

There is variation in the growth of services in the Brazilian regions; however, there was no decrease in specialized services that received financial support (Table 2). The average growth was similar in all the Brazilian regions. It is crucial to observe the absence of CER IV growth in the South region and CER III in the Midwest region and the absence of growth of hospital rehabilitation beds in the North.

## Discussion

The analyses show that the institution of the RCPD, with financial support from the federal government, effectively boosted the expansion of specialized services in this healthcare network. However, this expansion did not occur homogeneously between the country's regions, the rehabilitation modalities, and the various specialized services.

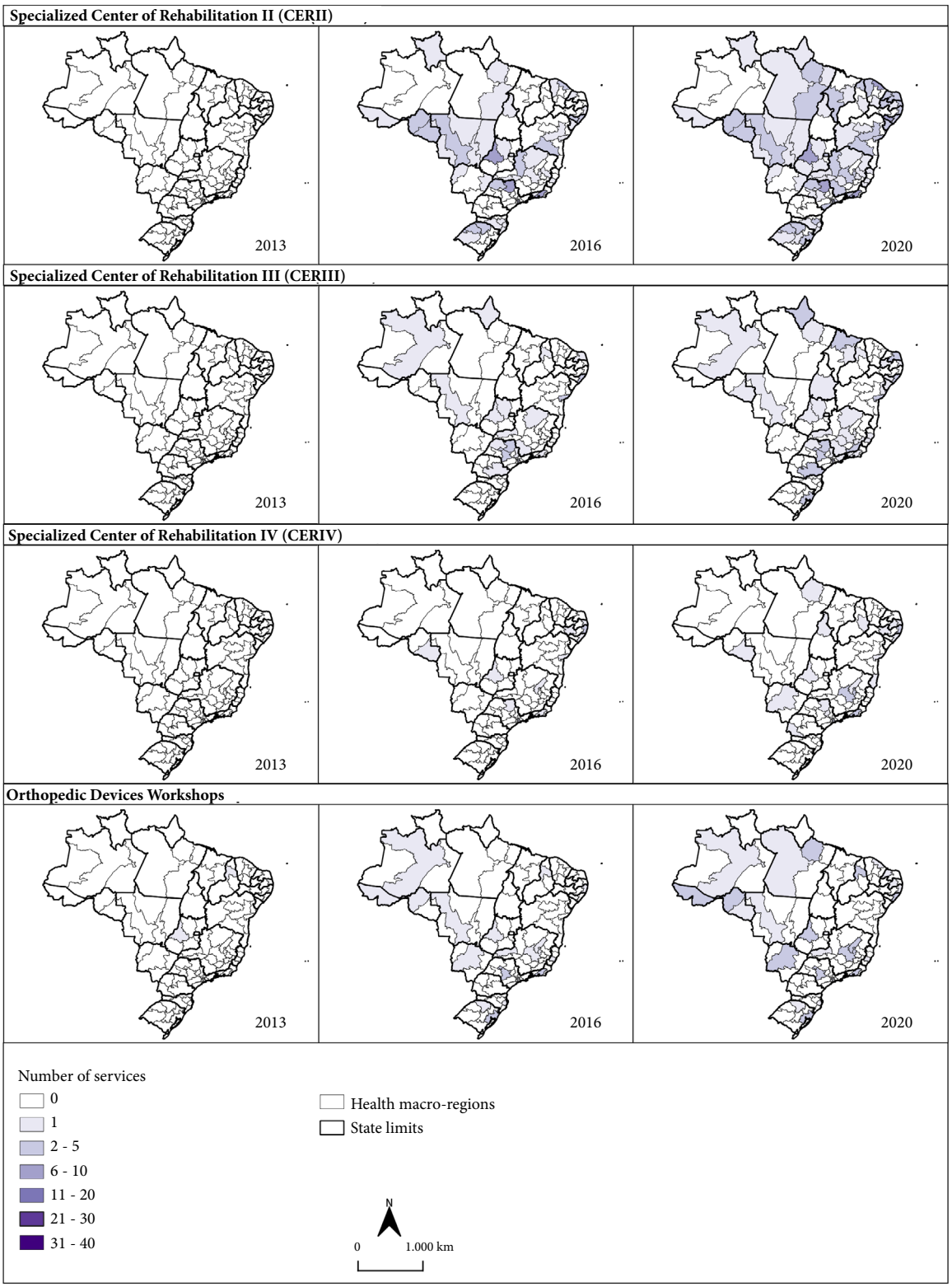


**Figure 1.** Distribution by health macro-regions of Specialized Rehabilitation Centers (CER), according to type, and orthopedic devices workshops that received financial support, according to the years 2013, 2016, and 2020. Brazil, 2021.

Source: Authors.

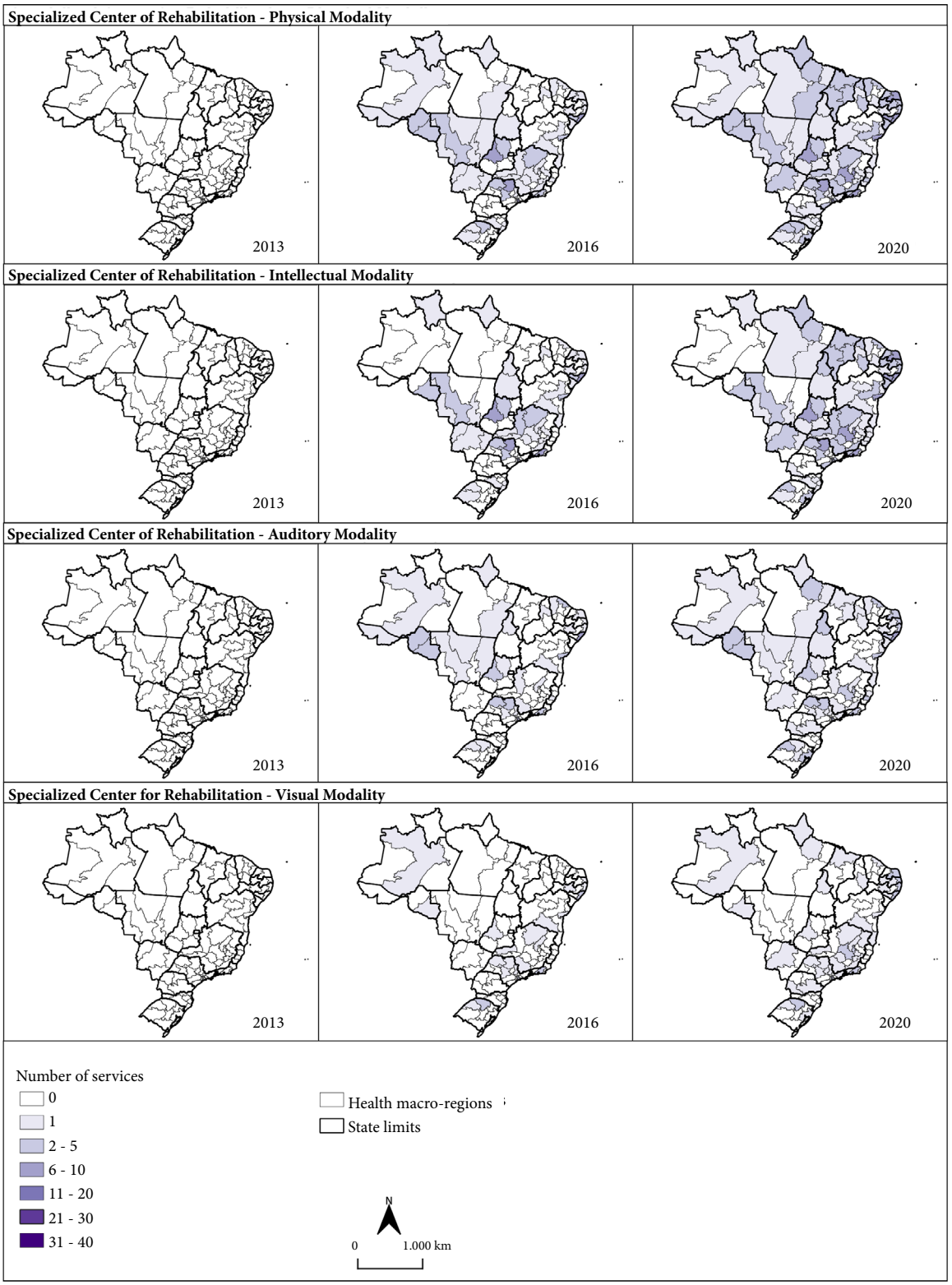


**Figure 2.** Distribution by health macro-regions of the Specialized Rehabilitation Centers (CER) rehabilitation modalities that received financial support, according to the years 2013, 2016, and 2020. Brazil, 2021.

Source: Authors.

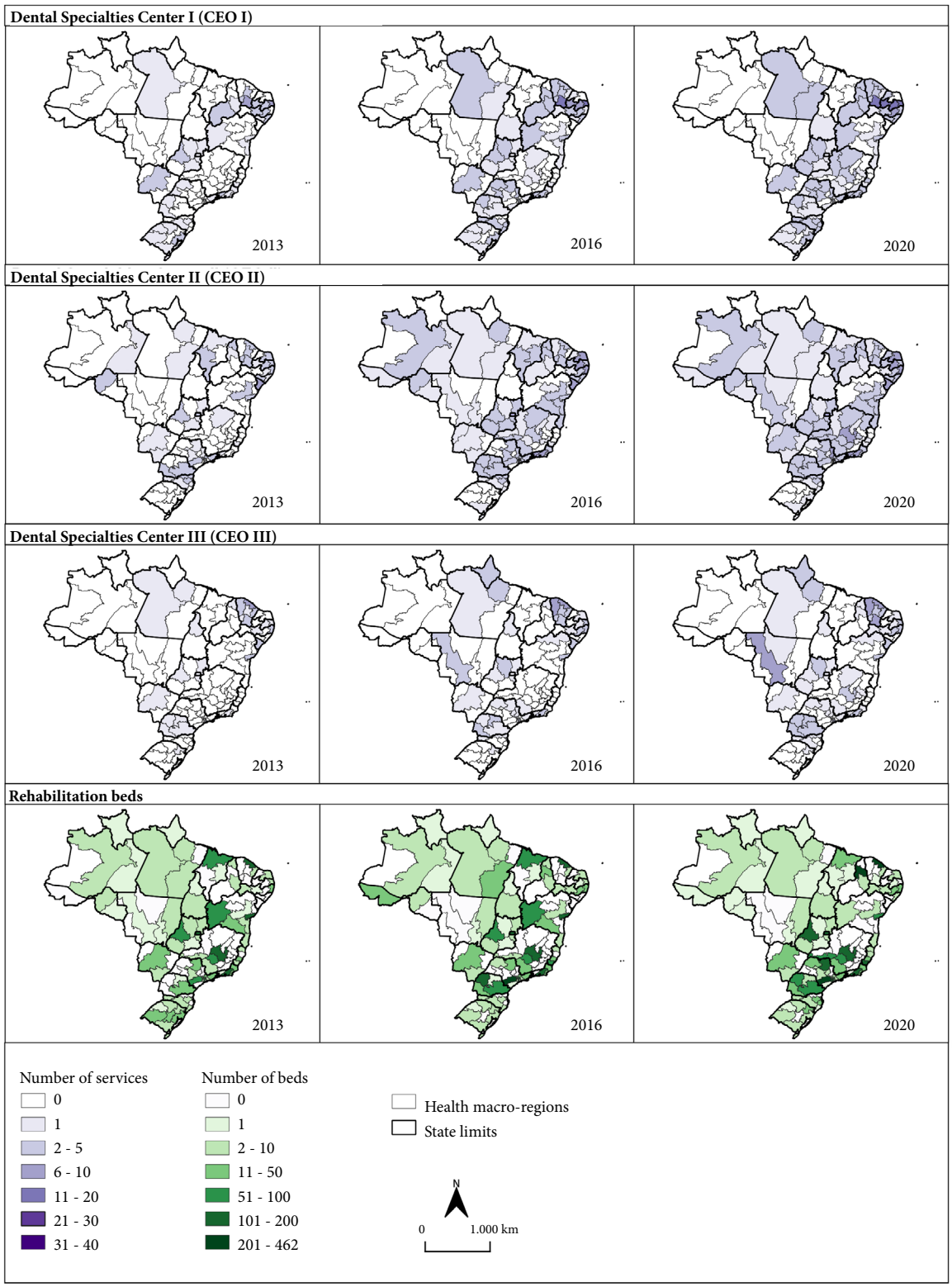


**Figure 3.** Distribution by health macro-region of the types of Dental Specialties Centers (CEO) and hospital rehabilitation beds that received financial support, according to the years 2013, 2016, and 2020. Brazil, 2021.

Source: Authors.

**Table 1**. Temporal trend of distributing specialized services that received financial support to compose the Health Care Network for People with Disabilities in Brazil from 2013 to 2020. Brazil, 2021.

| Specialized Services | Seg. | Initial year (n) | Last year (n) | APC (95%CI) | AAPC (95%CI) |
|---|---|---|---|---|---|
| CER II | 1 | 2014 (51) | 2017 (121) | 32.8* (29.0; 36.6) | 21.9* (20.8; 23.1) |
| | 2 | 2017 (121) | 2020 (164) | 12.0* (8.8; 15.2) | |
| CER III | 1 | 2014 (19) | 2017 (40) | 25.1* (7.4; 45.7) | 19.6* (13.9; 25.7) |
| | 2 | 2017 (40) | 2020 (59) | 14.5 (-1.7; 33.3) | |
| CER IV | 1 | 2014 (12) | 2017 (20) | 16.2* (2.1; 32.3) | 14.0* (9.3; 18.9) |
| | 2 | 2017 (20) | 2020 (28) | 11.9 (-1.7; 27.3) | |
| Total CER | 1 | 2014 (82) | 2017 (181) | 28.8* (21.9; 36.2) | 20.4* (18.3; 22.6) |
| | 2 | 2017 (181) | 2020 (251) | 12.6* (6.5; 19.0) | |
| CER – Physical Rehabilitation | 1 | 2014 (78) | 2017 (166) | 27.5* (20.0; 35.4) | 19.9* (17.6; 22.3) |
| | 2 | 2017 (166) | 2020 (226) | 12.8* (6.2; 19.8) | |
| CER – Intellectual Rehabilitation | 1 | 2014 (73) | 2017 (156) | 27.6* (20.0; 35.7) | 20.1* (17.8; 22.5) |
| | 2 | 2017 (156) | 2020 (214) | 13.1* (6.4; 20.3) | |
| CER – Auditory Rehabilitation | 1 | 2014 (43) | 2017 (81) | 21.9* (13.3; 31.2) | 15.1* (12.4; 17.9) |
| | 2 | 2017 (81) | 2020 (105) | 8.7* (1.0; 17.0) | |
| CER – Visual Rehabilitation | 1 | 2014 (18) | 2016 (31) | 32.7 (-13.2; 102.9) | 21.7* (12.8; 31.3) |
| | 2 | 2016 (31) | 2020 (62) | 16.5* (1.9; 33.2) | |
| CEO I | 1 | 2013 (65) | 2015 (155) | 47.1* (17.5; 84.3) | 15.8* (10.7; 21.2) |
| | 2 | 2015 (155) | 2020 (207) | 5.3* (0.1; 10.7) | |
| CEO II | 1 | 2013 (87) | 2015 (236) | 58.6* (44.8; 73.6) | 15.6* (13.5; 17.7) |
| | 2 | 2015 (236) | 2020 (278) | 1.8 (-0.2; 3.9) | |
| CEO III | 1 | 2013 (46) | 2015 (89) | 36.0* (15.4; 60.2) | 12.8* (9.1; 16.5) |
| | 2 | 2015 (89) | 2020 (112) | 4.6* (0.8; 8.5) | |
| Total CEO | 1 | 2013 (198) | 2015 (480) | 49.8* (29.7; 73.2) | 15.0* (11.7; 18.4) |
| | 2 | 2015 (480) | 2020 (597) | 3.5* (0.2; 6.9) | |

it continues

**Table 1**. Temporal trend of distributing specialized services that received financial support to compose the Health Care Network for People with Disabilities in Brazil from 2013 to 2020. Brazil, 2021.

| Specialized Services | Seg. | Initial year (n) | Last year (n) | APC (95%CI) | AAPC (95%CI) |
|---|---|---|---|---|---|
| Hospital rehabilitation beds | 1 | 2013 (1621) | 2015 (1859) | 8.0 (-3.6; 20.9) | 10.4* (7.9; 12.9) |
| | | 2015 (1859) | 2020 (3295) | 11.3* (8.5; 14.2) | |
| Orthopedic devices workshops† | 1 | 2013 (2) | 2015 (21) | 194.6* (99.7; 334.6) | 46.6* (35.6; 58.6) |
| | 2 | 2015 (21) | 2020 (45) | 10.9* (1.7; 21.0) | |

Seg.: segment; initial year: starting year of the segment; last year: end year of the segment; APC: annual percent change; AAPC: average annual percent change; 95%CI: 95% confidence interval; NC: not calculated; CER: specialized rehabilitation centers; CEO: dental specialties centers. † The total number of fixed and itinerant orthopedic devices workshops was considered. * Statistically significant at the 5% level.

Source: Authors.

Brazil is a continental country with significant regional differences in care availability and accessibility to the specialized services of the RCPD. Despite the growth, our data point to care gaps in the RCPD's specialized services, especially in the North, Northeast, and Midwest regions. They are the Brazilian places with more difficulty accessing the service internally and externally to reach the service or information, meaning that people with disabilities will have difficulties accessing health care and having their rights violated, according to international law and Brazilian[8].

People with disabilities need facilities to make life and care more equitable. Thus, having services available closer to the home and adequate urban and rural displacement to the services, including integration and alignment of care with primary health care, is essential[9]. Thus, this updated information contributes to caring planning with an adequate response from the health system[21].

It appears that there are care gaps in the specialized services of the RCPD, which was also identified in the study by Raska et al.[22], which pointed out a deficit in the number of specialized services, with emphasis on hospital beds, spread across the territory in health micro-regions. With specific financial support for assistance to people with disabilities, the CEO is the most available service among those studied, possibly due to the national oral health policy induction. Condessa et al.[23] reported having no difference in access to oral health services for people with and without disabilities.

The CERs had more recent implantation, with a more offer of CER II, with two types of rehabilitation, of which physical rehabilitation stands out. Hospital rehabilitation beds and orthopedic device workshops, which need the physical rehabilitation service, are the fewest and correspond to the central assistance gap. Maciel et al.[18] also observed a great disproportion between the RCPD services in the state of Minas Gerais, with more services for intellectual rehabilitation and non-equitable distribution. In addition to the indispensable coverage of RCPD's specialized services, Raska et al.[22] reinforce the importance of decentralization, hierarchization, and regionalization in spatial organization, which can help reduce the gaps in care found.

The availability of specialized and specific services for people with disabilities is greater for physical rehabilitation, followed by intellectual, auditory, and, visual, reflecting the disproportion between the rehabilitation modalities. According to the World Report on Disability of the World Health Organization, the highest prevalence of disability in descending order is physical, visual (including at least some difficulty, easily corrected), auditory, and cognitive/self-care/communication[24].

In Brazil, there are more than 45 million Brazilians with some difficulty seeing (19% and 3% with great difficulty), hear (5% and 1% with great difficulty), move (7% and 2% with great difficulty), or have some intellectual disability (1% and possibly underestimated). However, the prevalence of people with disabilities with access to rehabilitation is only 9.2% in Brazil[9]. The World Health Organization clearly describes an urgent need to expand integrated rehabilitation services for people with disabilities, and it is essential to have availability for all types of disability[25]. Thus, increasing the number of different types of rehabilitation care for all health macro-regions is essential to fill the care gap.

**Table 2.** Temporal trend of distributing specialized services that received financial support to compose the Health Care Network for People with Disabilities in Brazil from 2013 to 2020, according to the Brazilian regions. Brazil, 2021.

| | | North region | | | | Northeast region | | | | Southeast region | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Specialized Services** | **Seg.** | **Initial year (n)** | **Last year (n)** | **APC (95%CI)** | **AAPC (95%CI)** | **Initial year (n)** | **Last year (n)** | **APC (95%CI)** | **AAPC (95%CI)** | **Initial year (n)** | **Last year (n)** | **APC (95%CI)** | **AAPC (95%CI)** |
| CER II | 1 | 2014 (8) | 2020 (15) | 9.1* (3.2; 15.3) | 9.1* (3.2; 15.3) | 2014 (9) | 2020 (57) | 41.2* (23.2; 61.9) | 41.2* (23.2; 61.9) | 2014 (14) | 2016 (32) | 50.6* (11.0; 104.2) | 24.2* (17.5; 31.1) |
| | 2 | | | | | | | | | 2016 (32) | 2020 (54) | 12.8* (2.4; 24.2) | |
| CER III | 1 | 2014 (1) | 2020 (6) | 29.2* (19.0; 40.2) | 29.2* (19.0; 40.2) | 2014 (6) | 2020 (19) | 23.3* (5.7; 31.4) | 23.3* (5.7; 31.4) | 2014 (8) | 2020 (27) | 2.0* (13.6; 26.9) | 2.0* (13.6; 26.9) |
| | 2 | | | | | | | | | | | | |
| CER IV | 1 | 2014 (1) | 2020 (3) | 12.5 (-5.5; 34.0) | 12.5 (-5.5; 34.0) | 2014 (4) | 2017 (8) | 24.7* (11.8; 39.1) | 14.0* (10.0; 18.1) | 2014 (6) | 2020 (13) | 13.6* (10.1; 17.2) | 13.6* (10.1; 17.2) |
| | 2 | | | | | 2017 (8) | 2020 (9) | 4.2 (-6.6; 16.2) | | | | | |
| Total CER | 1 | 2014 (10) | 2020 (24) | 12.9* (6.3; 19.9) | 12.9* (6.3; 19.9) | 2014 (19) | 2020 (85) | 32.0* (19.2; 46.1) | 32.0* (19.2; 46.1) | 2014 (28) | 2016 (56) | 40.4 (-3.6; 104.6) | 21.8* (13.8; 30.3) |
| | 2 | | | | | | | | | 2016 (56) | 2020 (94) | 13.4* (0.7; 27.7) | |
| CER – Physical Rehabilitation | 1 | 2014 (8) | 2020 (22) | 15.1* (9.4; 21.2) | 15.1* (9.4; 21.2) | 2014 (20) | 2020 (78) | 31.3* (16.7; 47.7) | 31.3* (16.7; 47.7) | 2014 (26) | 2016 (49) | 36.6 (-4.0; 94.3) | 20.7* (13.3; 28.6) |
| | 2 | | | | | | | | | 2016 (49) | 2020 (83) | 13.5* (1.5; 25.2) | |
| CER –Intellectual Rehabilitation | 1 | 2014 (5) | 2020 (17) | 19.3* (12.5; 26.6) | 19.3* (12.5; 26.6) | 2014 (18) | 2020 (77) | 32.3* (18.1; 48.2) | 32.3* (18.1; 48.2) | 2014 (29) | 2016 (50) | 33.5 (-4.2; 86.1) | 19.3* (12.4; 26.6) |
| | 2 | | | | | | | | | 2016 (50) | 2020 (82) | 12.7* (1.5; 25.2) | |
| CER –Auditory Rehabilitation | 1 | 2014 (7) | 2020 (14) | 8.9* (3.8; 14.4) | 8.9* (3.8; 14.4) | 2014 (12) | 2020 (30) | 17.4* (9.5; 25.9) | 17.4* (9.5; 25.9) | 2014 (17) | 2020 (43) | 19.0* (12.7; 25.7) | 19.0* (12.7; 25.7) |
| | 2 | | | | | | | | | | | | |
| CER – Visual Rehabilitation | 1 | 2014 (2) | 2020 (5) | 10.3 (-4.6; 27.6) | 10.3 (-4.6; 27.6) | 2014 (4) | 2020 (19) | 29.6* (22.1; 37.5) | 29.6* (22.1; 37.5) | 2014 (9) | 2020 (30) | 19.0* (12.2; 26.2) | 19.0* (12.2; 26.2) |
| | 2 | | | | | | | | | | | | |
| CEO I | 1 | 2013 (1) | 2020 (7) | 24.0* (7.2; 43.6) | 24.0* (7.2; 43.6) | 2013 (37) | 2015 (87) | 46.7* (24.1; 73.4) | 14.5* (10.7; 18.4) | 2013 (8) | 2020 (48) | 17.6* (6.7; 29.7) | 17.6* (6.7; 29.7) |
| | 2 | | | | | 2015 (87) | 2020 (109) | 3.7 (-0.1; 7.7) | | | | | |
| CEO II | 1 | 2013 (6) | 2015 (13) | 44.8* (30.3; 60.9) | 12.1* (9.8; 14.6) | 2013 (43) | 2015 (87) | 39.6* (31.8; 47.9) | 10.6* (9.3; 11.9) | 2013 (15) | 2015 (86) | 91.2* (6.6; 119.4) | 22.0* (18.7; 25.5) |
| | 2 | 2015 (13) | 2020 (14) | 4.3 (-0.7; 9.5) | | 2015 (87) | 2020 (95) | 0.7 (-0.5; 2.1) | | 2015 (86) | 2020 (111) | 2.0 (-1.1; 5.2) | |
| CEO III | 1 | 2013 (3) | 2015 (6) | 40.5* (12.8; 74.9) | 13.6* (8.6; 18.7) | 2013 (30) | 2015 (43) | 19.5* (13.9; 25.5) | 6.6* (5.6; 7.7) | 2013 (3) | 2020 (26) | 18.4* (5.5; 32.9) | 18.4* (5.5; 32.9) |
| | 2 | 2015 (6) | 2020 (7) | 4.3 (-0.7; 9.5) | | 2015 (43) | 2020 (48) | 1.9* (0.8; 3.0) | | | | | |
| Total CEO | 1 | 2013 (10) | 2015 (23) | 47.2* (11.2; 94.7) | 15.0* (8.7; 21.7) | 2013 (110) | 2015 (217) | 37.0* (28.3; 46.3) | 11.2* (9.7; 12.6) | 2013 (26) | 2015 (130) | 78.4* (45.3; 119.1) | 21.5* (16.6; 26.6) |
| | 2 | 2015 (23) | 2020 (28) | 4.2 (-2.1; 10.9) | | 2015 (217) | 2020 (252) | 2.2* (0.7; .3.8) | | 2015 (130) | 2020 (185) | 4.2 (-0.5; 9.0) | |
| Hospital Rehabilitation Beds | 1 | 2013 (37) | 2018 (60) | 10.9 (-6.2; 31.2) | -6.5 (-19.7; 8.8) | 2013 (465) | 2020 (909) | 5.8 (-1.2; 13.2) | 5.8 (-1.2; 13.2) | 2013 (694) | 2020 (1630) | 14.7* (10.5; 19.0) | 14.7* (10.5; 19.0) |
| | 2 | 2018 (60) | 2020 (25) | -39.0 (-71.2; 29.2) | | | | | | | | | |
| Orthopedic Devices Workshops† | 1 | 2014 (3) | 2020 (9) | 18.8* (8.7; 29.9) | | 2013 (1) | 2020 (9) | 37.5* (26.3; 49.7) | 37.5* (26.3; 49.7) | 2014 (7) | 2020 (17) | 12.3* (8.6; 16.1) | 12.3* (8.6; 16.1) |
| | 2 | | | | | | | | | | | | |

it continues

**Table 2.** Temporal trend of distributing specialized services that received financial support to compose the Health Care Network for People with Disabilities in Brazil from 2013 to 2020, according to the Brazilian regions. Brazil, 2021.

| | | South region | | | | Midwest region | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Specialized Services** | **Seg.** | **Initial year (n)** | **Last year (n)** | **APC (95%CI)** | **AAPC (95%CI)** | **Initial year (n)** | **Last year (n)** | **APC (95%CI)** | **AAPC (95%CI)** |
| CER II | 1 | 2014 (5) | 2020 (17) | 19.4* (12.5; 26.8) | 19.4* (12.5; 26.8) | 2014 (15) | 2020 (21) | 5.4* (3.6; 7.2) | 5.4* (3.6; 7.2) |
| | 2 | | | | | | | | |
| CER III | 1 | 2014 (1) | 2020 (4) | 16.0 (-6.9; 4.6) | 16.0 (-6.9; 4.6) | 2014 (3) | 2020 (3) | NC | NC |
| | 2 | | | | | | | | |
| CER IV | 1 | 2019 (1) | 2020 (1) | NC | NC | 2014 (1) | 2020 (2) | 16.0* (5.1; 28.0) | 16.0* (5.1; 28.0) |
| | 2 | | | | | | | | |
| Total CER | 1 | 2014 (6) | 2020 (22) | 20.5* (14.5; 26.7) | 20.5* (14.5; 26.7) | 2014 (19) | 2020 (26) | 5.3* (3.4; 7.1) | 5.3* (3.4; 7.1) |
| | 2 | | | | | | | | |
| CER – Physical Rehabilitation | 1 | 2014 (5) | 2020 (17) | 20.1* (15.7; 24.7) | 20.1* (15.7; 24.7) | 2014 (19) | 2020 (26) | 5.3* (3.4; 7.1) | 5.3* (3.4; 7.1) |
| | 2 | | | | | | | | |
| CER – Intellectual Rehabilitation | 1 | 2014 (3) | 2020 (13) | 23.3* (16.1; 30.9) | 23.3* (16.1; 30.9) | 2014 (18) | 2020 (25) | 5.5* (3.4; 7.1) | 5.5* (3.4; 7.1) |
| | 2 | | | | | | | | |
| CER – Auditory Rehabilitation | 1 | 2015 (1) | 2020 (10) | 48.3* (28.2; 71.7) | 48.3* (28.2; 71.7) | 2014 (7) | 2020 (8) | 2.9* (1.0; 4.9) | 2.9* (1.0; 4.9) |
| | 2 | | | | | | | | |
| CER – Visual Rehabilitation | 1 | 2014 (2) | 2020 (6) | 14.8* (5.7; 24.7) | 14.8* (5.7; 24.7) | 2014 (1) | 2020 (2) | 16.0* (5.1; 28.0) | 16.0* (5.1; 28.0) |
| | 2 | | | | | | | | |
| CEO I | 1 | 2013 (10) | 2015 (25) | 52.7* (31.2; 77.6) | 15.6* (12.1; 19.1) | 2013 (9) | 2020 (12) | 4.5* (2.3; 6.7) | 4.5* (2.3; 6.7) |
| | 2 | 2015 (25) | 2020 (31) | 3.4 (-0.1; 6.9) | | | | | |
| CEO II | 1 | 2013 (12) | 2015 (26) | 42.7* (22.1; 66.7) | 11.8* (8.4; 15.4) | 2013 (11) | 2015 (24) | 44.0* (25.4; 65.4) | 13.7* (10.6; 17.0) |
| | 2 | 2015 (26) | 2020 (30) | 1.4 (-2.1; 5.0) | | 2015 (24) | 2020 (29) | 3.5* (0.3; 6.8) | |
| CEO III | 1 | 2013 (6) | 2015 (14) | 47.0* (11.5; 93.8) | 14.5* (8.3; 21.0) | 2013 (4) | 2015 (10) | 54.7 (-4.1; 149.8) | 20.6* (9.5; 32.9) |
| | 2 | 2015 (14) | 2020 (17) | 3.6 (-2.6; 10.2) | | 2015 (10) | 2020 (14) | 9.2 (-1.9; 21.5) | |
| Total CEO | 1 | 2013 (28) | 2015 (65) | 47.2* (25.9; 72.1) | 13.8* (10.3; 17.4) | 2013 (24) | 2015 (45) | 34.6* (9.8; 65.1) | 12.5* (8.0; 17.3) |
| | 2 | 2015 (65) | 2020 (77) | 2.7 (-0.9; 6.3) | | 2015 (45) | 2020 (55) | 4.7* (0.1; 9.6) | |
| Hospital Rehabilitation Beds | 1 | 2013 (132) | 2020 (331) | 11.1* (3.3; 19.5) | 11.1* (3.3; 19.5) | 2013 (293) | 2017 (208) | -8.4 (-16.3; 0.4) | 4.0 (-1.1; 9.3) |
| | 2 | | | | | 2017 (208) | 2020 (400) | 23.1* (6.6; 42.1) | |
| Orthopedic Devices Workshops† | 1 | 2014 (3) | 2020 (4) | 5.3* (0.6; 10.2) | 5.3* (0.6; 10.2) | 2013 (1) | 2020 (6) | 22.6* (9.2; 37.7) | 22.6* (9.2; 37.7) |
| | 2 | | | | | | | | |

Seg.: segment; initial year: starting year of the segment; last year: end year of the segment; APC: annual percent change; AAPC: average annual percent change; 95%CI: 95% confidence interval; NC: not calculated; CER: specialized rehabilitation centers; CEO: dental specialties centers. † The total number of fixed and itinerant orthopedic devices workshops was considered. * Statistically significant at the 5% level.

Source: Authors.

When analyzing the temporal trend of the implementation of health services considering the country's regions, it is observed that, generally, there was a growing trend in all regions. The results show that the Northeast and Southeast regions are the ones with the most significant number of health services composing the RCPD, results that are supported by the study by Condessa et al.[23], who identified that the Northeast and Southeast regions had a higher percentage of CEO qualified to care for people with disabilities, 38.3%, and 36.2%, respectively.

In this analysis, there was an increase in the number of CER implanted throughout the evaluated period when considering the total number of services with financial support, the modality, and the type of rehabilitation offered. It is also noteworthy that growth was observed only in the first monitoring period, 2014 to 2017. Knowing that the CERs computed in April/2014 reflect those implemented since March/2013, this result reflects the impetus given by Ordinance 793/2012[14] to consolidate these services and, over time, the stagnation of growth in these more complex and financially demanding modalities. The time elapsed from one year to the implementation of the first CER may have occurred due to the need to establish teams with different health professionals in order to ensure comprehensive care to different people with disabilities, in addition to the need for an administrative organization[26] and infrastructure adequacy so that this is sufficiently capable of meeting the demands related to the care of people with disabilities[27].

On the other hand, the CEOs were already present in the healthcare networks in 2012. They started to receive financial incentives to be part of the RCPD, reinforcing the impact of Ordinance 793/2012[14] as a device for the effectiveness of care for people with disabilities. A study carried out with data from the 1st Cycle of the Program for Improving Access and Quality of Dental Specialty Centers (PMAQ-CEO), collected in 2014 in all regions of the country, considered dental care at this time in development, in need of elimination physical and attitudinal barriers to its real consolidation[23]. The period coincides with the highest growth of CEOs recorded in this study, and as a result of its reduction in the following period, this consolidation was probably not achieved.

Hospital rehabilitation beds have grown the least in general, indicating a weak consolidation of hospital care in the RCPD. Professionals who work in hospitals point out difficulties for the hospital discharge of patients who would need the continuity of care in rehabilitation, as guidelines for which services to refer, due to the lack of dissemination of the flows recommended by the RCPD[28].

On the other hand, orthopedic device workshops were the service with the highest growth in the total period, and between 2013 and 2015. However, this growth can be explained by the small amount of this service, two units in 2013, reaching 45 services across the country in 2020. However, given the significant gap in the system concerning orthopedic device workshops in the country, this growth was not enough to meet the needs of the states, presenting significant healthcare gaps and not following the same distribution and growth services with rehabilitation for physical disabilities.

The availability of assistive technology in Brazil is a challenge. In this sense, a study carried out in a Brazilian capital identified the following barriers: indication based on medical models, without a comprehensive approach, lack of professional training, and also the non-follow-up of users after receiving the device[29]. Such challenges need to be overcome so that these services become accessible to all since assistive technology is crucial in the functional capacity for basic and instrumental activities of daily living, work, leisure, and education, improving the quality of life of people with disabilities physical, visual and intellectual[30].

Considering that the present study was carried out using secondary sources, the limitations inherent in this type of research can be recognized, such as those related to the quality of some data and those arising from technical-operational conditions directly related to the system of information. It should be noted that the RCPD is a service network organized under the logic of regionalization and does not consider the population estimate of people with disabilities as a criterion for expansion. This situation is mainly due to the lack of updated information about this population. Furthermore, it is important to point out that the absence of robust information does not allow analyses based on indicators considering the number of people with disability in any region.

Although the results have shown the expansion of the RCPD and the existing care gaps in the country concerning specialized services with financial support from the RCPD, no analysis was carried out on the supply and demand of these services is presented as a possibility for future studies. From this perspective, it is noteworthy

that no current official data reveals the number of people with disabilities since the available data are only from the 2010 Census.

Despite the limitations observed, the study revealed the installed capacity of some of the RCPD's health services. The space-temporal analysis of the first eight years after the institution of the RCPD showed an increase in specialized services. However, this growth differed between the RCPD's specialized services and geographic regions, with care gaps still being verified in macro-regions. The need for continuity in the expansion of the RCPD is highlighted, with the definition of priorities based on the needs of the health regions and a guarantee of financial resources for enabling services where gaps persist.

## Collaborations

All authors have worked in the completion of the present study, have read the manuscript, agree with the publication of the paper and accept responsibility for its contents.

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