

Pathways for dispensing upper limb prostheses in Bahia - Brazil.

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Abstract: Access to prostheses for amputees presents problems in terms of dispensing efficiency, whether due to budgetary issues or the lack of expansion of health care centers for people with disabilities. The Specialized Rehabilitation Centers are outpatient rehabilitation centers that diagnose, treat, prescribe, adapt, and maintain assistive technologies, such as prostheses, and serve as a reference for the healthcare network in the territory. However, in the state of Bahia, the procedures for dispensing upper limb prostheses contrast with those for lower limb prostheses. This article presents an overview of prosthesis dispensation in Bahia, as well as the paths that amputees take to obtain an upper limb prosthesis, and shows through documentary research the incompleteness of actions closer to the municipalities where amputees live, in addition to the time it takes to access the prosthesis.

Keywords: Prosthesis Coverage and Dispensation, Upper Limb prostheses, territory and health residence.

1. Introduction

The granting of Orthotics, Prostheses and Means of Locomotion (OPM) must respect the specific needs of each patient, allowing for the necessary adaptations and a systematic assessment and monitoring process. These concessions operate through the Care Network for People with Disabilities (RCPD), which is an initiative to care for people with disabilities, in their particularities and specificities, within the Unified Health System (SUS)[1,2].

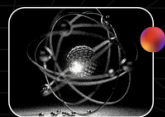
The actions to expand the supply of prostheses and orthoses, as well as care for other disabilities, are integrated into the RCPD by the Specialized Rehabilitation Centres (CER), which are outpatient care centers specializing in rehabilitation that carry out diagnosis, treatment, granting, adaptation and maintenance of assistive technology, constituting a reference for the health care network in the territory, and

which may have a fixed or itinerant Orthopaedic Workshop service.

In Brazil, 7,3% of the population aged two and over were people with disabilities, corresponding to 14,4 million Brazilians [3]. According to the IBGE (2025), people with disabilities are those who have great difficulty or are unable to carry out day-to-day activities in any way in the functional domains of seeing, hearing, lower limbs, upper limbs and mental limitations, even when using aids [4].

In the upper limb domain, situations involving the use of the limb for strength and coordination activities in the arm or shoulder are linked with permanent difficulty in picking up small objects or opening and closing bottle tops, even when using prostheses and devices, this domain encompasses people with upper limb amputation.

Amputation procedures imply the need for prostheses so that amputees can try to resume



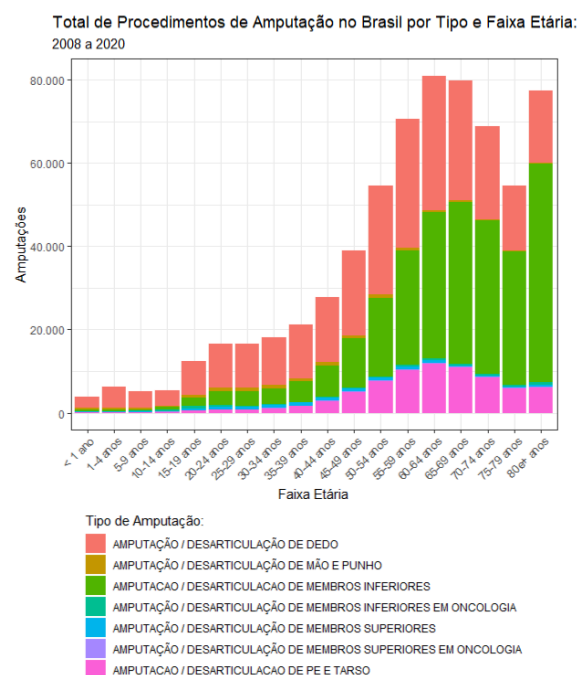
their daily activities, albeit through rehabilitation processes. However, amputees face problems in accessing prostheses, and the difficulties in dispensing OPM are manifold, ranging from administrative and budgetary challenges to logistical and technological issues, and aspects related to human behavior [5].

All these problems directly affect disabled people's access to the materials dispensed, preventing them from maintaining their physical and mental health, social inclusion and quality of life. This article seeks to present the path to granting upper limb prostheses to amputees in the state of Bahia, Brazil, based on documentary research from sources such as regulatory documents and SUS databases.

2. Amputations in numbers

Amputation is the term used to define the total or partial removal of a limb, which is a treatment method for various diseases, usually complications of chronic degenerative diseases and traumatic causes such as traffic accidents and firearm injuries [6].

Figure 1. Amputation procedures by type and age group: 2008-2020

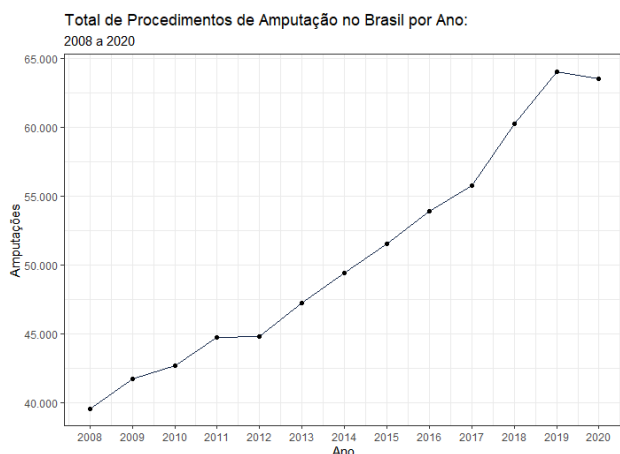


In Brazil, from 2008 to 2020, the DataSUS database documented 659.329 amputation procedures related to upper and lower limbs, including finger amputation or disarticulation [7]. However, from the perspective of categorising upper limb and lower limb amputation, the data on the procedure does not indicate whether the disarticulation or amputation is of fingers or toes. Consequently, with a view to ensuring adequate representation, data pertaining to cases of finger amputation or disarticulation will be excluded from the study. As demonstrated in Figure 1, the population with the highest rates of amputation is in the 50s. This finding is in line with the indices of the IBGE (2025), which show that 2,2% of the population aged 2 to 14 had some kind of disability. In the 15 to 59 age group, this



percentage rises to 5,4%, and reaches 27,5% among people aged 70 or over.

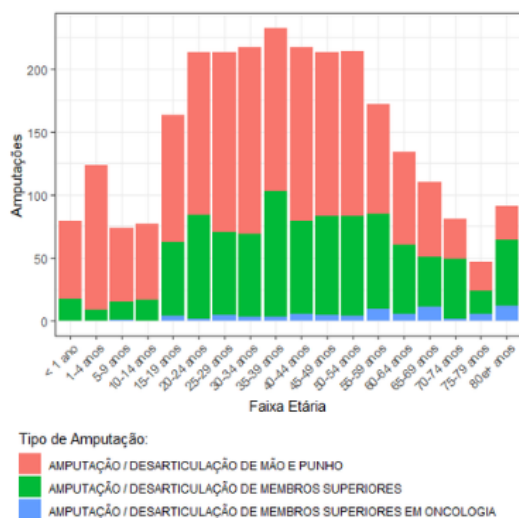
Figure 2. Amputation in Brazil, 2008-2020:



Source: Prepared by the author based on DATASUS/SIH/SUS, 2025.

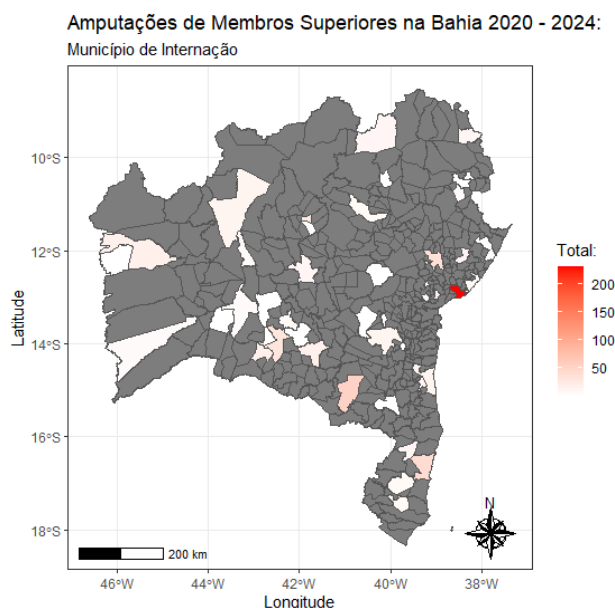
In the state of Bahia, individuals living with disabilities constitute 7,9% of the total population, amounting to 1,1 million people. It is estimated that 1,4% of the population experiences issues related to the upper limb, including difficulty picking up small objects or opening and closing lids. This group includes individuals who have undergone upper limb amputation [4].

Figure 3. Upper limb amputation procedures by type and age group in Bahia: 2008-2024:



The number of upper limb amputations is related to wrist amputation or disarticulation, followed by upper limb amputation or disarticulation, which does not accurately determine the level of the upper limb amputation procedure. The age groups with the highest number of amputations are 30 to 44 years old, as shown in Figure 3.

Figure 4. Upper limb amputations in Bahia by municipality of hospitalization: 2008-2024:



Although the number of municipalities for which patients are hospitalised for amputation procedures is poorly distributed within the same health macro-region, as shown in Figure 4, there are nine health macro-regions in Bahia. When looking at the municipalities of origin of patients who have undergone amputation, the distribution of amputation occurrences is wider, Figure 5. In both figures, the municipality of Salvador has the highest total due to its demographic density and the number of healthcare establishments in the capital of Bahia.

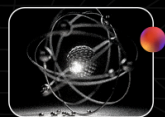
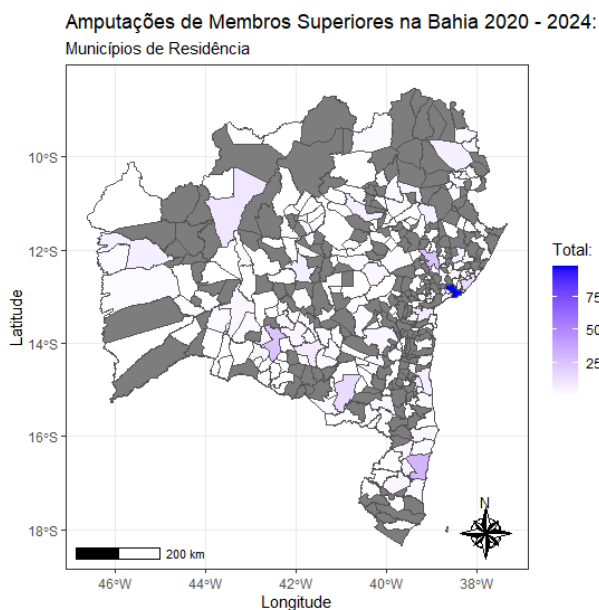


Figure 5. Upper limb amputations in Bahia by municipality of residence: 2008-2024:



2.1 The Care Network for People with Disabilities in Bahia

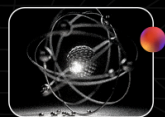
The number of amputation procedures has increased, Figure 2, implying an increase in demand for orthoses, prostheses and mobility aids (OPM) for this population. The RCPD seeks to expand and coordinate healthcare provision for people with temporary or permanent disabilities, and one of its specific objectives is to increase the supply of OPM

The CER is an integral and essential part of the RCPD and can be organised according to the type of rehabilitation modality provided: hearing; physical; intellectual; and visual. They are classified as follows: CER II consists of two rehabilitation modalities; CER III consists of three; and CER IV consists of four. A CER qualified in physical rehabilitation must have the support of a fixed orthopaedic workshop.

The activities of the Orthopaedic Workshops aim to assist people with reduced mobility by creating, adapting and developing assistive technologies, as well as adapting and developing bespoke prostheses for amputees and people with congenital limb differences.

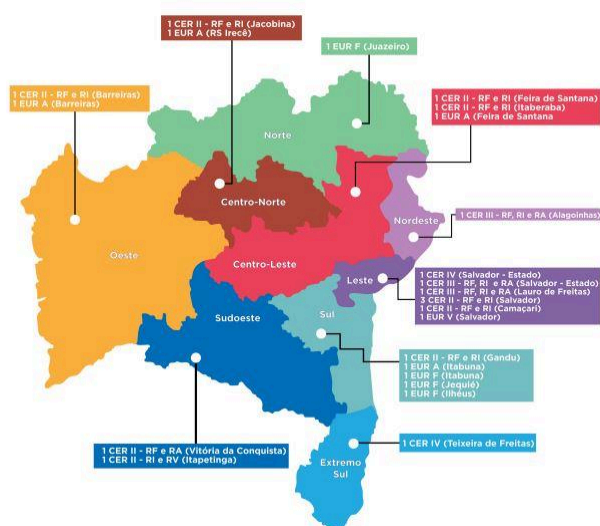
The prescription and dispensing of OPMs must be carried out by trained professionals and be subject to the completion and issuance of a justified report, in accordance with the rules established in the SUS regulations. Prior authorisation must also be obtained from the state or municipal manager, who must consider the justification presented in the prescription. The local and state managers are responsible for supplying OPMs, and they programme and regulate services and access for the population according to the identified needs, respecting the pacts signed in the Pacted and Integrated Programming (PPI) and the terms of commitment to guarantee access. In this case, it is not necessary for the health service to be recognised by the Ministry of Health (MS) as a Specialised Rehabilitation Centre (CER) in order to dispense OPMs.

In Bahia, the RCPD is governed by CIB/BA Resolution No. 167/2013 [8], which establishes state guidelines. According to the Bahia State Health Department (SESAB) [9], the specialised care component of the RCPD in Bahia comprises 25 services, 16 of which are specialised rehabilitation centres (CER) and nine of which are single rehabilitation establishments



(EUR). These are distributed across nine health macro-regions in 22 municipalities within 16 health regions characterised by host municipalities [10], as shown in Figure 6.

Figure 6. Specialized Rehabilitation Care Services by health region in Bahia.



Source: ATSPD/CPST/DGC/SAIS/SESAB, 2025

In the Northeast health macro-region are the municipalities of Alagoinhas and Ribeira do Pombal. In the Central-East are Feira de Santana, Serrinha, Itaberaba and Seabra. In the West are Barreiras, Ibotirama and Santa Maria da Vitória. In the centre north, there are Irecê and Jacobina; in the south west, there are Vitória da Conquista, Itapetinga, Guanambi and Brumado; in the north, there are Juazeiro, Paulo Afonso and Senhor do Bonfim; in the south, there are Ilhéus, Itabuna, Jequié and Valença; in the far south, there are Porto Seguro and Teixeira de Freitas. In 2021, the National Register of Health Establishments (CNES) included an orthopaedic workshop linked to CER IV in Teixeira de Freitas, in the far south of Bahia. There is a care gap in Bahia due to the

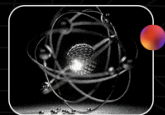
uneven distribution of orthopaedic workshops across the state and the limited provision of OPMs[11].

The Orthopaedic Workshop of Teixeira de Freitas was not included in the distribution of specialised rehabilitation care services covered by health regions.

3. The provision of prostheses in Bahia

The Technical Health Area for People with Disabilities (ATSPD) is responsible for formulating, monitoring and evaluating healthcare and rehabilitation initiatives for people with disabilities across all nine Health Macro-Regions of Bahia [9,12]. The ATSPD's activities aim to provide institutional support to municipal managers for the prevention and early detection of disabilities, as well as comprehensive healthcare for people with disabilities. The ATSPD also participates in state committees and intersectoral working groups that plan and discuss comprehensive healthcare for people with disabilities. The ATSPD also implements the Network with the aim of setting up and implementing the RCPD in the various health regions, linking the points of care in the various components, and discussing the flow of users. The ATSPD makes efforts to implement the Network throughout the state of Bahia, including proposals to enable new Specialised Rehabilitation Centres (CERs) [9].

The panorama of prosthesis dispensation in Bahia mirrors the national situation. However, the difference in the quantities of lower limb and

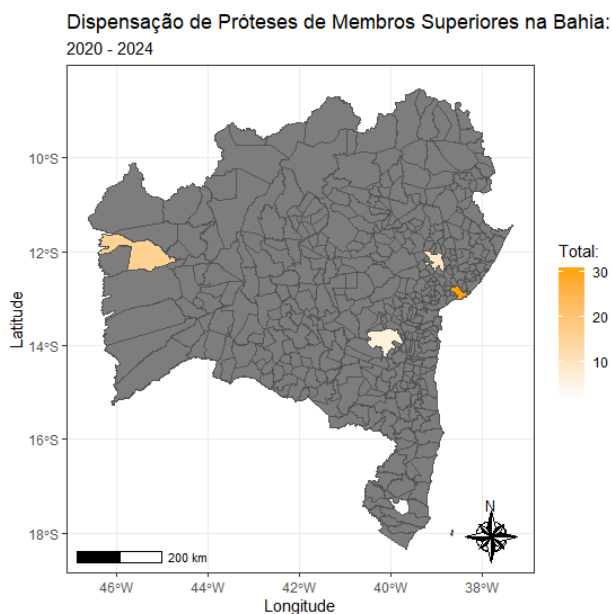


upper limb prostheses dispensed is striking, despite the respective differences in the number of amputations.

A total of 6.643 lower limb prostheses were dispensed, compared to 64 upper limb prostheses [7]. Upper limb prostheses account for 10,1% of upper limb amputations, whereas lower limb amputations account for 37%. Lower limb amputations are far more prevalent than upper limb amputations. As the field of upper limb prosthetics becomes increasingly technical and specialised, it is challenging for many prosthetists to expand their knowledge and applications since significantly fewer people with upper limb amputations are treated [13].

In the nine health macro-regions of Bahia, establishments are classified as either Specialised Rehabilitation Centres (CER) or Single Rehabilitation Establishments (EUR). However, the procedures for dispensing prostheses occurred in only five of these regions: Health Region (RS) Salvador (East); RS Feira de Santana (Central East); RS Jequié (South); RS Teixeira de Freitas (Far South); and RS Barreiras (West), as shown in Figures 7 and 8.

Figure 7. Dispensing of upper limb prostheses in Bahia: 2020-2024:



The establishments with the highest number of dispensations are the State Centre for the Prevention and Rehabilitation of Disabilities (Cepred) (29), the Specialised Centre for the Rehabilitation of People with Disabilities (Anibal Alves Filho) (16), and the Feira de Santana Association for the Education and Care of People with Intellectual Disabilities (APAE) (9). Figure 9 shows the representation of the flow of demand, municipality of origin and destination of the health establishment.



Figure 8. Dispensing procedures for upper limb prostheses in Bahia by municipality of residence: 2020-2024

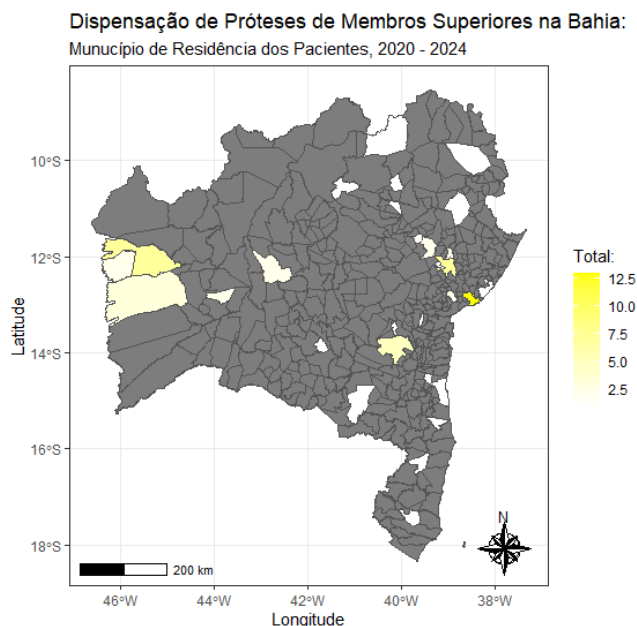
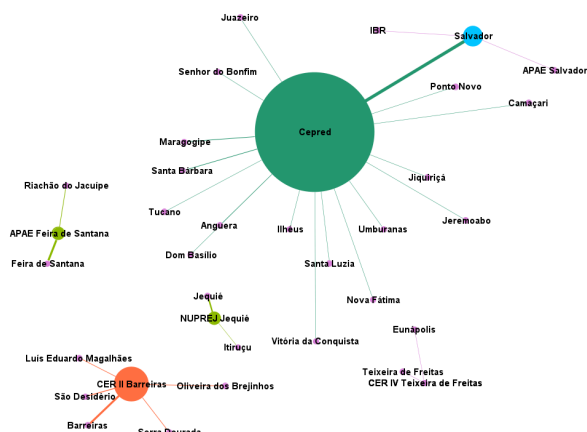


Figure 9. Municipality (Origin) and Health Establishments (origin) in the State of Bahia 2020 - 2024



Source: Prepared by the author based on DATASUS/SIH/SUS, 2025.

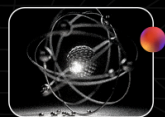
The State Centre for the Prevention and Rehabilitation of People with Disabilities (Cepred) is a unit of the Unified Health System (SUS). Founded in 1998 and located in the city of Salvador, Bahia, it is accredited as a Specialised Rehabilitation Centre (CER III). It carries out secondary prevention and rehabilitation activities for people with physical,

hearing, intellectual, ostomy and multiple disabilities. It forms part of the RCPD of the State of Bahia and is based on the theoretical foundations of the Ministry of Health Programme and the Healthcare Programme for People with Disabilities of the State Health Department (SESAB).

Although Cepred is the largest dispensing centre for upper limb prostheses, the high demand from the various regions of the state exceeds the unit's installed and technical capacity, as set out in the Assistance Regulation [14] for the Granting of Prostheses. This generates longer delays in the provision of a range of services [15].

A possible process for dispensing prostheses begins with the patient's initial visit to a Basic Health Unit (UBS) for an initial assessment and referral to specialised services within the health macro-region. Depending on the complexity of the service required, the patient may be redirected to another reference centre, such as Cepred. Examples of greater complexity include: bilateral amputations; difficult-to-heal stumps (requiring more than four months of rehabilitation); stumps with deformities requiring specialised prostheses; wrap-around prostheses; and hip disarticulation prostheses [15].

Multi-professionals, such as doctors and physiotherapists, carry out assessments and referrals. They assess the need for prostheses and refer patients to the CER, EUR or Orthopaedic Workshops. Depending on stock



availability and the order of registration, patients are registered and included on a waiting list for the prosthesis. Once the prosthesis has been evaluated and manufactured, the patient is called to receive it, after which rehabilitation routines begin.

4. Discussions

Given the challenges associated with providing prostheses in Brazil, the disparity in the number of dispensations across different prosthesis categories, and the uneven distribution across the state of Bahia's health macro-regions, exploring solutions to improve production processes and access to assistive technologies is crucial.

Accessing prostheses late can lead to greater difficulty in accepting and rehabilitating [16]. These delays can directly affect the rehabilitation process and even hinder the amputee's social and economic reintegration, preventing them from participating fully and effectively in society on an equal footing with others [6].

To effectively implement the RCPD throughout the state, progress must be made in overcoming the inequalities between central-level network management actions and those developed in the health regions. This will ensure that all network operational phases are completed, providing articulation of all network components to effectively expand access and improve care quality in the direction of integrality [17].

As a public policy of specialised care for patients with disabilities [18], the CERs and Orthopaedic Workshops are not distributed equitably across the territory. Gaps in care should be taken into account when planning or expanding activities, particularly with regard to the provision of upper limb prostheses.

One way to avoid possible delays could be to use digital manufacturing [19] to produce prostheses. This involves using 3D modelling and printing to develop assistive technology.

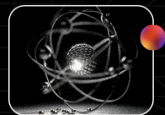
5. Conclusion

The pathways for dispensing prostheses in the state of Bahia are supported by the State Action Plan for the Care Network for People with Disabilities. However, solutions are needed to speed up access to prostheses for amputees.

Although the State Action Plan for the Care Network for People with Disabilities has implemented regionalised coverage by Specialised Rehabilitation Centres (CER) and Single Rehabilitation Establishments (EUR) in Bahia, there is still unmet demand. For example, there is a need for prosthesis dispensing services in health territories to avoid patients having to move to other health macro-regions.

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