

# Hospital admissions for child malnutrition in Brazil: an epidemiological overview of the last 10 years

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## ABSTRACT

**Objective:** To describe the number of hospital admissions due to child malnutrition in Brazil. **Methods:** This is an epidemiological, descriptive, observational study with a quantitative approach, focusing on hospitalizations of children aged 1 to 9 years due to malnutrition across Brazilian regions. Data were collected from the Notifiable Diseases Information System (SINAN) between January 2012 and December 2022.

**Results:** A total of 20,855 cases of child malnutrition were reported in Brazil. The years with the highest incidence within the analyzed period were 2012, with 13.0% of cases, followed by 2014, with 12.4%. The Northeast region showed the highest number of hospitalizations, accounting for 34.2% of the total cases. Reports of malnutrition were more common among males (50.9%), children aged 1 to 4 years (70.9%), and those self-identified as brown (40.8%). Regarding the number of deaths, 286 cases were reported, with the highest incidence in 2012 (12.9%).

**Conclusion:** Although there has been a significant decrease in hospitalizations due to malnutrition over the study period, child malnutrition remains a public health issue, driven by factors related to socioeconomic inequalities and disparities in health services across the country.

**Keywords:** Child malnutrition, Hunger, Morbidity, Prevalence.

## INTRODUCTION

The term malnutrition refers to deficiencies, excesses, or instability in energy and/or nutrient intake; it is a worldwide problem, where all countries are affected by one or more forms of malnutrition, thus, one of the greatest global health difficulties<sup>1</sup>.

In addition, it is a multifactorial pathology, classified into three dimensions, namely: immediate, underlying, and structural. When dealing with immediate causes, one can cite insufficient diets in quality and quantity, and some pediatric illnesses;

As for underlying factors, access to public health services and basic sanitation conditions stand out, which are also associated with structural aspects, mainly poverty<sup>2</sup>.

Malnutrition involves a set of situations that result in poor nutrition, which compromises health, and alters neuropsychomotor development and child growth.<sup>3</sup> Therefore, if malnutrition is not treated properly, it can affect all the child's organs, thus becoming a chronic disease.<sup>4</sup>

Thus, children with malnutrition can have permanent consequences, such a

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short stature, difficulty in school performance, lower productivity as adults, and consequently lower financial income, which contributes to the transmission of poverty between generations.<sup>5</sup>

From this perspective, the influence of inequality in income distribution results in precarious access to food, thus configuring the biggest food problem in Brazil<sup>3</sup>.

In this context, this study is justified, taking into account the importance of the theme, because despite being an old problem, it remains a very current public health issue, considering that this pathology can also have consequences in the phase of adult life, facilitating the development of chronic diseases, and those related to the neurological system such as epilepsy, schizophrenia, and depression. Thus, priority should be given to combating malnutrition, even in childhood. Furthermore, the objective is to describe the number of cases of hospital admissions due to child malnutrition in Brazil, between January 2012 and December 2022.

## METHODS

This is an epidemiological, descriptive, observational study with a quantitative approach. It is based on secondary data from the records of hospitalizations of the pediatric population due to malnutrition in the Brazilian regions, extracted from the Department of Informatics of the Brazilian Unified Health System (DATASUS), through the SSUS Hospital Information System (SIH/SUS), developed by the Brazilian Ministry of Health, using the TABNET program. The time frame chosen to analyze the cases of hospital admissions was the

period between January 2012 and December 2022.

To obtain the data, the information available on the DATASUS platform was consulted between January and February 2023. The filters used were “SUS Hospital Morbidity (SIH/SUS)”, “General, by place of hospitalization – from 2008 onwards”, “Brazil by region and federation unit”, “CID-10 Morb List - Malnutrition” and “age group 1- 1 year to 9 years”. In the line field, the following variables were selected: “Region”, “age group 1”, “gender”, and “color/race.” In the column field, the option “year of processing” was selected, while in the content field, “hospitalizations” and “deaths” were selected.

After the data collection process, they were tabulated in Microsoft Office Excel® software and statistically treated using the Statistical Package for Social Sciences (SPSS) program, version 20.0, which provided an understanding of absolute and relative frequency. The research was carried out with secondary data, in the public domain, without identifying the subjects, therefore obeying the ethical principles of Resolution 196/96 of the National Health Council, which justifies the absence of the opinion of the Research Ethics Committee.

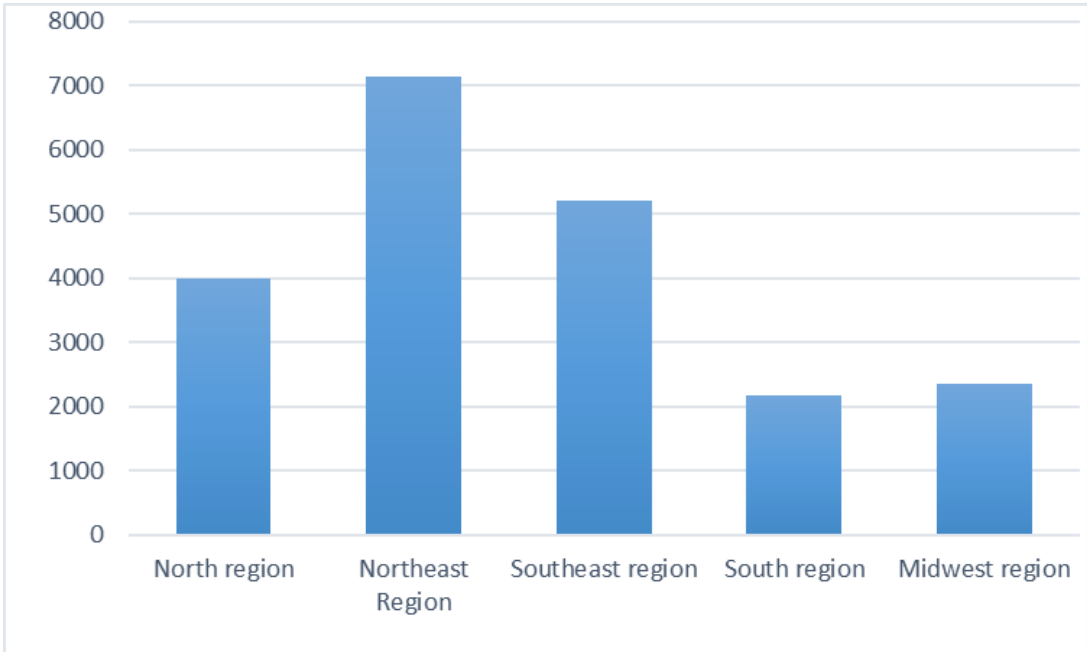
## RESULTS

According to data obtained from DATASUS, based on ICD-10 codes, there were 20,855 reported cases of malnutrition in the child population in Brazil between January 2012 and December 2022. The year with the highest number of hospitalizations was 2012, accounting for 13.0% of the cases, followed by 2014 with 12.4% and 2013

with 11.3%. The lowest number of hospitalizations occurred in 2020, with only 5.6% of the cases. Over the period from 2012 to 2022, there was a 39.2% decrease in the number of reported hospital admissions.

Regarding the Brazilian regions, the Northeast had the highest proportion of hospitalizations, totaling 34.2% of the cases, followed by the Southeast with 25.0% and the North with 19.1%. The Midwest and South regions had the lowest incidence of hospitalizations for most of the period, with 11.3% and 10.4% of the cases, respectively (Graph 1).

**Graphic 1.** Number of hospital admissions due to child malnutrition in the period from 2012 to 2022, in Brazilian regions.



Regarding gender, the male population was represented by a total of 50.9% of hospitalizations, while the female population was represented by 49.1% of reported hospitalizations. Regarding the color/race variable, the self-declared brown population predominated in 40.8% of the cases, followed by the white population in 18.6%, indigenous in 7.6%, black with 1.8%, and

yellow with only 0.9% of cases. It should be noted that 30.3% of the cases did not have the population identified.

About the age group of the study, there was a predominance of hospitalizations in the population aged 1 to 4 years with 70.9% of cases, followed by 5 to 9 years with 29.1% (Table 1).

**Table 1.** Sociodemographic characteristics of hospital intentions for malnutrition, notified in the period from 2012 to 2022.

Variables	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	Total
<b>Sex</b>												
Masculine	1.350	1.227	1.313	1.062	1.009	878	829	841	589	698	830	10.617
Feminine	1.367	1.133	1.265	1.017	953	853	764	832	585	647	822	10.238
<b>Color/Race</b>												
White	488	405	441	331	381	329	342	374	224	235	331	3.881
black	58	37	41	38	37	19	29	22	22	33	33	369
Curtain	886	805	932	869	776	826	744	778	543	611	742	8.512
Yellow	4	11	23	16	32	30	23	20	8	9	13	189
Indigenous	145	178	233	199	174	100	89	94	89	137	148	1.586
ignored	1 .136	924	908	626	562	427	366	385	288	311	385	6.318
<b>Age Group</b>												
1 to 4 years	1.923	1.685	1.789	1.455	1.423	1.235	1.143	1.148	839	977	1.170	14.787
5 to 9 years	794	675	789	624	539	496	450	525	335	359	482	6.068
Total	2.717	2.360	2.578	2.079	1.962	1.731	1.593	1.673	1.174	1.336	1.652	20.855

**Source:** Prepared by the authors with data from DATASUS, 2023.

Throughout the study period, 286 cases of deaths due to malnutrition were reported in the child population. Within the variable color/race, the brown and indigenous populations had the highest numbers of deaths by destruction with 32.1% and 17.4%, respectively. The white, black, and yellow populations had the lowest rates with 12.4%, 2.4%, and 0.6%, respectively. It is observed that in 2012 there was a higher number of

deaths due to malnutrition, with a total of 12.9% of deaths. The years 2017 and 2018 have the same number of deaths, being the years with the lowest death rates at 5.9%. Although the number of deaths over the period studied has decreased, from the year 2019 there was an increase in death rates, from 17 deaths in 2018 to 29 in 2021, representing an increase of 70.58% (Table 2).

**Table 2.** Number of deaths due to malnutrition in the age group from 1 to 9 years, in the period from 2012 to 2022.

Color/Race	2012	2013	2014	2014	2016	2017	2018	2019	2020	2021	2022	Total
White	2	3	5	4	1	1	2	6	3	3	7	37
black	-	-	3	1	-	-	1	-	1		1	7
Curtain	11	10	9	8	6	9	7	5	6	12	9	92
Yellow	-	1	-	-	-	1	-	-	-	-	-	2
Indigenous	4	8	7	5	4	4	3	5	4	5	1	50
ignored	20	12	11	11	9	2	4	5	6	9	9	98
Total	37	34	35	29	20	17	17	21	20	29	27	286

**Source:** Prepared by the authors with data from DATASUS, 2023.

## DISCUSSION

When evaluating the data presented, it is evident that the proportion of cases decreased over the period from 2012 to 2022, dropping from 2,717 cases in 2012 to 1,652 in 2022, representing an overall reduction of 39.2%. Hospital admissions due to malnutrition were predominantly reported in the Northeast region, accounting for 34.2% of the cases.

This situation is closely related to the inequalities in socioeconomic indicators and health services across the country. Less developed regions, such as the Northeast, have historically been more affected by this

public health issue compared to more developed regions like the Center-South. These disparities are tied to a complex process of territorial organization, economic development, and diverse health policies in Brazil, rather than solely the availability of food.<sup>6</sup>

In this sense, income transfer programs contribute to reducing inequalities and poverty conditions and to combating hunger in the national territory, being important for the reduction of malnutrition, especially for children under 2 years of age.<sup>7</sup>, but it should be noted that access to food is not necessarily synonymous with food safety and nutrition quality, which permeates other issues, such as the increased

consumption of ultra-processed products, either due to cost or the influence of advertisements, for example<sup>8</sup>. In this sense, the prioritization of the Food and Nutrition Security Agency (SAN), from 2003 onwards, with the implementation of programs such as Fome Zero, Bolsa Família, and expansion of access to daycare centers and preschools, contributed to access to food<sup>9</sup>. Furthermore, the downward trend in child malnutrition in the country is also related to the increase in maternal schooling, the purchasing power of families, health care, and sanitation conditions.<sup>10</sup>

In addition to environmental, social, and economic factors, birth weight, and morbidities such as hospitalizations, diarrhea, fever, and cough are directly related to child malnutrition, maternal age and breastfeeding also seem to be connected with child nutritional factors<sup>11</sup>. A Brazilian study, which investigated the nutritional status of children in daycare centers, described that the socioeconomic level was already the main determining variable for child malnutrition so it cannot fail to be considered in analyzes on the subject, although it has also found at that time higher prevalence of malnutrition in male and black or brown children<sup>12,13</sup>.

In all regions analyzed by the study, males (50.9%) are more affected than females (49,1%). These findings are in line with results obtained by other authors, in which males predominate in malnutrition rates.<sup>14,15</sup> According to the study by Medeiros<sup>16</sup>, male children, up to 5 years old and preferably indigenous, have a stratified prevalence of 47.6% for malnutrition.

Most of the hospitalizations and deaths observed in the study occurred in brown (32.1%) and indigenous (17.4%) po-

pulations. These values are justified by the lack of health care that these populations encounter. A longitudinal study in Brazil showed that indigenous children are 98% more likely to die due to malnutrition compared to white children, in which the mortality of children under 5 years of age was 39% and 19% among black and brown children compared to white children, respectively<sup>17</sup>. In this sense, in the current scenario, the Ministry of Health has decreed a Public Health Emergency of National Importance, given the lack of health care faced by indigenous peoples in the Yanomami territory. This occurred due to the state of severe malnutrition that this population is in, as well as infectious conditions. This study identifies a similar pattern regarding the stratification of this population when considering the brown and black populations together since there is a predominance of brown children in terms of hospital admissions due to malnutrition. These data reinforce the need to recognize and act to minimize the vulnerability of these populations<sup>18</sup>.

When considering the age range as an analysis variable, the highest prevalence occurred between 1 and 4 years old (70.9%). These data corroborate the research by Rodrigue and Saraiva<sup>19</sup>, which also revealed a higher rate of malnutrition in the 1-4 year age group. Another Brazilian study, developed by Felix-Beltran and Seixas<sup>20</sup>, sought to analyze the experiences of hunger in childhood and the chronic health conditions that develop later in life among elderly Brazilians and showed that exposure to multiple adverse experiences, such as abuse, neglect, and domestic dysfunction in childhood, can result in greater risk of obesity in adulthood, in addition to predisposing to heart disease, decreased functional health, less physical activity, overweight, diabetes, smoking, alcohol/drug use

and even self-directed violence. In this sense, not receiving nutrients during childhood results in direct epigenetic changes, which can lead to metabolic dysfunctions that manifest in a higher risk of diabetes, hypertension, and cardiovascular diseases in the long term.<sup>20</sup>

Another study, developed by Katoch<sup>21</sup>, identified maternal education, family income, maternal nutritional status, child's age, availability of basic sanitation at home, family size, birth order in the family, and child's birth weight as aspects related to the onset of child malnutrition. In addition to these factors, in a study carried out with children hospitalized in a hospital in southern Ethiopia, it was found that comorbidities after hospitalization, HIV positive, vaccination status, hospitalization for a period longer than one week, and use of a nasogastric tube was also evidenced as predictors malnutrition-related mortality<sup>22</sup>.

The increase in hospital admissions due to malnutrition in 2019, with an increasing trend in some regions until 2022, as well as the increase in deaths in 2021, with a decrease in 2022, may be related to the pandemic period covid-19 and its damage to society. The study carried out by Fore *et al.*<sup>23</sup>, during the COVID-19 pandemic, showed that it harmed nutrition worldwide, especially in low- and middle-income countries, with young children being the most affected. In this sense, the measures used to combat the spread of COVID-19, such as physical distancing, school closures, trade restrictions, and country blockades, have had an impact on the normal flow of production, transport, and sale systems for nutritious, fresh and affordable food, leading to a decline in the quality of nutrition of these individuals, and these factors may be responsible for the increase in the num-

ber of deaths due to malnutrition in 2019, an aspect that has been decreasing in previous years.

Severe malnutrition during the pandemic was also aggravated by factors such as loss of income due to unemployment, lower wages, and rising food prices, aspects that are aggravated by the blockades and restrictions imposed due to the pandemic, leading to the weakening of social safety nets, suspension of school feeding programs and the onset of instability<sup>24</sup>. In addition, it is estimated that the risk of death from COVID-19 is up to 10 times higher among the socioeconomically most vulnerable population, which goes against the reality of mortality due to child malnutrition.<sup>25</sup>

From the analysis of the study, it is possible to identify limitations that may interfere with the data and its full evaluation, since it is conducted from secondary data, therefore, it is necessary to consider the possibility of underreporting, as well as different diagnostic criteria in different hospital services covered by the database. However, these limitations did not prevent the description and critical reflection on child malnutrition in the country, based on the last ten years.

## CONCLUSION

Given the arguments presented, the inequalities in the incidence of child malnutrition in Brazil are closely linked to disparities in socioeconomic indicators and health services across the country. Less developed regions, such as the Northeast, have historically been more severely impacted by this public health issue. Additionally, data from DATASUS show that between January 2012 and November 2022, 20,855

cases of malnutrition were reported among the child population in Brazil, with the highest incidence occurring in 2012.

Regarding the Brazilian regions, the Northeast had the highest number of hospital admissions, totaling 7,141 cases (34.2%). The COVID-19 pandemic also exacerbated malnutrition, due to factors such as job loss, rising food prices, tax restrictions, the suspension of school feeding programs, and overall instability.

In light of these findings, it is essential to implement public policies aimed at combating food insecurity, promoting more effective nutritional screening, and providing treatment within 48 hours of hospital admission, in accordance with Brazilian nutritional guidelines. It is concluded that proper training can significantly enhance the knowledge of healthcare professionals, enabling them to offer more reliable nutritional guidance to the community and ensuring higher quality care for patients.

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#### **Author contributions:**

G.D.S.P.P- contributed substantially to the design of the study, analysis, and interpretation of data, participation in the writing of the preliminary version, participated in the review and approval of the final version to be published, and agreed to be responsible for all aspects of the work, in the sense to ensure that questions relating to the accuracy or completeness of any part of the work are properly investigated and resolved.

G.G.C.L- contributed substantially to the design of the study, participated in writing the preliminary version, participated in the review and approval of the final version to be published, and agreed to be responsible for all aspects of the work, to guarantee that questions related to the accuracy or completeness of any part of the

work are properly investigated and resolved.

A.O.F.L- contributed by participating in the writing of the preliminary version, in participating in the review and approval of the final version to be published, and agreed to be responsible for all aspects of the work, in the sense of guaranteeing that questions related to the accuracy or completeness of any part of the work are properly investigated and resolved.

R.B- contributed to participating in the writing of the preliminary version, participating in the review and approval of the final version to be published, and agreed to be responsible for all aspects of the work, in the sense of guaranteeing that questions related to the accuracy or completeness of any part of the work are properly investigated and resolved.

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