Research Article
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Hospital morbidity and mortality due to anemia in Brazil, 2015-2024

Abstract

Introduction: Anemia is a condition characterized by reduced hemoglobin (Hb) concentration, which may be caused by a deficiency of one or more essential nutrients, such as iron, zinc, and vitamin B12. It represents a major public health problem. From a global perspective, the WHO classifies iron deficiency anemia as the most common nutritional deficiency in the world. When anemia is not adequately treated at the outpatient level of PHC, patients may progress to more severe conditions, requiring hospitalization and intensive care.

Objective: To investigate the profile of morbidity and mortality due to anemia in Brazil over the last 10 years.

Methodology: Cross-sectional epidemiological study, with a temporal cut, referring to the period from 2015 to 2024, on anemia in Brazil, using secondary data from the Hospital Information System of the SUS (SIH-SUS) /TABNET/DATASUS - Ministry of Health/ Brazil.

Results: There were n=873794 hospitalizations, most in the Southeast (n=47354), followed by the Northeast (n=26752). The most affected gender was female, representing 55%. The race with the highest morbidity was brown (n=351977). Most care was on an emergency basis, with n=810146 hospitalizations. Regarding the category, in Brazil, Anemia/Other Anemias prevailed (n=748781), compared to the Iron Deficiency classification (n=125013). Regarding deaths in Brazil, there were a total of n=44220 deaths due to hospitalizations/ anemia in the decade under analysis.

Final considerations: Anemia remains a pathology of high epidemiological relevance in Brazil, reflecting high rates of hospital morbidity and mortality and significant costs for the health system. Improving health indicators related to anemia depends on effective coordination between public policies, professional training and preventive actions in PHC, which would produce, in the long term, effective structural changes in public health.

Keywords: anemia, morbidity and mortality, public health

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Introduction

Anemia is a condition characterized by a reduction in the concentration of hemoglobin (Hb), which can be caused by a deficiency of one or more essential nutrients, such as iron, zinc, and vitamin B12.[1] This condition affects approximately one third of the world's population, affecting the living conditions and physiological needs of the human body.[2] According to criteria established by the World Health Organization (WHO), the diagnosis of anemia may vary according to sex and age group: in men, Hb < 13 g/dL; in non-pregnant women, Hb < 12 g/dL; and in pregnant women and children, Hb < 11 g/Dl.[3]

Anemia is a major public health problem.[4] From a global perspective, the WHO classifies iron deficiency anemia as the most common nutritional deficiency in the world, affecting millions of people, especially vulnerable groups such as young children, menstruating adolescents, and women.[5,6] Although it is a condition that affects everyone, it tends to affect individuals with lower socioeconomic levels more frequently.[7]

In addition to reducing quality of life, anemia increases the morbidity and mortality of patients, especially those with chronic diseases.[8] In Brazil, the Ministry of Health has implemented fundamental strategies to prevent and treat anemia in Primary Care, aiming to minimize its impacts. Among the initiatives, the Breastfeeding and Feeding Brazil Strategy stands out, which encourages exclusive breastfeeding up to six months, and the National Iron Supplementation Program, which provides iron supplementation for children aged 6-24 months, pregnant women and women immediately after giving birth.[9]

Anemia is a very common condition in the clinical practice of Primary Health Care (PHC).[10] PHC is essential in the prevention, diagnosis, and management of anemia, being the first level of care in the Brazilian health system.[11] The WHO emphasizes the importance of a multidisciplinary and intersectoral approach in the management of anemia, involving, for example, doctors, nurses, and nutritionists who will work on iron supplementation, correction of nutritional deficiencies, and dietary reeducation.[12] Thus, PHC has an extremely important function in the treatment and monitoring of those affected by this problem.[13]

However, when anemia is not adequately treated in the outpatient setting of PHC, patients may progress to more severe conditions, requiring hospitalization and intensive care. Failure to intervene early in the treatment of anemia can lead to worsening disease outcomes, increased morbidity, and higher healthcare costs. Specifically, anemia is a common complication in patients with chronic kidney disease (CKD) treated in primary care, and its poor recognition and undertreatment are associated with adverse outcomes, such as major

adverse cardiovascular events and increased mortality.[14] Therefore, detection, treatment, and adequate monitoring in PHC are crucial to prevent severe complications and improve clinical outcomes.

Since the detection, treatment and adequate monitoring of anemia has positive impacts on the health of the population, the health system and the functional and socioeconomic context of patients,[15] the present study aims to investigate the profile of morbidity and mortality due to anemia in Brazil over the last 10 years.

Methodology

A cross-sectional epidemiological study was conducted, with a time frame, covering the period from 2015 to 2024. It included a study of a decade of hospitalizations due to anemia in Brazil.

Data from the SUS Hospital Information System (SIH-SUS) were used, accessed via TABNET/DATASUS, the SUS Information System of the Brazilian Ministry of Health, which is a public and official system that portrays population health data.

The variables studied were anemia, Brazil, region, year, by place of residence, gender, race, type of care, ICD-10 morbidity list, total amount spent, average amount spent, average number of days of stay, deaths and mortality rate.

The secondary data explored in DATASUS were exported to the EXCEL program, in which they were tabulated, and graphs and tables were created. The results were expressed in absolute numbers and frequencies and presented in graphs and tables.

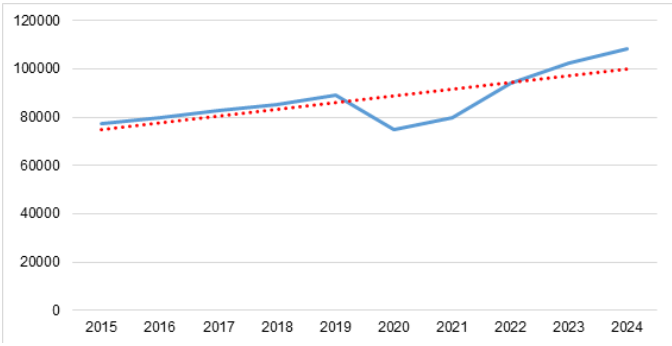
The use of secondary data from public, official health information systems and with population data that do not allow the identification of individuals guarantees us the exemption of submission/approval by a Research Ethics Committee, in accordance with the standards and laws on Scientific Research in Humans, such as the Declaration of Helsinki (1964), Nuremberg Code (1949) and Brazilian law n° 14.874/2024, therefore, complying with Brazilian and global ethical requirements.

Results

Anemia in Brazil is a highly relevant epidemiological pathology because it is associated with high hospital morbidity, with a total of n=873794 hospitalizations in all regions of the country, during the entire period from 2015 to 2024.

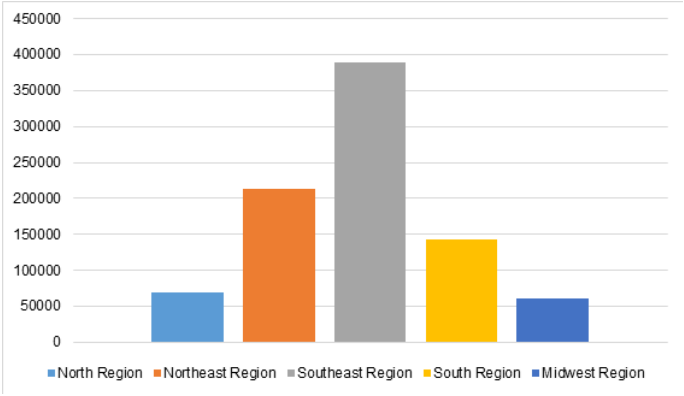
Hospital morbidity due to anemia (Graph 1) during the decade studied showed high numbers in all years analyzed, of which in the period from 2015 (n=77163) to 2019 (n=89342), it remained above the trend line. From 2020 (n=74927) onwards, there was a reversal of this growth pattern, representing the year with the highest decreasing peak in hospitalizations, remaining below the trend line until 2021, with n=79928. While the year 2022 (n=93943) represented a new change in behavior, with numbers above the trend line, in constant growth, which continued in the year 2023 (n=102526) and in 2024, with n=108216, being the biggest upward peak in the entire decade analyzed.

Regarding hospitalizations by region (Graph 2), the Southeast region accounted for the highest number of hospitalizations due to anemia, with n=388607, followed by the Northeast region, with n=212888, in third place, the South also stood out with n=143575, followed by the North region, with n=68,669 and in last place the Midwest, with the lowest number of hospitalizations among all regions of Brazil in the decade under study.



Graph 1 Distribution of Hospital Morbidity due to Anemia in Brazil, by Year, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.



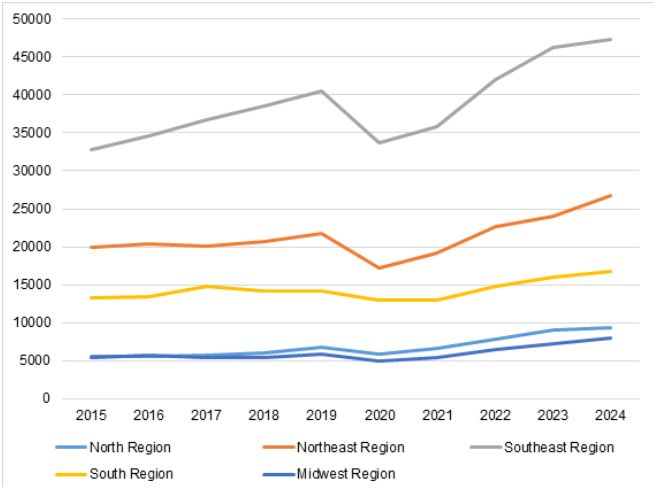
Graph 2 Distribution of Hospital Morbidity due to anemia in Brazil, by Region, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

Regarding hospitalizations by Region in each year studied (Graph 3), 2024 was the year with the highest number of hospitalizations due to anemia in all regions, of which the Southeast had the highest number, with n=47354, followed by the Northeast with n=26752, South with n=16,763, North with n=9403 and Central-West with n=7944. Regarding the years with the lowest number of hospitalizations, in 2023 there was lower hospital morbidity in the Southeast, with n=32749, while in the Northeast, the lowest number was observed in 2020 (n=17267), in the South region the lowest hospital morbidity occurred in 2021 (n=12,918), while in the North and Central-West regions the number of hospitalizations was even lower in the years 2016 (n=5618) and 2020 (n=5034), respectively, for each region.

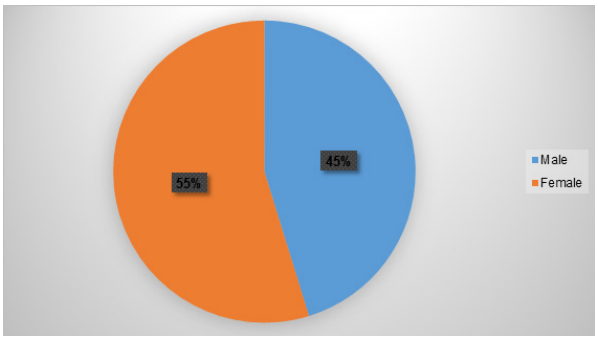
Regarding hospital morbidity due to anemia in Brazil by gender (Graph 4), women were the most affected, representing 55% of the number of hospitalizations due to this pathology in the national territory, with n=395252, while men accounted for the other 45% of anemia cases in Brazil, with n=478542.

Citation: Miranda WS, Oliveira LM, Reis CC, et al. Hospital morbidity and mortality due to anemia in Brazil, 2015-2024. *MOJ Public Health.* 2025;14(1):82–87. DOI: 10.15406/mojph.2025.14.00475



Graph 3 Distribution of Hospital Morbidity due to anemia in Brazil, by region/year, from 2015 to 2024.

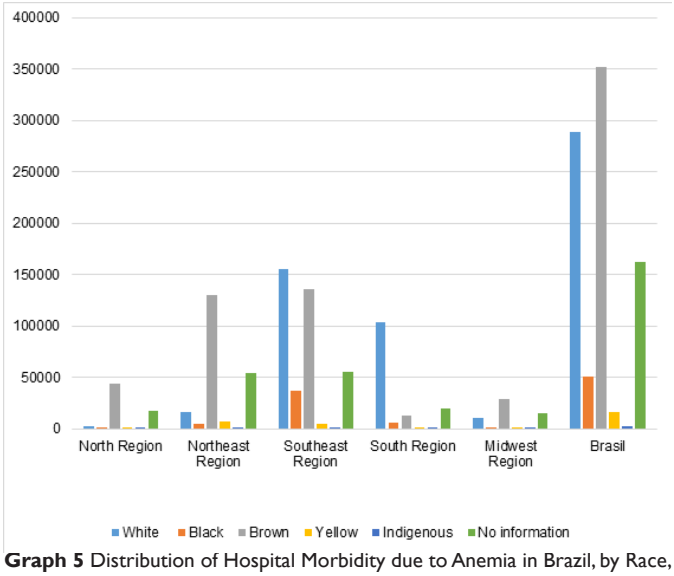
Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.



Graph 4 Distribution of Hospital Morbidity due to Anemia in Brazil, by Gender, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

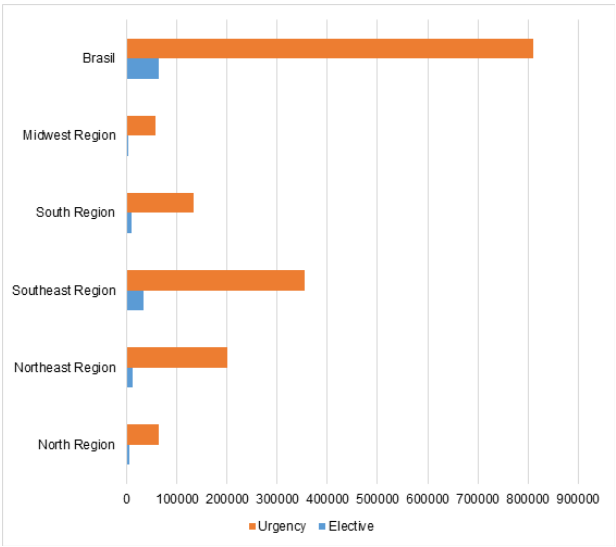
Regarding these hospitalizations according to race (Graph 5), in Brazil, the race with the highest morbidity was the Brown race (n=351977), the second most affected was the White race (n=288774), the third with the highest number of hospitalizations was the classification No Information (n=162869), followed by the Black race (n=51162) and the one with the fewest hospitalizations was the Indigenous race (n=3090). In the Southeast region, there was the highest morbidity in the White race (n=155,389), followed by the Brown race (n=135463), while the lowest number occurred in individuals of the Indigenous race (n=145). Regarding the Northeast region, the highest numbers were observed in the Brown race (n=130158), then in the classification of the race No Information (n=53909) and the race with the fewest hospitalizations was the Indigenous race (n=291). In the South region, the highest morbidity rate was among Whites (n=103,686), followed by the No Information classification (n=19803) and the lowest number of cases among Indigenous population (n=290). In the North, morbidity was highest among the Brown race (n=44178), followed by those with No Information (n=17890) and the lowest number among Whites (n=896). In the Midwest region, there was a higher number of hospitalizations among Brown races (n=229340), in second place among the No Information classification (n=15,500) and the lowest number among Indigenous population (n=1104).



Graph 5 Distribution of Hospital Morbidity due to Anemia in Brazil, by Race, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

Regarding the nature of anemia care in Brazil (Graph 6), the highest number of emergency care services was provided, with n=810146, while elective care services represented a smaller number in the national territory, with n=63648. Regarding the distribution of care services in the Southeast, emergency care prevailed (n=354655), compared to a lower prevalence of elective care services (n=33952). In the Northeast, the number of emergency care services was also more abundant, with n=200763, while elective care services corresponded to n=12125. The South presented n=134,273 emergency care services, in discrepancy with n=9302 elective care services in this region. In the North there was also a greater number of hospitalizations related to emergency care for anemia cases, with n=63520, compared to elective care services, with n=5,149. Regarding data from the Midwest region, there was a higher morbidity rate in emergency care (n=569350), compared to the lower number of cases in elective care (n=3120).

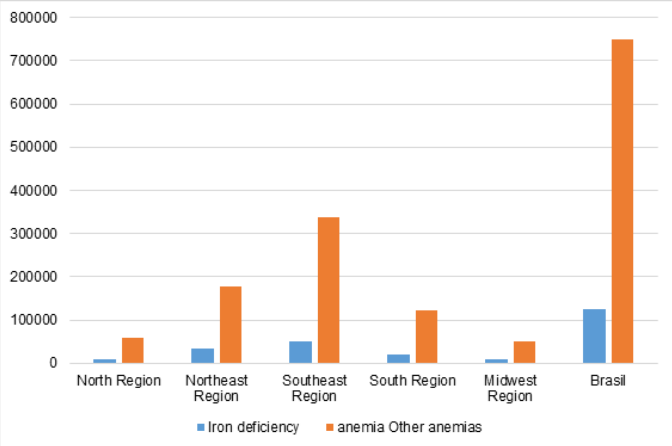


Graph 6 Distribution of hospital morbidity due to anemia in Brazil, by type of care, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

Citation: Miranda WS, Oliveira LM, Reis CC, et al. Hospital morbidity and mortality due to anemia in Brazil, 2015-2024. *MOJ Public Health.* 2025;14(1):82–87. DOI: 10.15406/mojph.2025.14.00475

Regarding the morbidity data due to anemia in the national territory by ICD-10 morbidity list (Graph 7), the Anemia/Other Anemias category prevailed, with n=748781, in comparison to the Iron Deficiency classification, with n=125013 in Brazil, throughout the decade studied. In the Southeast region, the Anemia/Other Anemias category also predominated (n=338328), in relation to Iron Deficiency (n=50279). In the Northeast, the Anemia/Other Anemias category (n=178486) predominated over the Iron Deficiency classification (n=34402). Regarding the data from the South, the number of cases categorized as Anemia/Other Anemias (n=123271) prevailed over the Iron Deficiency category (n=20304). In the North region, the Anemia/Other Anemias classification prevailed (n=58788), while the Iron deficiency category had fewer numbers, with n=9881. In the Midwest, the Anemia/Other Anemias classification (n=49908) also prevailed over the Iron Deficiency category (n=10147).



Graph 7 Distribution of Hospital Morbidity due to Anemias in Brazil, by ICD-10 morbidity list, from 2015 to 2024.

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

Regarding the values obtained regarding the distribution of hospital morbidity due to anemia in the national territory (Table 1), the total amount spent in Brazil for this pathology was n=R$649152452,90. Regarding the regions, the one that received the highest total amount was the Midwest (n=R$40104906,15), the second one that received the highest amount was the Southeast (n=R$297868028,40), in third place the highest total amount was the Northeast (n=R$151779058,30), followed by the South (n=R$118039481.60) and the North (n=R$41360978.50), equivalent to the lowest total amount.

As regards the average amount spent, the Brazilian average for this amount was n=R$742,89, the regions with averages above the national average were: 1st South (n=R$822,13), 2nd Southeast (n=R$766,46), while the regions below the general average for Brazil were: 1st North (n=R$602,32), 2nd Central-West (n=R$667,8) and 3rd Northeast (n=R$712,94). Regarding the average days of stay, the national average was n=5.7 days, in which the Northeast (n=6.3) and Southeast (n=5.8) regions presented average days above the Brazilian average, while the North region (n=5.4) presented a number of days lower than that of Brazil and the South and Central-West regions represented an average of days considerably lower than the national average, both with n=4.8 days (Table 1).

In respect of deaths, in Brazil there were a total of n=44220 deaths due to hospitalizations/anemia in the decade under analysis, of which deaths due to this disease prevailed in the Southeast, with n=22304 deaths, the second region with the most deaths due to hospitalizations/anemia was the Northeast (n=10707), followed by the South (n=6837), then by the North (n=2361) and finally by the Midwest (n=2011). Regarding the mortality rate, in Brazil this number was n=5.06, the only region above this rate was the Southeast with n=5.74, with a relatively discrepant amount from the Brazilian total and the other regions, which presented in the Northeast (n=5.03), a number slightly lower than the national one, in the South there was a n=4.76, while in the North (n=3.44) and in the Midwest (n=3.35) these numbers were considerably below the country's mortality rate (Table 1).

Table 1 Distribution of Hospital Morbidity due to anemia in Brazil, by total amount spent, average amount spent, average number of days of stay, deaths and mortality rate, by region, from 2015 to 2024

Region	Total_value	Value average	Average stay	Deaths	Mortality rate
North Region	41360978,5	602,32	5,4	2361	3,44
Northeast Region	151779058,3	712,94	6,3	10707	5,03
Southeast Region	297868028,4	766,46	5,8	22304	5,74
South Region	118039481,6	822,13	4,8	6837	4,76
Midwest Region	40104906,15	667,8	4,8	2011	3,35
Brasil	649152452,9	742,89	5,7	44220	5,06

Source: Prepared by the authors, with data from the Ministry of Health - SUS Hospital Information System (SIH/SUS), 2025.

Discussion

The analysis of hospital morbidity and mortality due to anemia in Brazil between 2015 and 2024 reveals a worrying panorama, marking anemia as a condition of high epidemiological relevance. The data demonstrates a total of n=873794 hospitalizations, with significant fluctuations over the years, suggesting not only a pattern of increasing hospital morbidity, but also the need for investigation into the underlying causes and associated risk factors.

The trend of hospitalizations due to anemia in the first years of the studied period, with a peak in 2019, followed by a decrease in 2020 and 2021, is related to the impact of the COVID-19 pandemic, which affected health systems and the capacity to provide care. The data showed a variation in the trend of hospitalizations throughout the decade, with a reduction between 2020 and 2021, followed by a new significant increase from 2022 onwards, reaching the maximum peak in 2024 (n=108216).

This is demonstrated by the study by Meyer *et al.*,[16] which reaffirms this maxim, since their cross-sectional study assesses the impact of the COVID-19 pandemic on the search for health services in the population of Baltimore, Maryland, highlighting the correlation between this historical period and the social determinants of health. However, the increase observed again in 2022 and 2023 raises questions about the resilience of health services and public policies aimed at preventing and treating anemia. For example, the National School Feeding Program (PNAE), which seeks to ensure the supply of healthy and nutritious food for students, including foods rich in vitamin C and iron, which help prevent anemia, has been operating consistently during the decade in question.

Furthermore, regional disparities are evident, with the Southeast region presenting the highest morbidity. Furthermore, this reflects not only population density and the greater supply of health services, but also socioeconomic inequalities, access to treatments and the

prevalence of conditions that contribute to anemia, such as chronic diseases, which is confirmed by the study by Malta *et al.,*[17] which shows the Southeast region as the one with the most chronic diseases among Brazilian regions, considering the social determinants of this region, such as income, education and environment that contribute to the increase, severity and morbidity and mortality, as low-income or socially disadvantaged individuals are more exposed to risk factors, have less access to health services, reducing opportunities for prevention and health promotion, as well as treatment for these diseases.

Still about regional differences, in the Northeast, although mortality is high, the lower rate of elective care may indicate barriers in access to health care, which worsens the final outcome of patients with anemia, a fact confirmed by the ecological study by Soares Filho *et al.,*[18] since the scarcity and high turnover of human resources in primary care is a challenge demonstrated by him, which highlights inequality.

Regarding the demographic profile, women had a higher morbidity rate due to anemia (55%), which may be related to factors such as a higher incidence of iron deficiency anemia in women of reproductive age, due to menstrual losses and greater demand for iron during pregnancy, as stated by Bezerra *et al.,*[19] in their cross-sectional analytical study.

In addition, the brown race was the most affected (n=351977), followed by the white race (n=288774), which reflects racial inequalities in access to health and living conditions that may aggravate the vulnerability of certain groups. These differences have already been reported in previous studies, which indicate that black and brown populations tend to have worse health indicators due to socioeconomic determinants and less access to preventive services.[20] Therefore, it is crucial to address these inequalities to ensure that public health interventions are effective and equitable.

Furthermore, the high prevalence of emergency care (n=810146) in relation to elective care (n=63648) shows that many cases of anemia reach health services in advanced stages, which may reflect failures in early detection and adequate monitoring of the disease in PHC, as reported by Gomes *et al.*[21] This finding reinforces the importance of screening, supplementation and dietary re-education strategies from the first levels of health care, aiming to reduce the need for hospitalizations and complications associated with anemia. Furthermore, the Ministry of Health[22] reinforces that anemia prevention and control policies, when implemented in PHC, can reduce morbidity and mortality and hospital costs associated with the disease.

In financial terms, the high cost associated with treating anemia (R$ 649152452,90) should also be considered, as it highlights the burden that this condition imposes on the public health system. Investing in prevention and early treatment can not only reduce mortality and morbidity, but also alleviate the financial pressure on the health system, as reported by the General Secretariat,[23] which states that investing in disease control can prevent deaths and generate significant savings.

It is therefore understood that hospital morbidity due to anemia in Brazil is a complex issue that involves multiple social, economic and public health factors. Implementing health policies that address these inequalities and promote equitable access to health services will be essential to improving health outcomes for the Brazilian population.

Among the above, it is worth noting that the main limitation of this study was the limited amount of data available on the topic under analysis. The scarcity of data may impact the generalization of the results and limit the scope of the conclusions, making it difficult to build a more solid picture of the effectiveness and challenges of the approaches investigated.

However, even given the limitation of the study design that does not allow for the investigation of causal relationships, this study allows for the generation of hypotheses and the support of public health policies. Therefore, it is expected that this research will expand the evidence base on the topic, enabling the generation of more robust results that can support the formulation of more effective public policies.

In this scenario, primary health care continues to be fertile ground for developing strategies for prevention, care, and monitoring of patients and families, especially when it comes to diseases such as anemia. However, for such initiatives to be effective, investments in infrastructure, training of professionals, and social awareness policies are essential. Thus, expanding scientific evidence can support government decisions and more informed clinical practices, reinforcing the relevance of future studies that aim to fill the identified gaps and strengthen the role of primary care in this context.

Final considerations

In this context, the data analyzed demonstrate that anemia remains a condition of high epidemiological relevance in Brazil, reflecting high rates of hospital mortality and significant costs for the health system. Regional disparities are striking, with the Southeast region accounting for the highest number of deaths, which highlights not only population density but also socioeconomic and structural inequalities in access to health services. The demographic profile shows a predominance of hospitalizations among females and individuals of Brown race, reinforcing the need for public policies targeted at vulnerable groups.

Therefore, it is imperative to invest in early detection, continued education of Primary Health Care (PHC) professionals, and implementation of prevention and rehabilitation strategies in order to reduce morbidity and mortality and costs associated with anemia in the hospital system. Such initiatives should be integrated with the strengthening of the care network, considering regional specificities and social determinants that aggravate the condition. Thus, improving health indicators related to anemia depends on effective coordination between public policies, professional training, and preventive actions in PHC, which produces effective structural changes in public health in the long term.

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Conflicts of interest

The authors declare there is no conflict of interest.

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References

1. Speranza M, Gómez-Mesa JE, Fairman E, et al. Consensus document on anemia and iron deficiency in heart failure: Consejo Interamericano de Falla Cardiaca e Hipertensión Pulmonar (CIFACAH) of the Interamerican Society of Cardiology (IASC). Arch Cardiol Mex. 2023;93(Supl):27–38.
2. Chaparro CM, Suchdev PS. Anemia epidemiology, pathophysiology, and etiology in low-and middle-income countries. *Ann N Y Acad Sci*. 2019;1450(1):15–31.

3. Ferreira CG, Ribeiro JVF, Oliveira ML. Importance of the complete blood count in the diagnosis of anemia: a bibliographic review. *Revista Multidisciplinar do Nordeste Mineiro*. 2024;7(1):1–23.
4. Gardner WM, Razo C, McHugh TA, et al. Prevalence, years lived with disability, and trends in anemia burden by severity and cause, 1990–2021: findings from the Global Burden of Disease Study 2021. *The Lancet Haematology*. 2023;10(9):e713–e734.
5. Kumar A, Sharma E, Marley A, et al. Iron deficiency anemia: pathophysiology, assessment, practical management. *BMJ Open Gastroenterol*. 2022;9(1):e000759.
6. Hess SY, Owais A, Jefferds MED, et al. Accelerating action to reduce anemia: review of causes and risk factors and related data needs. *Ann N Y Acad Sci*. 2023;1523(1):11–23.
7. Da Silva Vieira RC, Livramento ARS, Calheiros MSC, et al. Prevalence and temporal trend (2005–2015) of anaemia among children in Northeast Brazil. *Public Health Nutr.* 2018;21(5):868–876.
8. Gelaw Y, Getaneh Z, Melku M. Anemia as a risk factor for tuberculosis: a systematic review and meta-analysis. *Environ Health Prev Med*. 2021;26(1):13.
9. Dias PC, Teles CG, Mendonça DF, et al. Disputing concepts in the use of micronutrient supplementation and/or fortification in school meals for the prevention of anemia. *Cad Saude Publica*. 2022;38(2):e00001321.
10. Pedraza DF. Performance of Family Health Strategy nurses in the nutritional care of children. *Cadernos Saúde Coletiva*. 2022;30(1):94–107.
11. Brazil. Ministry of Health. *Secretariat of Primary Health Care*. Brasília, 2022.
12. Nascimento LEP. Epidemiological situation of anemia in Brazil and approaches to prevention, care and management in primary health care: Integrative literature review. *Multidisciplinary Journal of Health*. 2024;5(3).
13. Dietrich AC. Sickle cell anemia and iron deficiency anemia: analysis of their approaches in Brazilian primary care.
14. Xu Y, Evans M, Mazhar F, et al. Poor recognition and undertreatment of anemia in patients with chronic kidney disease managed in primary care. *J Intern Med*. 2023;294(5):628–639.
15. Luengo BT, García-Sierra R, Trinxant MAW, et al. Early detection of anaemia in primary care with haemoglobinometry: ANHEMOG clinical trial protocol. *BMC Fam Pract*. 2021;22(1):199.
16. Meyer D, Lowensen K, Perrin N, et al. An evaluation of the impact of social and structural determinants of health on forgone care during the COVID-19 pandemic in Baltimore, Maryland. *PLoS One*. 2024;19(5):e0302064.
17. Malta DC, Bernal RTI, Lima MG, et al. Socioeconomic inequalities related to noncommunicable diseases and their limitations: National Health Survey, 2019. *Rev Bras Epidemiol*. 2021;24(suppl 2):e210011.
18. Soares Filho AM, Vasconcelos CH, Dias AC, et al. Primary Health Care in the North and Northeast of Brazil: mapping disparities in team distribution. *Cien Saude Colet*. 2022;27(1):377–386.
19. Bezerra AGN, Leal VS, Cabral de Lira PS, et al. Anemia and associated factors in women of reproductive age in a municipality in Northeastern Brazil. *Rev Bras Epidemiol*. 2018;21:e180001.
20. Moura RF, Cesar CLG, Goldbaum M, et al. Factors associated with inequalities in social conditions in the health of white, brown and black elderly people in the city of São Paulo, Brazil. *Cien Saude Colet*. 2023;28(3):897–907.
21. Gomes LMX, Pereira IG, Torres HC, et al. Access and care of individuals with sickle cell anemia in a primary care service. *Acta Paulista de Enfermagem*. 2014;27(4):348–355.
22. Brazil. Ministry of Health. *National Commission for the Incorporation of Technologies into the SUS*. Technical report: Clinical Protocol and Therapeutic Guidelines for Iron Deficiency Anemia. Brasília, DF, 2023.
23. Brazil. General Secretariat. *Investing in the control of chronic diseases can prevent deaths and save billions of dollars*. 2024.

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