

Hospitalizations for diarrheal diseases in childhood in Brazil and Guinea-Bissau: an integrative literature review

Internações por doenças diarreicas na infância no Brasil e na Guiné-Bissau: revisão integrativa da literatura

Hospitalizaciones por enfermedades diarreicas en la infancia en Brasil y Guinea-Bissau: una revisión integradora de la literatura

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Resumo

Objetivo: Identificar na literatura científica as evidências relacionadas às principais causas de internação hospitalar por doenças diarreicas agudas (DDAs) em crianças no Brasil e na Guiné-Bissau.

Método: Esta Revisão Integrativa da Literatura usou a estratégia PICo para formular a questão de pesquisa e organizar a coleta de dados: P (População): crianças; I (Interesse): internações por DDA; e Co (Contexto): ambiente hospitalar. A coleta de dados foi realizada de maio a julho de 2024 nas bases de dados LILACS, BDNF, MEDLINE e SciELO usando estratégias de busca específicas para cada base. Foram recuperados 71 artigos na LILACS (27), BDNF/MEDLINE (14) e SciELO (30). Após aplicar os critérios de inclusão e exclusão, 16 estudos foram selecionados para análise temática descritiva.

Resultados: As evidências encontradas no Brasil e na Guiné-Bissau mostraram que as internações hospitalares por DDA estão fortemente associadas a fatores socioeconômicos e ambientais. Como agravantes e causas diretas do aumento nas hospitalizações, foram identificados a precariedade das condições de vida, a ausência ou deficiência de saneamento básico, a qualidade da água e a variabilidade climática. Em contraste, a vacinação contra o Rotavírus e a adoção de padrões de aleitamento materno exclusivo mostraram ser medidas eficazes para reduzir a incidência de casos graves que evoluem para internação hospitalar.

Conclusão: Nos países estudados, as taxas de internação hospitalar por doenças diarreicas agudas refletem as profundas desigualdades socioeconômicas e as condições sanitárias. A pobreza, o baixo nível de escolaridade dos cuidadores e a falta de saneamento básico são os principais fatores associados à necessidade de hospitalização e ao risco de mortalidade infantil por DDA.

Abstract

Objective: To identify in the scientific literature the evidence related to the main causes of hospital admission for acute diarrheal diseases (ADD) in children in Brazil and Guinea-Bissau.

Method: This Integrative Literature Review used the PICo strategy to formulate the research question and organize data collection: P (Population): children; I (Interest): hospitalizations due to ADD; and Co (Context): hospital environment. Data collection was carried out from May to July 2024 in the databases LILACS, BDNF, MEDLINE, and SciELO using search strategies specific to each database. Articles (71) were retrieved from LILACS (27), BDNF/MEDLINE (14), and SciELO (30). After applying the inclusion and exclusion criteria, 16 studies were selected for descriptive thematic analysis.

Results: Evidence found in Brazil and Guinea-Bissau showed that hospitalizations for ADD are strongly associated with socioeconomic and environmental factors. Precarious living conditions, lack of basic sanitation, water quality, and climate variability were identified as aggravating factors and direct causes of the increase in hospitalizations. In contrast, rotavirus vaccination and the adoption of exclusive breastfeeding patterns are effective measures in reducing the incidence of severe cases that progress to hospital admission.

Conclusion: In the countries studied, hospital admission rates for acute diarrheal diseases reflect profound socioeconomic inequalities and sanitary conditions. Poverty, low educational levels among caregivers, and lack of basic sanitation are the main factors associated with the need for hospitalization and the risk of infant mortality due to ADD.

Keywords

Children, Diarrheal Diseases, Hospitalization, Morbidity and mortality indicators.

Descritores

Crianças, Doenças Diarreicas, Hospitalização, Indicadores de morbimortalidade.

How to cite:

Cassamá DA, Alves VC, Figueiredo CL, Almeida AC, Jantsch LB, Neves ET. Hospitalizations for diarrheal diseases in childhood in Brazil and Guinea-Bissau: an integrative literature review. *Rev Soc Bras Enferm Ped.* 2025;25:eSOBEP202505i.

Data availability:

The study data are available in this article.

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Conflicts of interest: nothing to declare.

Submitted: July 10, 2025 | **Accepted:** November 03, 2025

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DOI: 10.31508/1676-3793202505i

Resumen

Objetivo: Identificar en la literatura científica la evidencia relacionada con las principales causas de hospitalización por enfermedades diarreicas agudas (EDA) en niños en Brasil y Guinea-Bissau.

Método: Esta Revisión Integrativa de la Literatura utilizó la estrategia PICO para formular la pregunta de investigación y organizar la recolección de datos: P (Población): niños; I (Interés): hospitalizaciones por EDA; y Co (Contexto): entorno hospitalario. La recolección de datos se realizó de mayo a julio de 2024 en las bases de datos LILACS, BDNF, MEDLINE y SciELO, utilizando estrategias de búsqueda específicas para cada base de datos. Se recuperaron 71 artículos de LILACS (27), BDNF/MEDLINE (14) y SciELO (30). Tras aplicar los criterios de inclusión y exclusión, se seleccionaron 16 estudios para el análisis temático descriptivo.

Resultados: La evidencia encontrada en Brasil y Guinea-Bissau mostró que las hospitalizaciones por enfermedades diarreicas agudas están fuertemente asociadas con factores socioeconómicos y ambientales. Las malas condiciones de vida, la falta o deficiencia de saneamiento básico, la calidad del agua y la variabilidad climática se identificaron como factores agravantes y causas directas del aumento de las hospitalizaciones. En cambio, la vacunación contra el rotavirus y la adopción de normas de lactancia materna exclusiva demostraron ser medidas eficaces para reducir la incidencia de casos graves que derivan en hospitalización.

Conclusión: En los países estudiados, las tasas de hospitalización por enfermedades diarreicas agudas reflejan profundas desigualdades socioeconómicas y condiciones sanitarias. La pobreza, el bajo nivel educativo de los cuidadores y la falta de saneamiento básico son los principales factores asociados a la necesidad de hospitalización y al riesgo de mortalidad infantil por enfermedades diarreicas agudas.

Descriptor

Niños, Enfermedades Diarreicas, Hospitalización, Indicadores de Morbilidad y Mortalidad.

Introduction

Acute diarrheal disease (ADD) is a major public health problem in many regions of the world, being one of the leading causes of infant morbidity and mortality, especially in developing countries. Diarrhea is also one of the main reasons for seeking consultations in Primary Health Care (PHC).⁽¹⁻⁴⁾

Although ADD affects individuals of all ages, children under five years are the most susceptible and vulnerable. ADD is characterized by an increase in the number of watery or inconsistent bowel movements (≥ 3 in 24 h) and can be aggravated by factors such as poor drinking water quality, inadequate basic sanitation, and nutritional deficiencies.⁽⁵⁾

Several agents (bacteria, viruses, and parasites) can cause the disease, and fecal-oral transmission occurs through food, contaminated water, or interpersonal contact.⁽⁵⁾

Symptoms include loss of appetite, vomiting, weight loss, and fever; in severe cases, symptoms can progress to dehydration, seizures, brain damage, and preventable death.

Acute diarrheal diseases are potentially preventable through simple and effective measures such as providing clean drinking water, good sanitation, health education, exclusive breastfeeding (until six months of age), rotavirus vaccination, etc.⁽⁶⁾ Thus, strengthening public policies aimed at health promotion and disease prevention plays an essential role in reducing inequalities and protecting children, reinforcing the value of intersectoral programs in sanitation, epidemiological surveillance and primary care.

Despite improvements in morbidity and mortality indicators for ADD globally, the disease still has high rates in several countries, particularly in sub-Saharan Africa.

It has been estimated that ADD is responsible for about four million deaths annually, although the use of oral rehydration therapy has contributed to reducing childhood hospitalizations.⁽⁷⁾

Studies have shown that children aged 1-4 years are more likely to develop ADD compared to older children.⁽⁷⁾ In Brazil, the North and Northeast regions have the highest rates of the disease. Between 2000 and 2010, 22,933 deaths were recorded in children under 1 year old, and 1,209,622 hospitalizations were registered; the Northeast region is responsible for 57% and 46% of these totals, respectively.⁽⁵⁾

In Guinea-Bissau, a country with one of the highest infant mortality rates in the world, 41.9% of the population is under 15 years old, and 53% lack access to safe drinking water. Only 32% of urban residents and 17% of rural residents have access to adequate basic sanitation.⁽⁸⁾ This precarious situation directly impacts children's health, being associated with high rates of hospitalization and preventable mortality.

The United Nations Children's Fund highlights that 94% of children under 5 years of age registered by Community Health Workers (CHW) received support for treatment of prevalent childhood illnesses (such as malaria, diarrhea, and pneumonia), in addition to vaccination and nutritional monitoring. It has been estimated that this type of intervention, supported by public health policies, has contributed to reducing hospital admissions and premature deaths.⁽⁸⁾

Then, to investigate the evidence associated with hospitalizations of children due to diarrheal diseases in Brazil and Guinea-Bissau is relevant. Thus, this study sought to contribute to the Brazilian literature by reinforcing the importance of public policies for health promotion and disease prevention, especially in the context of socioeconomic inequalities and sanitary conditions.

Therefore, the research question was as follows: What is the evidence regarding hospitalizations for diarrheal diseases in children in Brazil and Guinea-Bissau? The objective of this study was to identify, in scientific literature, the main causes associated with these hospitalizations in both countries.

Methods

This study was an integrative literature review. This type of review allows for integrating the ideas and concepts found in the scientific literature on the topic to be studied.⁽⁹⁾ The following steps were followed in its preparation: formulation of the protocol to guide the review and definition of the research question; data collection from CAPES databases; evaluation, analysis and interpretation of data; categorization of information; and presentation of results and conclusion.

The research question was structured according to the PICO strategy, which consists of:

- P (Population): children;
- I (Interest): hospitalizations due to diarrheal diseases; and
- Co (Context): hospital admissions in Brazil and Guinea-Bissau.

Data collection was carried out between May and July in the Latin American and Caribbean Health Sciences Literature (LILACS), Medical Literature Analysis and Retrieval System Online (MEDLINE), Nursing Database (BDENF) via Virtual Health Library (BVS), and Scientific Electronic Library Online (SciELO).

The terms were organized using the Boolean operator AND, using the descriptors from the Health Sciences Descriptors (DeCS) and the Medical Subject Headings (MeSH). The strategies used are presented in Chart 1.

The inclusion criteria used to select articles were as follows: the article must be an original and fully avail-

Chart 1. Search strategy in databases. Santa Maria. (7)

Database	Search Criteria
LILACS	(child) AND ("Diarrheal disease") AND (hospitalization)
SCIELO	("child") AND ("diarrheal disease") AND ("hospitalization")
MEDLINE and BDEF	children AND (diarrheal diseases) AND (db :("MEDLINE" OR "BDEF")) AND (year_cluster:[2015 TO 2023])

Source: Authors.

able, published in Portuguese, English, or Spanish, addressing the proposed research topic or question, and published between 2015 and 2023. This selection was justified by the fact that in 2015, the Ministry of Health published the National Policy for Comprehensive Child Health Care (PNAISC), which is considered a milestone for child health. In Guinea-Bissau, specific public policies related to child health have not yet been published.

After searching for articles, the titles and abstracts were read, excluding studies that did not address the research question and the defined inclusion criteria. Then, the selected articles were read in full by two independent researchers; those who met the objective of this review were then included.

For data extraction, a table was created containing information about the following: article number, reference, research objective, methodological design, research setting, results, conclusions, and level of evidence.⁽¹⁰⁾

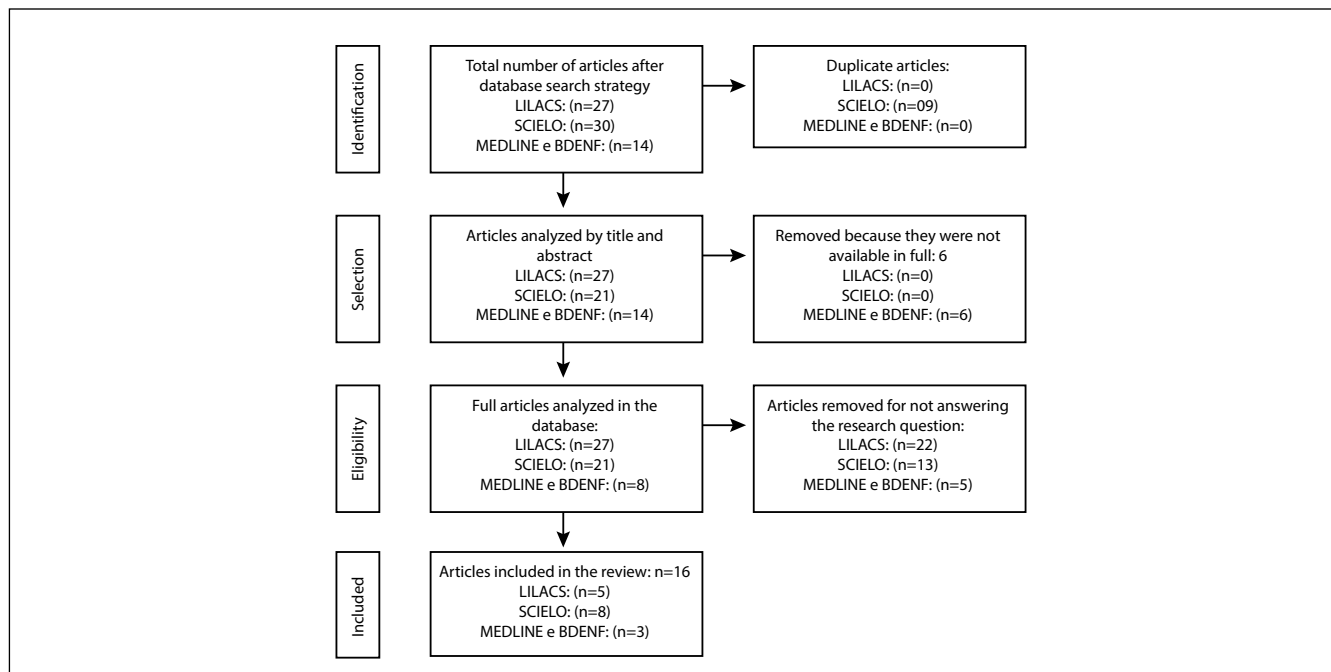
Regarding the level of scientific evidence, the classification proposed by Fineout-Overholt and Melnyk⁽¹¹⁾, was adopted, in which the evidence was organized into seven levels from the highest (systematic reviews and meta-analyses) to the lowest level (expert opinions and committee reports).

The review presentation includes a synthesis of the knowledge developed, relating diarrheal diseases and the factors associated with hospital admissions. These steps constitute the results and discussion.

The ethical aspects of research involving human subjects were not applied because this was an integrative literature review in which humans were not the direct target of the search. However, the ethical principles related to copyright and scientific integrity were respected.

Results

After the searches, 71 articles were included; they were obtained from the LILACS (27), MEDLINE and BDEF



Source: Authors

Figure 1. Flowchart of the article search and selection processes

(14), and SciELO (30) databases; 16 of them were included in the study corpus for comprehensive analysis. Figure 1 shows the flow and selection of articles in this integrative review based on the PRISMA model.⁽¹³⁾

The data were organized and interpreted through systematization and the creation of an analytical synoptic chart, containing the following information: study code, authors, year and country, title, objective, methodological design, results, conclusion, and level of evidence (Chart 2).

Discussion

Based on the content analysis of the selected studies, the main themes identified related to the study's objective were the following: epidemiological influence regarding climate variability and spatial distribution of hospitalizations due to acute diarrheal diseases (ADD). They were related to living conditions, basic sanitation, the impact of rotavirus vaccination, and exclusive breastfeeding patterns in reducing hospitalizations for diarrheal diseases. There is evidence that ADD is a global health problem, with high rates of hospital admissions, causing preventable deaths, especially in children under 5 years of age.

According to UNICEF⁽¹³⁾, 41.9% of the population in Guinea-Bissau is composed of individuals under 15 years of age, with one of the highest infant mortality rates in the world, registering 51 child deaths per 1,000 live births under 5 years of age. Most deaths related to diarrhea occurred due to dehydration, caused by the loss of a large amount of bodily water and electrolytes in the stool. Washing hands with soap and water can reduce diarrheal diseases by up to 40%. However, it has been estimated that 60% of such diseases in the world can be attributed to unsafe water consumption, lack of hygiene, and inadequate sanitation.⁽¹³⁾

Climate variability

It is known that climatic factors are important in the transmission of diarrhea. Given the regional diversity in Brazil, the North and Northeast regions (which have the highest poverty rates) have the highest rates of this disease, which is related to factors such as flooding in the Amazon region and infection of drinking water by infectious agents.^(14,15,16) Flooding favors the proliferation of disease vectors in areas with wastewater and trash; this leads to an increase in the number of flies and rats, contaminating the environment with their feces containing parasites.^(14,15,16)

Chart 2. Summary of the objectives, results, conclusions, and level of evidence of the selected articles.

REFERENCES OF PUBLICATIONS	OBJECTIVES	METHODOLOGICAL DESIGN	RESULTS	CONCLUSIONS	LEVELS OF EVIDENCE
Costa REAR, Visgueira ARL, Sousa RFV, Monteiro KJL, Horta MAP, Oliveira BFA. Tendência de indicadores de morbimortalidade por doenças diarreicas agudas em menores de cinco anos no estado do Piauí (2000–2019). Rev Bras Saúde Mater Infant. 2023;23:e20230120.	To analyze the trend of morbidity and mortality indicators for acute diarrheal diseases in children under five years of age in Piauí.	Ecological study	The mean of hospitalization rates was highest in the semi-arid macro-region (36.6/1000 children under five years old) and lowest in Teresina (14.9/1000 children under five years old). The mean mortality rate was highest in the coastal macro-region (0.98/1000 live births) and lowest in Teresina (0.47/1000 live births). The indicators showed a downward trend in all locations analyzed ($p<0.05$). A turning point was noted starting in 2009, with a significant reduction in hospitalization rates in the Cerrado and Semi-Arid macro-regions.	Indicators of morbidity and mortality from acute diarrheal diseases in children under five years old showed a downward trend in Piauí between 2000 and 2019, with differences in trends among the macro-regions evaluated.	NE-4
Vaz FPC, Nascimento LFC. Spatial distribution for diarrhea hospitalization in São Paulo State. Rev Bras Saúde Mater Infant. 2017;17(3):483-90	To identify a spatial pattern for hospitalization rates for diarrhea in children in the Municipalities of the State of São Paulo.	Ecological and exploratory study	There were 34,802 hospitalizations, with a mean of 4.7 hospitalizations per 1,000 children ($SD=7.2$) in the period. Hospitalization rates were correlated with education level ($r=0.09$; $p<0.05$). Moran's index for hospitalization rate was $i=0.31$ ($p<0.01$). The thematic map of hospitalization rates showed a cluster of Municipalities in the Western part of the State. Kernel's map shows a higher density of hospitalizations in this region, and Moran's map identified 57 Municipalities that deserve attention.	The results provide input for municipal and regional managers in implementing the measures necessary to reduce these rates.	NE-4
Paulo RLP, Rodrigues ABD, Machado BM, Gilio AE. O impacto da vacinação contra o rotavírus nas visitas ao pronto-socorro e nas internações hospitalares por diarreia aguda em crianças menores de 5 anos. J Pediatr (Rio J). 2017;93(6):506-12.	To analyze the impact of RV1 on emergency department visits and hospitalizations for acute diarrhea.	Retrospective ecological study	Emergency department visit rates for acute diarrhea were 85.8 and 80.9 per 1,000 total emergency department visits in the pre- and post-vaccination periods, respectively, resulting in a 6% reduction (95%CI: 4-9%, $p<0.001$). Hospitalization rates for acute diarrhea were 40.8 per 1,000 in the pre-vaccination period and fell to 24.9 per 1,000 hospitalizations, resulting in a 40% reduction (95%CI: 22-54%, $p<0.001$).	The introduction of the RV1 vaccine resulted in a 6% reduction in visits to the public health system and a 40% reduction in hospitalizations due to acute diarrhea.	NE-4
Meneguessi GM, Mossri RM, Segatto TCV, Reis PO. Morbimortalidade por doenças diarreicas agudas em crianças menores de 10 anos no Distrito Federal, 2002 a 2012. Epidemiol Serv Saúde. 2015;24(4):721-30.	To describe the morbidity and mortality and seasonality of diarrheal diseases in children under 10 years of age residing in the Federal District, Brazil, from 2003 to 2012.	Descriptive study	A total of 558,737 cases of diarrhea were recorded, with the highest incidence among children under 1 year old (32.3 cases/100 children in 2003). During this period, hospitalization rates decreased (from 6.5 to 3.0 hospitalizations/1000 children), as did mortality rates (from 4.5 to 1.5 deaths/100,000 children) and hospital mortality rates (from 0.70 to 0.49/100 children), with a more pronounced drop after the implementation of the rotavirus vaccine in 2006. The highest hospitalization rates occurred between July and September.	Reduction in morbidity and mortality from diarrhea occurred, mainly in children under 1 year old, with hospitalizations predominating during the dry season.	NE-6
Masukawa MLT, Moriwaki AM, Santana RG, Uchimura NS, Uchimura TT. Impacto da vacina oral de rotavírus humano nas taxas de hospitalização de crianças. Acta Paul Enferm. 2015; 28(3):243-9.	To assess the risk of hospitalization for acute diarrhea in children under five years of age over ten years, before and after oral rotavirus vaccination.	Ecological-descriptive-analytical study	During the study period, the hospitalization rate was 117.41 per 10,000. In the pre-vaccination period, the median hospitalization rate was observed to be 124.2 per 10,000 children. After the introduction of the vaccine, hospitalization rates were lower compared to the median of the pre-vaccine years.	Reduction in hospitalization rates for acute diarrhea occurred, suggesting that vaccine use and other associated factors may reduce the number of cases.	NE-4
Benicio MHD'A, Monteiro CA. Tendência secular da doença diarreica na infância na cidade de São Paulo (1984-1996). Rev Saúde Pública. 2000;34(6 Suppl):83-90.	To estimate the prevalence and social distribution of diarrheal disease in childhood, to establish the secular trend of this disease, and to analyze its determination through data collected by two household surveys conducted in São Paulo, SP, in 1984/85 and 1995/96.	The surveys studied probabilistic samples of the population	Among the surveys, there were significant reductions in the instantaneous prevalence of diarrhea (from 1.70% to 0.90%) and the annual incidence of hospitalizations due to the disease (from 2.21 to 0.79 hospitalizations per 100 child-year). The decline in these indicators was more pronounced in the poorest third of the population, contributing to a reduction in social inequality regarding the occurrence of the disease.	Improvements in household purchasing power and public water supply coverage could account for a great portion of the decline in diarrhea prevalence. Among children under two years old, there is indication that this decline may have been favored by a slight increase in breastfeeding frequency.	NE-4

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Continuation.

REFERENCES OF PUBLICATIONS	OBJECTIVES	METHODOLOGICAL DESIGN	RESULTS	CONCLUSIONS	LEVELS OF EVIDENCE
Torres RMC, Bittencourt SA, Oliveira RM, Siqueira ASP, Sabroza PC, Toledo LM. Uso de indicadores de nível local para análise espacial da morbidade por diarreia e sua relação com as condições de vida. <i>Ciênc Saúde Colet</i> . 2013;18(5):1441-50.	To analyze the spatial distribution of diarrheal morbidity in children and its association with living conditions.	Ecological study	Diarrhea still represents a significant portion of hospitalizations in children (15.5% between 2006 and 2009). The hospitalization rate for diarrhea was high during this period (69.7 hospitalizations/1,000 live births).	Spatial analysis identified that the neighborhoods with the highest HRD values were mainly those with the largest population concentrations and best living conditions.	NE-4
Mendes PS, Ribeiro Jr HC, Mendes CM. Temporal trends of overall mortality and hospital morbidity due to diarrheal disease in Brazilian children younger than 5 years from 2000 to 2010. <i>J Pediatr (Rio J)</i> . 2013;89(3):315-25.	To understand the temporal trends of indicators of general mortality and hospital morbidity due to diarrheal disease in children under one year and from one to four years, according to Brazilian regions, between 2000 and 2010.	Ecological time series study	Mortality from diarrhea in Brazil showed a trend toward a slowing decrease in both age groups. Regarding hospitalization, there was a slight decreasing trend in children under one year old, and an insignificant increase among those aged 1-4 years, but with shorter lengths of stay and lower mean cost of hospitalization, regardless of age and region. In the northern and northeastern regions, the highest mortality rates and the highest percentage of hospitalizations were recorded for children under one year old. The central-west region showed the greatest mean annual reduction in length of hospital stay.	Currently, indicators of overall mortality and hospital morbidity due to diarrhea in Brazilian children are generally lower, but slowly decreasing.	NE-4
Bittencourt SA, Leal MC, Santos MO. Hospitalizações por diarreia infecciosa no Estado do Rio de Janeiro. <i>Cad Saúde Pública</i> . 2002;18(3):747-54.	To measure the rate of childhood diarrhea hospitalizations in Rio de Janeiro in 1996 and its association with demographic, geographic, and clinical information, comparing differences between public/university and contracted/philanthropic hospitals of the Unified Health System (SUS).	Retrospective ecological study	The variations observed in the age of hospitalized children, mean length and cost of hospitalization, and use of the ICU may reflect differences in medical practice and, thus, in the service's ability to prevent death from diarrhea in hospitalized children.	Therefore, continuously monitoring the use of hospital resources is necessary to directly address the costs and quality of care provided.	NE-4
Vanderlei LCM, Silva GAP, Braga JU. Fatores de risco para internamento por diarreia aguda em menores de dois anos: estudo de caso-controle. <i>Cad Saúde Pública</i> . 2003;19(2):455-63.	To investigate the association between socioeconomic, demographic, and biological determinants and hospitalization for acute diarrhea in children under two years of age.	A case-control study was used	The Epi Info and Stata programs were used to analyze the data. The odds ratio and 95% confidence intervals were calculated using multiple logistic regression to control for confounding factors, considering a hierarchical model of risk factors.	The investigation using the proposed model showed that there is an association between hospitalization due to parity of mothers with ≥ 5 children, children under six months old, and the severity of episodes, which depends on the interaction between unfavorable socioeconomic conditions, young age of the children, and severe diarrheal episodes.	NE-4
Boccolini CS, Boccolini PMM. Relação entre aleitamento materno e internações por doenças diarreicas nas crianças com menores de um ano de vida nas capitais brasileiras e Distrito Federal, 2008. <i>Epidemiol Serv Saúde</i> . 2011;20(1):19-26.	The prevalence of breastfeeding has increased in the last two decades as a result of public policies encouraging this practice.	Ecological epidemiological study	The Spearman's non-parametric test was used to correlate variables. A total of 1,329,618 live births were studied during the period. The increase in the prevalence of exclusive breastfeeding in children under 4 months of age showed a negative correlation with hospitalization rates for diarrhea ($r=-0.483$; $p=0.014$); this correlation was stronger for girls ($r=-0.521$; $p=0.016$) than for boys ($r=-0.476$; $p=0.008$).	The increase in the prevalence of exclusive breastfeeding between 1999 and 2008 appears to be correlated with the reduction in hospital admission rates for diarrhea in the same period, confirming the importance of public policies for the promotion, protection, and support of breastfeeding.	NE-4

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REFERENCES OF PUBLICATIONS	OBJECTIVES	METHODOLOGICAL DESIGN	RESULTS	CONCLUSIONS	LEVELS OF EVIDENCE
Matijasevich A, Cesar JA, Santos IS, Barros AJD, Dode MASO, Barros FC, et al. Internações na infância em três estudos de base populacional no Sul do Brasil: tendências e diferenciais. Cad Saúde Pública. 2008;24(Suppl 3):S437-43.	To measure the occurrence of hospitalization in the first year of life and to examine the association between hospitalization and cause of hospitalization, sex, birth weight, and family income.	Cohort study	There was a sharp reduction in hospitalizations due to diarrhea, but the frequency of hospitalizations remained constant for all causes. In all three cohorts, infants from poorer families and those born weighing <2,000 g had the highest frequencies of hospitalization for diarrhea and all other causes; these latter groups also showed a sharp increase in hospitalizations for all causes.	These findings could be explained by a high number of premature births in the studied population.	NE-4
Rocha MCGS, Carminate DLG, Tibiriçá SHC, Carvalho IP, Silva MLR, Chebli JMF. Diarreia aguda em crianças hospitalizadas do município de Juiz de Fora, MG, Brasil: prevalência e fatores de risco associados à gravidade da doença. Arq. Gastroenterol. 2012;49(4).	To describe the prevalence of demographic, epidemiological, and clinical characteristics of children under 6 years of age hospitalized for acute diarrhea and to investigate the association between these determinants and the severity of the diarrheal episode.	Retrospective cross-sectional study	The prevalence rate of hospitalization for acute diarrhea was 8.4%. The factors significantly associated with the severity of the diarrheal episode were the following: age <6 months ($p=0.01$; $or=2.762$); onset of illness during autumn ($p=0.033$; $or=1.742$), presence of fever ($p=0.017$; $or=1.715$), and use of antibiotics during hospitalization.	Diarrhea is the third most common cause of hospitalization in children under 6 years old in Juiz de Fora (MG). Young age (≤ 6 months), fever, antibiotic use during hospitalization, and onset of illness during the fall are risk factors associated with longer hospital stays.	NE-4
Brito LCS, Pacheco HSA, Nascimento BSA, Sousa WEA, Melo AS, Conceição HN, et al. INTERNAÇÕES POR DIARREIA EM CRIANÇAS MENORES DE CINCO ANOS. Rev Enferm UFPE Online. 2021;15(1).	To describe the epidemiological characteristics of hospitalizations for acute diarrheal diseases in children under five years of age.	A quantitative, descriptive, and ecological time series study using descriptive statistics.	Between 2010 and 2019, 21,805 hospitalizations for diarrheal diseases were observed in children under 5 years of age. Hospitalizations among those aged 1-4 years (76.9%), males (52.3%), and those of miscegenation (52.5%) have prevailed. The month of January had the highest number of cases (12%).	The number of hospitalizations has decreased considerably over the last 10 years. However, taking extra precautions is necessary, especially during the rainy season.	NE-4
Duarte JL, Diaz-Quijano FA, Batista AC, Duarte AF, Melchior LAK, Giatti LL. Variabilidade climática e internações por doenças diarreicas infecciosas em um município da Amazônia Ocidental brasileira. Ciênc Saúde Colet. 2019;24(8):2959-70.	To analyze the association between hospitalization rates for infectious diarrheal diseases in the population of the Municipality of Rio Branco (AC) and rainfall, river level, humidity, and temperature between the years 2000 and 2013.	Cohort study	The results showed a positive association between hospitalizations for infectious diarrheal diseases and the level of the Acre River ($rt: 1.07$; $ic95\%:1.04-1.1$); A 14% decrease occurred in these hospitalization rates between the years 2000 and 2013 ($rt:0.86$; $ic95\%:0.85-0.87$); the most vulnerable group belongs to the age range of children under 1 year old.	This study showed the vulnerability of a city in the Amazon regarding climate variability and its epidemiological influence on the incidence of hospitalizations due to infectious diarrheal diseases.	NE-4
Vasconcelos MJOB, Rissin A, Figueiroa JN, Lira PIC, Filho MB. Doenças diarreicas e hospitalizações em menores de cinco anos no Estado de Pernambuco, Brasil, de 1997 a 2006. Ciênc Saúde Colet. 2018;23(3):715-722. DOI: 10.1590/1413-81232018233.14872016	To assess the temporal and geographical trends of diarrhea and its implications for hospitalization demands of children under five years of age in Pernambuco from 1997 to 2006.	Descriptive and retrospective study	The occurrence of cases on the day or in the two weeks prior to the interview was considered as prevalence, and cases requiring a minimum 24-hour hospital stay were considered as hospitalizations within a 12-month period. In Pernambuco, the prevalence of diarrhea showed a statistically insignificant decline (19.8% to 18.1%; $p=0.192$); however, a statistically significant reduction was observed (16.9% to 10.5%; $p=0.003$) in the metropolitan region of Recife. Hospitalizations more than doubled (from 2.7% to 5.5% in the State, and from 1.6% to 3.8%, thus opposing to the Brazilian trends.	In this State, diarrhea became the main reason for pediatric hospitalizations during the period analyzed.	NE-6

Source: Authors

In Guinea-Bissau, many improved wells experience drought between January and the end of May, although the availability of drinking water has gradu-

ally improved in the capital. In urban centers, 92% of the population consumes water from improved wells, whereas 61% of the population uses this type of water

in rural areas. This fact is related to a greater demand for health services due to diarrheal diseases caused by contaminated water.⁽¹⁷⁾

Spatial distribution

Crowded urban spaces, close contact in daycare centers, and enclosed environments also influence the transmission of Acute Diarrheal Disease (ADD). Malnourished children are more susceptible to diarrheal disease and may require a longer hospital stay compared to other children.^(6,1) Furthermore, low maternal education levels, living in vulnerable areas, socioeconomic factors, and the rainy season contribute to the increased hospitalization rates for diarrhea.^(1,2,6,16,18,19) Mothers with lower levels of education face difficulties with the quality of care (such as hygiene, vaccination, and educational activities) provided to their children. These and other factors can increase the risk of hospitalization.⁽¹⁹⁾

Living conditions and basic sanitation

Literature has shown that diarrheal disease is an illness related to poverty; it affects low-income families living in areas without access to basic sanitation, with few resources to purchase personal and household hygiene products, and misinformation regarding healthy hygiene habits, such as food contamination control and hand hygiene.⁽¹⁹⁾ In Guinea-Bissau, most of the population still uses improved well water for drinking; however, there is evidence of a lack of hygiene and basic sanitation, especially among those living in rural areas.⁽¹³⁾

According to UNICEF⁽¹³⁾, 18,842 students from 44 schools participated in activities promoting hygiene. Guinea-Bissau is on track to meet the Sustainable Development Goal (SDG #6.2) for sanitation, if the current pace of 300 villages free from open defecation is maintained. However, adopting preventive and promotional health measures is necessary.

Among the most effective preventive measures to reduce acute diarrhea, improving the following were highlighted: basic sanitation, treated water, garbage collection, domestic sewage piping, vector control, and rainwater drainage, in addition to promoting personal and domestic hygiene.^(6,1) To reduce the burden

of diarrheal diseases, improving family purchasing power and increasing public service coverage are essential for the supply of drinking water.^(2, 20)

Vaccination

Acute Diarrheal Disease (ADD) is easily managed (with Oral Rehydration Solution, ORS) and preventable. Infections caused by the most common bacteria (such as *Escherichia coli* and species of *Salmonella*, *Shigella*, *Campylobacter*, and *Yersinia*) and parasites (such as species of *Giardia*, *Cryptosporidium*, and *Entamoeba histolytica*) are among its causes.⁽²¹⁾ There is evidence that hospitalization rates and death from diarrhea decreased after the rotavirus vaccine was introduced into the SUS vaccination schedule, improving basic sanitation.⁽⁶⁾

Rotavirus is the most common pathogen and one of the most serious causes of diarrheal disease in children; those under 1 year old are three times more likely to be hospitalized compared to older children (A1, A7). The use of the oral rotavirus vaccine in children (as well as other factors) can reduce hospitalization rates for ADD in children under 5 years of age by up to 50%.⁽¹⁾ Study concluded that there was a reduction in consultation rates ($\leq 6\%$) and hospital admissions for ADD (40%) in children under 5 years of age in São Paulo after the introduction of the rotavirus vaccine.⁽²⁰⁾

Feeding and breastfeeding

Promoting exclusive breastfeeding and improving weaning practices have been cited as ways to reduce and prevent ADD (by implementing appropriate foods).^(6,1) According to Boccolini and Boccolini⁽²²⁾, exclusive breastfeeding is linked to a 50% reduction in hospitalization rates for ADD in children under 1 year of age. Human milk helps reduce the incidence and severity of ADDs through various immunological components that are adapted to meet each child's specific needs, thereby preventing attachment of pathogenic agents to the intestinal mucosa.

After the creation of SUS and the Family Health Strategy Program in Brazil, the promotion of exclusive breastfeeding and the use of ORS improved child health, allowing a reduction (from 14% to 1.4%) in mortality due to ADD in the period 1990-2015.^(1,4,6,16)

Children who were more socially vulnerable and had lower birth weight were hospitalized more frequently during the first year of life.⁽²⁾

In most of the works incorporated into this study, the introduction of oral rehydration solution (ORS) reduced both hospitalization rates for children with ADD and hospital expenditure.⁽¹⁸⁾ The greater the perception of managing ADD with ORS, the lower the number of hospitalizations and deaths due to diarrhea.⁽⁴⁾ In addition to various efforts undertaken to reduce this disease, we emphasize that training teams (especially health technicians) on the disease is necessary. However, developing countries have shown little progress on the recommendations for diarrhea control. Contaminated water, inadequate sanitation, lack of hygiene, and low levels of education account for 88% of global deaths from diarrhea.^(2,14,23)

Bittencourt et al.⁽¹⁴⁾ stated that children hospitalized late for infectious diarrhea have a chance of dying after 48 h in the State of Rio de Janeiro. Most of these children have limited access to PHC services. Study listed the risk factors for hospitalization due to acute diarrhea as follows: environmental factors (inadequate water sources and waste disposal), household factors (children living in precarious housing, high number of residents, and reduced number of rooms), and individual variables (caregiver's age, mother's age, high number of children, children of teenage mothers, and child's age).⁽²³⁾

Conclusion

In the scientific literature, the main causes associated with hospitalizations for acute diarrheal diseases in children in Brazil and Guinea-Bissau are generally linked to socioeconomic inequalities and sanitary conditions. In both countries, hospitalizations for acute diarrheal disease are intrinsically linked to risk factors such as socioeconomic inequalities and poor conditions of sanitation.

The highest hospitalization rate for diarrhea was associated with variables such as lack of access to basic sanitation and drinking water, inadequate housing conditions, and low educational levels of caregivers. Specifically, poverty, regional disparities, and dispar-

ities in access to health services are crucial determinants of illness severity, culminating in the need for hospitalization.

In both countries, the persistence of high rates of hospital admissions for acute diarrheal disease in children is a strong indicator of the urgent need for interventions that extend beyond the clinical setting. To reduce the number of hospitalizations and thus infant morbidity and mortality from diarrhea, investing in public policies is fundamental, improving socioeconomic conditions, universalizing basic sanitation, and empowering both families and community health workers with knowledge about prevention and management of the disease to avoid progression to hospitalization and death.

Contributions

Cassamá DA, Alves VC, Figueiredo CL, Almeida AC, Jantsch LB, and Neves ET declare that they contributed to the conception of the study, data collection, analysis and interpretation, article writing, relevant critical review of the intellectual content, and approval of the final version to be published.

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