TEMPORAL AND REGIONAL EVALUATION OF CHILDREN NUTRITIONAL STATUS IN THE STATE OF PARAÍBA

AVALIAÇÃO TEMPORAL E REGIONAL DO ESTADO NUTRICIONAL DE CRIANÇAS NO ESTADO DA PARAÍBA

Ana Rafaele dos Santos Silva [I], Bianca Caldas Amorim [II], Laís Yasmin Xavier Cavalcanti [III], Anderson Felix dos Santos [IV], Renato Lima Dantas [*V]

Abstract. Healthy eating is essential for quality of life and longevity, as it helps prevent diseases and supports the body's recovery. In the state of Paraíba, as in other regions of the Brazilian Northeast, childhood malnutrition, particularly among children aged 0 to 5 years, is rooted in issues such as poverty and limited access to healthcare services. To monitor the nutritional situation, the Food and Nutrition Surveillance System (SISVAN) collects data on children's food intake and nutritional status. This retrospective study aimed to compare the nutritional status of children in Paraíba from 2013 to 2023 using data from SISVAN. The analysis considered children's Body Mass Index (BMI), grouping the data into categories such as Severe thinness, Thinness, Eutrophy, At risk of overweight, Overweight, and Obesity. The results showed that eutrophy predominated, peaking in 2023 when about 99,515 children were at an ideal weight. However, the at risk of overweight and overweight indices increased, especially in the last three years, reaching 33,832 and 11,971 children in 2023, respectively. Obesity, although it showed some variations, remained relatively stable over the years. Underweight and severe underweight also showed minimal fluctuations. Despite the increase in children at risk of overweight, the growth rate was slower compared to the rise in eutrophic children. These findings highlight the importance of promoting healthy eating and public health policies to prevent malnutrition and the long-term consequences of an inadequate diet, which can lead to health problems. In 2023, 58.31% of children were eutrophic, while 41.69% had some nutritional deficit.

Keywords: Childhood malnutrition; Ecological study; Eutrophy; Public health policies; Body Mass Index (BMI)

Resumo. A alimentação saudável é essencial para a qualidade de vida e longevidade, pois contribui para a prevenção de doenças e recuperação do corpo humano. No estado da Paraíba, como em outras regiões do Nordeste, a desnutrição infantil, particularmente entre crianças de 0 a 5 anos, tem raízes em questões como a pobreza e o acesso limitado a serviços de saúde. Para monitorar a situação nutricional, o Sistema de Vigilância Alimentar e Nutricional (SISVAN) coleta dados sobre a ingestão alimentar e o estado nutricional das crianças. Este estudo retrospectivo teve como objetivo comparar o estado nutricional das crianças paraibanas entre 2013 e 2023, utilizando dados do SISVAN. A análise considerou o Índice de Massa Corporal (IMC) das crianças, agrupando os dados em categorias como Magreza severa, Magreza, Eutrofia, Risco de sobrepeso, Sobrepeso e Obesidade. Os resultados mostraram que a eutrofia predominou, com destaque para 2023, quando cerca de 99.515 crianças estavam no peso ideal. No entanto, os índices de risco de sobrepeso e sobrepeso aumentaram, especialmente nos últimos três anos, com 33.832 e 11.971 crianças em 2023, respectivamente. A obesidade, embora tenha apresentado variações, manteve-se estável ao longo dos anos. A magreza e a magreza acentuada também mostraram oscilações mínimas. Apesar do aumento de crianças com risco de sobrepeso, o crescimento foi menor em comparação com o aumento das crianças com eutrofia. Esses dados refletem a importância de promover uma alimentação saudável e políticas públicas de saúde para prevenir a desnutrição e as consequências de uma dieta inadequada, que pode gerar problemas de saúde a longo prazo. Em 2023, 58,31% das crianças estavam em eutrofia, enquanto 41,69% apresentavam algum déficit nutricional.

Palavras-chave: Desnutrição infantil; Estudo ecológico; Eutrofia; Políticas públicas de saúde; Índice de Massa Corporal (IMC).

[I]Undergraduate Nursing Student, Faculdade de Enfermagem Nova Esperança.
CEP 58067-698. João Pessoa-PB.
ORCID: 0009-0007-5183-6018

[II]Undergraduate Nursing Student, Faculdade de Enfermagem Nova Esperança.
CEP 58067-698. João Pessoa-PB.
ORCID: 0009-0008-1025-5329

[III]Undergraduate Nursing Student, Faculdade de Enfermagem Nova Esperança.
CEP 58067-698. João Pessoa-PB.
ORCID: 0009-0001-5789-3976

[IV]Nurse, Ph.D. Candidate in Therapeutic Innocation, Professor at Faculdade de Enfermagem Nova Esperança.
CEP 58067-698. João Pessoa-PB.
ORCID: 0000-0001-6622-3934

[*V]Agricultural engineer, Ph.D. in Agricultural Engineering (Phytotechnics/Post-harvest physiology), Professor at Faculdade de Enfermagem Nova Esperança.
CEP 58067-698. João Pessoa-PB.
Email: renato_dantas@hotmail.com.br.
ORCID: 0000-0002-5464-9476

INTRODUCTION

Proper nutrition is crucial for children's optimal physical and cognitive development and for preventing chronic diseases later in life[1,2] . The first two years are crucial for healthy growth and cognitive development. Children require the same nutrients as adults but in different amounts at various ages[2] . This shift has contributed to rising childhood obesity rates, although recent data suggest a stabilization. Other concerns include food insecurity, under-consumption of key nutrients, and early development of diet-related risks for chronic diseases. Parents and caregivers play a crucial role in developing children's lifelong healthy eating behaviors[3]. Health professionals should provide science-based nutrition guidance to promote children's nutritional well-being[3,4].

Studies on child nutrition in Brazil reveal complex patterns across different regions and populations. Indigenous children, particularly in the northern and central regions, face significant nutritional challenges, with higher rates of stunting and underweight compared to national averages[5,6]. However, the nutritional transition is evident, with an increasing prevalence of overweight children, especially in urban areas. Socioeconomic factors play a crucial role in determining nutritional status, with low family income, inadequate breastfeeding practices, and low birth weight identified as risk factors for malnutrition[7,8]. Regional disparities are notable, with the northern region experiencing worse living conditions and slower progress in addressing nutritional issues[6].

In northern Brazil, children under five face height-for-age, weight-for-age, and weight-for-height deficits, alongside an increasing prevalence of overweight[6]. Rural settlements also demonstrate poor nutritional outcomes, with high rates of anemia and parasitic infections[9]. In urban areas, malnutrition affects nearly a quarter of children and is associated with low birth weight, inadequate prenatal care, and poor housing conditions[10]. Common factors contributing to nutritional deficits include limited access to healthcare, precarious socioeconomic conditions, and inadequate dietary practices. These findings highlight the need for targeted interventions that consider regional characteristics and socioeconomic factors to address undernutrition and overweight in Brazilian children.

Brazil's Food and Nutritional Surveillance System (SISVAN) monitors children's nutritional status but faces coverage and data reliability challenges. A study in Rio Grande do Sul found low SISVAN coverage (10.5%) and poor agreement between recorded and calculated nutritional classifications[11]. Research in Alagoas revealed high rates of stunting (9-15%) and overweight (16-20%) among children under five[12]. National trend analysis from 2008 to 2015 showed increasing SISVAN registrations and coverage in most regions, with declining rates of thinness and normal weight and rising rates of overweight and obesity[13].

Research on children's nutrition in Paraíba State, Brazil, reveals concerning trends. Studies have found prevalence rates of stunting ranging from 2.4% to 7.9% and overweight/obesity rates between 6.23% and 12.8%[5,14,15]. Factors associated with poor nutritional status include food insecurity, low socioeconomic status, and maternal nutritional status[15]. These studies consistently demonstrate the coexistence of stunting and overweight in Brazilian children, highlighting the ongoing nutritional transition. Despite its limitations, SISVAN remains crucial for nutritional diagnosis and policy implementation in Brazil's public health system. Therefore, the goal of this research is to evaluate the nutritional status of children in the Paraíba state during the period from 2013 to 2023.

METHODOLOGY

This is a retrospective ecological time series study with data on the nutritional status of children aged 0 to 5 years in Paraíba. The data were obtained from the SISVANWeb platform and comprised the years 2013 to 2023 of all coverage regions regarding the Body Mass Index (BMI) classification[16]. This platform is anchored to the Primary Health Care Secretary, which is in charge of covering the first level of health care and is characterized by a set of health actions at an individual and collective level, which encompasses health promotion and protection, disease prevention, diagnosis, treatment, rehabilitation, harm reduction, and health maintenance intending to develop comprehensive care that has a positive impact on the health situation of communities[17].

The State Secretary of Health had divided the Paraíba into 16 regions to better manage population health. The data were grouped by the total and average numbers of the different nutritional status ranges: thinness, marked thinness, normal weight, risk of overweight, obesity, and overweight. They were organized in tables and graphs in percentages and absolute numbers with the aid of Excel® software.
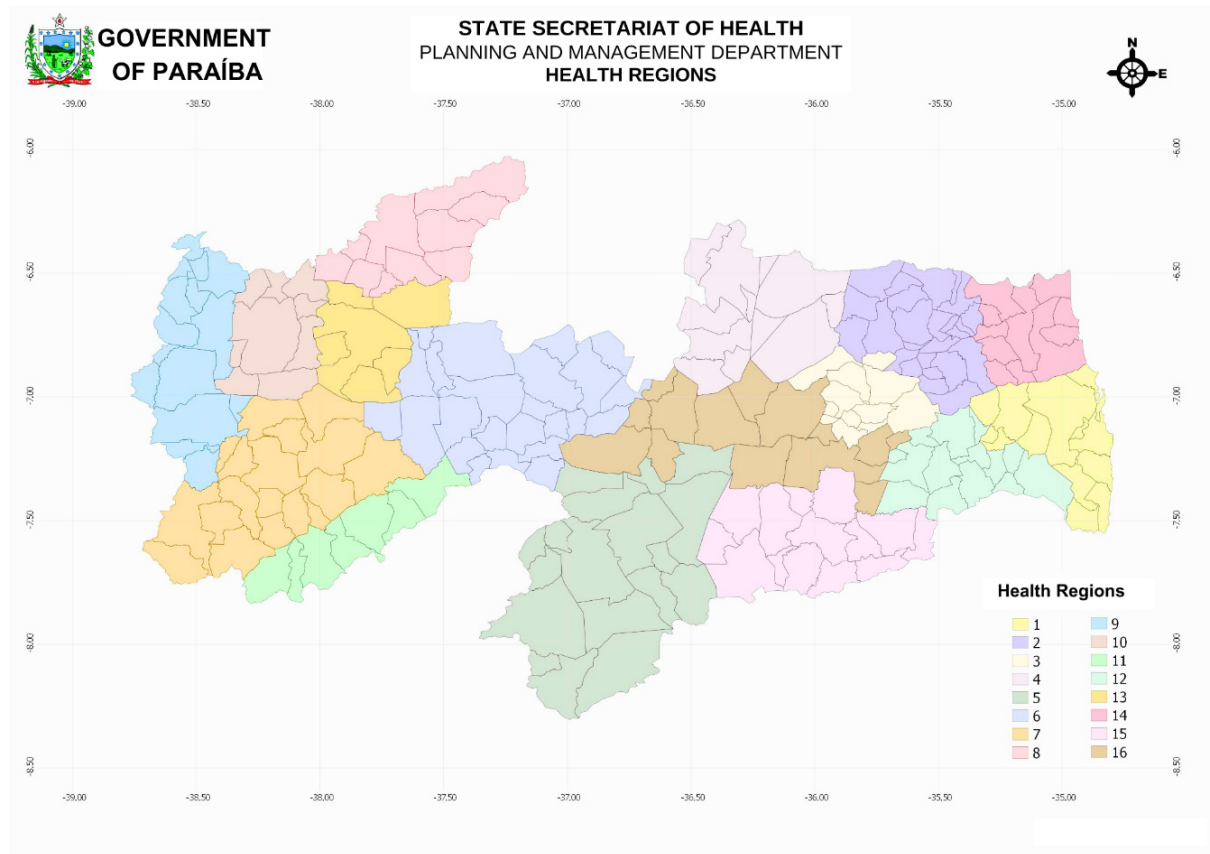

FIGURE 1: Regions of health management proposed by the State Secretary of Health in Paraíba. Adapted from Paraíba[18].

For this study, the evaluated data consisted of children under 5 years of age. The classification of nutritional status based on BMI-for-age typically follows the growth standards provided by the World Health Organization (WHO).[19] The classifications are as follows in Table 1:

TABLE 1. WHO Classification of Nutritional Status for Children Under 5 Years Based on MI-for-Age Percentiles[19].

Classification	BMI-for-age Percentile Range
Severe thinness	< Percentile 0.1
Thinness	≥ Percentile 0.1 and < Percentile 3
Eutrophy	≥ Percentile 3 and < Percentile 85
At risk of overweight	≥ Percentile 85 and < Percentile 97
Overweight	≥ Percentile 97 and < Percentile 99.9
Obesity	≥ Percentile 99.9

RESULTS AND DISCUSSION

According to SISVAN data presented in Figure 2, both severe thinness and thinness have decreased slightly from 2013 to 2023. Severe thinness started at 4,549 children in 2013, dipped to its lowest in 2020 (3,223), and slightly increased to 4,331 in 2023. The initial decline suggests improved access to nutrition or public health programs targeting undernourished children. However, the increase post-2020 might indicate challenges such as economic hardship, possibly exacerbated by the COVID-19 pandemic, which could have disrupted food security. Eutrophy consistently accounts for the most significant proportion of children across all years, representing ~55–60% of the population. The number rose from 81,316 in 2013 to its highest point of 99,515 in 2023, showing a steady increase over time (Figure 2). The increase in normal-weight children reflects a positive trend in overall nutritional health, likely driven by public health initiatives promoting balanced diets and improved living standards. This category's dominance suggests that most children in Paraíba maintain adequate nutritional status, though disparities remain in other categories.

The effectiveness of Brazil's public health programs has to be considered[5], such as the Bolsa Família Program and nutritional policies targeting food insecurity, in improving children's nutritional outcomes, particularly in vulnerable populations like Indigenous communities. These policies likely contributed to reducing undernutrition in Paraíba. However, the resurgence of severe thinness and thinness in recent years, particularly post-pandemic (2022–2023), aligns with findings by Jesus et al[10]. and Oliveira et al[15]., who identified economic vulnerability and limited access to health services as recurring barriers to sustained improvement in child nutrition. The "at risk of overweight" category has shown moderate fluctuations but remained relatively stable at ~30,000–35,000 children annually. Overweight children increased from 14,000 in 2013 to 16,159 in 2023, fluctuating over the years. Obesity also saw a slight decline, starting at 13,444 in 2013, peaking in 2016 (14,356), and falling to 11,971 in 2023 (Figure 2). Studies like Damé et al[11]. and Moreira et al[13]. have highlighted similar trends in other Brazilian regions, attributing the rise in overnutrition to dietary transitions involving higher consumption of ultra-processed foods, sugary beverages, and reduced physical activity. The findings suggest that Paraíba is not unaffected by these national trends.

A marked drop in the total number of children across all categories occurred in 2020 and 2021, particularly in eutrophy and the malnourished categories (severe thinness and thinness). The lowest recorded values for severe thinness (3,223) and thinness (3,017) occurred in 2020 (Figure 2). The pandemic likely disrupted healthcare services, food security, and school feeding programs, particularly for vulnerable families. This period shows a broader impact on all aspects of children's nutritional health, reflecting the need for robust safety nets during crises. Oliveira et al[15]. highlighted how the pandemic exacerbated food insecurity in already vulnerable regions like Paraíba, which may explain the observed fluctuations in the data.
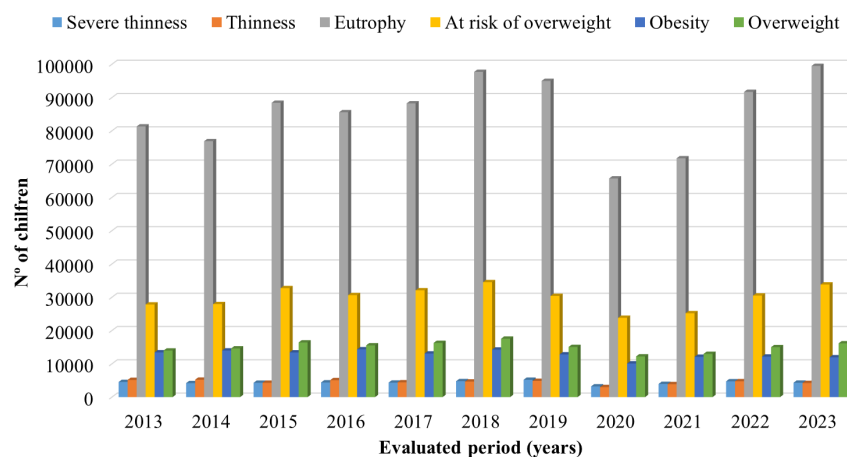

FIGURE 2: Number of children under 5 years old registered in the Food and Nutrition Surveillance System the 'BMI-age' index in the Paraíba state, Brazil, 2013-2023. Source: Brasil[18].

revista de NOVA
ciências
da saúde ESPERANÇA

308

The data in Figure 3 suggest there are significant regional disparities in nutritional status in the state of Paraíba. While urban areas like Region 1 (João Pessoa) tend to have a higher prevalence of obesity and overweight, more rural regions show signs of severe thinness and undernutrition. Although the number of children at risk of overweight and obesity has increased, the growth appears to be smaller compared to the rise in children with eutrophy.

Some regions, such as Region 1 and Region 6, have high numbers of children classified as eutrophic, which could reflect better access to balanced nutrition or healthcare services. Region 1 shows 15,772 children in this category, a stark contrast to Region 13, with only 1,683 children in this category, indicating regional disparities in health and nutritional status. The first includes municipalities such as João Pessoa and Santa Rita in the coastal area, and the last includes Pombal in the countryside. The study by Mourão et al.20 analyzed the temporal trends in the coverage of the Sistema de Vigilância Alimentar e Nutricional (Sisvan) among children under 5 years old in the Northern region of Brazil from 2008 to 2017. The study highlights a substantial increase in the coverage of nutritional surveillance systems over the years.

This trend suggests improved monitoring and intervention efforts in the Northern region, which could be a positive indicator for addressing nutritional issues among children. Significant disparities exist among different cities in Paraíba (Figure 3). For example, Region 1 shows high numbers across all categories, while cities in Region 13 have lower numbers, indicating varied nutritional challenges and intervention needs.
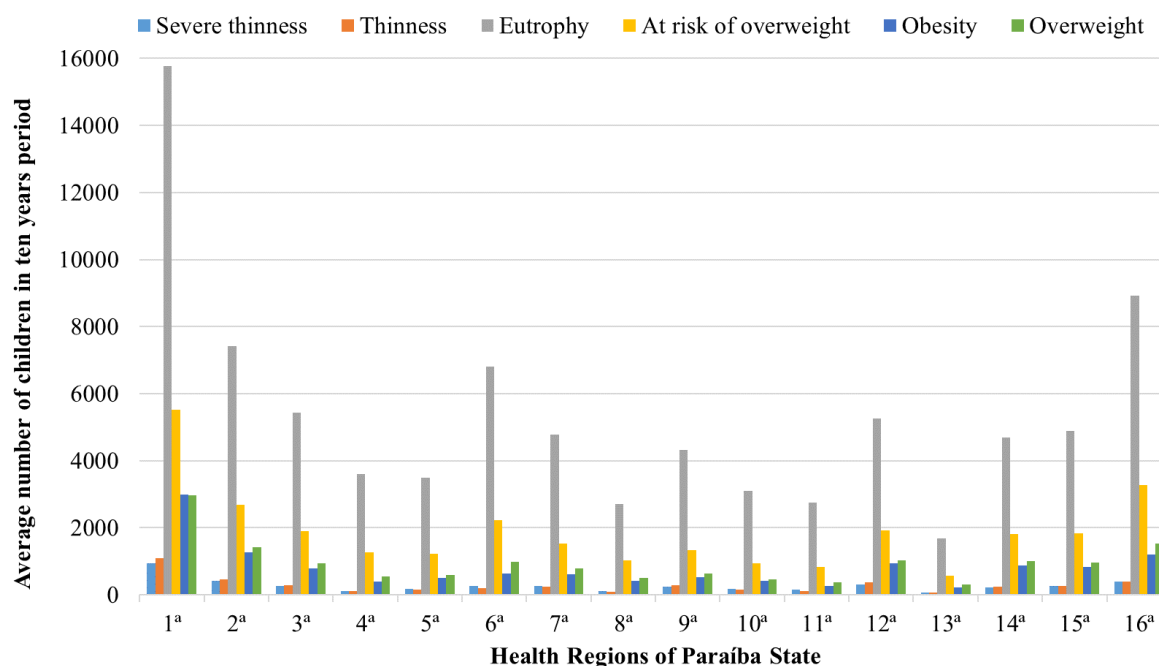

FIGURE 3: Average number of children under 5 years old registered in the Food and Nutrition Surveillance System, the 'BMI-age' index in the 16 regions of health management proposed by the State Secretary of Health in Paraíba in 2013-2023. Source: Brasil[18].

Addressing undernutrition is needed by strengthening safety nets for vulnerable families and ensuring universal access to health and nutritional services. Felisbino-Mendes et al[8]. stressed the importance of early childhood interventions to combat undernutrition, particularly in low-income regions. Expand education campaigns promoting healthy eating and active lifestyles while regulating the availability and marketing of unhealthy foods, as recommended by Moreira et al[13]. Improve the coverage and reliability of data collection through systems like SISVAN, as emphasized by Damé et al[11], to better support policy decisions.

revista de **NOVA**
ciências
da saúde **ESPERANÇA**

309

Therefore, the overall nutritional status of children in Paraíba seems positive, with a predominance of eutrophy. Still, it is necessary to use those data to implement school-based nutritional programs that educate children and families about healthy eating and physical activity and launch community health initiatives in regions with high obesity and overweight rates, emphasizing the importance of healthy lifestyles. Additionally, health managers have to monitor and evaluate regional differences in nutritional status to tailor interventions that address local needs and collaborate with local agricultural sectors to ensure the availability of fresh, nutritious food in rural areas to prevent malnutrition.

The Brazilian Food Acquisition Program (Programa de Aquisição de Alimentos- PAA) can play a significant role in minimizing nutritional problems among children under five years old and can play a considerable role in reducing nutritional problems among children under five years old. The program is a substantial policy that promotes food and nutritional security in Brazil. It purchases and distributes food from family farmers to public food facilities and vulnerable populations[21]. The program has contributed to positive socioeconomic changes, ensuring food security for both suppliers and recipients while supporting family agriculture[22].

CONCLUSIONS

When comparing the nutritional status of children in Paraíba, it is concluded that in 2023, approximately 58.31% of children achieved the level of eutrophy, while another 41.69% still showed deficits in their physical evaluations. In most cases, this is associated with their dietary habits and a lack of knowledge about the importance of a healthy diet.

REFERENCES

1. Corkins MR, Daniels SR, de Ferranti SD, Golden NH, Kim JH, Magge SN, et al. Nutrition in children and adolescents. Med Clin. 2016;100(6):1217-35.

2. Khodaee GH, Emami Moghadam Z, Khademi G, Saeidi M. Healthy diet in children: Facts and keys. Int J Pediatr. 2015;3(6.2):1183-94.

3. Ogata BN, Hayes D. Position of the Academy of Nutrition and Dietetics: nutrition guidance for healthy children ages 2 to 11 years. J Acad Nutr Diet. 2014;114(8):1257-76.

4. Lifshitz F, Finch N, Lifshitz J. Children's Nutrition. Boston: Jones and Bartlett Publishers; 1991. p. 3-16. Pedraza DF, et al. Brazilian indigenous children: Review of studies about nutritional status. Rev Nutr. 2014;27:473-88.

5. Cunha MP, Marques RC, Dórea JG. Child nutritional status in the changing socioeconomic region of the northern Amazon, Brazil. Int J Environ Res Public Health. 2018;15(1):15.

6. Ferreira AA, Welch JR, Santos RV, Gugelmin SA, Coimbra CE. Nutritional status and growth of indigenous Xavante children, Central Brazil. Nutr J. 2012;11:1-9.

7. Felisbino-Mendes MS, Campos MD, Lana FC. Nutritional assessment in children under 10 in Ferros, Minas Gerais. Rev Esc Enferm USP. 2010;44:257-65.

8. Castro TGD, Campos FM, Priore SE, Coelho FM, Campos MT, Franceschini SC, et al. Health and nutrition of children, 0 to 60-month old, in an agrarian-reform settlement, Vale do Rio Doce, MG, Brazil. Rev Nutr. 2004;17:167-76.

9. Castro TGD, Campos FM, Priore SE, Coelho FM, Campos MT, Franceschini SC, et al. Health and nutrition of children, 0 to 60-month old, in an agrarian-reform settlement, Vale do Rio Doce, MG, Brazil. Rev Nutr. 2004;17:167-76.

10. Jesus GM, Castelão ES, Vieira TDO, Gomes DR, Vieira GO. Déficit nutricional em crianças de uma cidade de grande porte do interior da Bahia, Brasil. Ciência & Saúde Coletiva. 2014;19:1581-8.

11. Damé PKV, Pedroso MR de O, Marinho CL, Gonçalves VM, Duncan BB, Fisher PD, et al. Sistema de Vigilância Alimentar e Nutricional (SISVAN) em crianças do Rio Grande do Sul, Brasil: cobertura, estado nutricional e confiabilidade dos dados. Cad Saude Publica 2011;27:2155–65.

12. Lira MCS, de Menezes RCE, Longo-Silva G, Oliveira MAA, Oliveira JS, Costa EC, et al. Estado nutricional de crianças segundo critérios do SISVAN em municípios do estado de Alagoas. O Mundo da Saúde. 2017;41(1):68-76.

13. Moreira NF, Soares CDA, Junqueira TDS, Martins RDCB. Tendências do estado nutricional de crianças no período de 2008 a 2015: dados do Sistema de Vigilância Alimentar e Nutricional (Sisvan). Cadernos Saúde Coletiva. 2020;28:447-54.

14. Sousa CPDC, Sousa MPDC, Rocha ACD, Pedraza DF. Perfil epidemiológico do estado nutricional de crianças assistidas em creches no Estado da Paraíba. Nutrire Rev Soc Bras Aliment Nutr.

15. Oliveira MMD, Santos EESD, Bernardino IDM, Pedraza DF. Factors associated with nutritional status of children under five years old from Paraíba, Brazil. Ciência & Saúde Coletiva. 2022;27:711-24.

16. BRASIL. Sistema de Vigilância Alimentar e Nutricional - SISVAN: Relatórios Públicos do SISVAN [Internet]. Brasilia-DF; 2024 [cited 2024 Apr 1]. Available from: http://sisaps.saude.gov.br/sisvan/relatoriopublico/index.

17. Brasil. Ministério da Saúde. Secretaria de Atenção Primária à Saúde [Internet]. Brasília-DF; 2024 [cited 2024 Nov 11]. Available from:

18. Paraíba. Mapa da Saúde – Paraíba [Internet]. João Pessoa-PB; 2024 [cited 2024 Apr. 10]. Available from: http://infosaudepb.saude.pb.gov.br/mosaico/regionalizacao/mapas_estaticos.

19. World Health Organization. WHO child growth standards: length/height-for-age, weight-for-age, weight-for-length, weight-for-height, and body mass index-for-age: methods and development [Internet]. Geneva: World Health Organization; 2006 [cited 2024 Aug. 17]. Available from: https://www.who.int/tools/child-growth-standards/standards.

20. Mourão E, Gallo C de O, Nascimento FA do, Jaime PC. Tendência temporal da cobertura do Sistema de Vigilância Alimentar e Nutricional entre crianças menores de 5 anos da região Norte do Brasil, 2008-2017. Epidemiol Serv Saúde. 2020;29(2):e2019377.

21. Grisa C, Zimmermann SA. Estado e sociedade civil na promoção da segurança alimentar e nutricional no Brasil: a construção do Programa de Aquisição de Alimentos da Agricultura Familiar (PAA). Agroalimentaria [Internet]. 2015; [cited 2024 Nov 17]. Available from: http://erevistas.saber.ula.ve/index.php/agroalimentaria/article/download/6982/6853 .

22. Pereira GPJ, Jesus. Programa de Aquisição de Alimentos e Segurança Alimentar e Nutricional: uma análise sobre o município de Vitória da Conquista, Bahia. Rev Econ Nordest. 2024;55:139-57.