

Nutritional status of children under five years of age in the metropolitan health region I state of Pará: SISVAN web 2016 to 2020

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Abstract — The present study aimed to characterize the nutritional status of children aged zero to five years in the Metropolitan Health Region I between the years 2016 to 2020. This is a descriptive quantitative study with secondary data from the National Food and Nutrition Surveillance System (SISVAN - WEB). The collection of these data was carried out from June to July 2021. The results showed high percentages of children with nutritional deficits, such as Low Weight for Age, Low Height for Age and Low BMI for Age, as well as a significant percentage of eutrophic children and with High Weight for Age in the five municipalities from which the data were extracted (Belém, Ananindeua, Benevides, Marituba and Santa Barbara do Pará). It was possible to identify that nutritional problems caused by economic, demographic and social factors are directly impacting the nutritional status of children belonging to metropolitan health region I.

I. INTRODUCTION

Child development is directly linked to genetic and environmental factors to which children are exposed. Adequate nutrition in early childhood is of great importance for the growth of little ones. Likewise, for the success of this process it is necessary that it be introduced at the beginning of the individual's life cycle. Exclusive breastfeeding for the first 6 months not only helps to meet all the needs of infants, but also helps to prevent the onset of other diseases such as allergies, type 1 diabetes, leukemia and obesity [1].

To identify possible nutritional problems in the Brazilian population, the Food and Nutrition Surveillance System (SISVAN) was created, a tool that helps in monitoring the food and nutritional situation. Its first milestones date back to 1970, but it was only in 1990 that the first legal milestones that supported its actions were observed. To improve the flow of data and the way in which these are recorded, the SISVAN Web was developed, an online version of the system launched in 2008. Over the years, this system has focused on the support of health professionals, mainly in the care basic care, contributing to the local diagnosis of food and

nutritional conditions and disorders of the population served in Primary Care services in Brazil [2, 3].

The present research aimed to characterize the nutritional status of children under five years of age in the metropolitan health region I in the state of Pará/Brazil, from 2016 to 2020, registered in the SISVAN- Food Surveillance System. and Nutritional, through reports available in the SISVAN WEB database, observing P/A, A/A and BMI/A indexes during the years 2016 to 2020.

II. METHODOLOGY

This is a quantitative and descriptive study, with secondary data from the National Food and Nutrition Surveillance System (SISVAN - WEB). The collection of these data was carried out from June to July 2021. The sample of this study consisted of children aged 0 to 5 years living in the municipalities of Belém, Ananindeua, Benevides, Marituba and Santa Bárbara do Pará, which

make up the Region of Metropolitan Health I in the state of Pará, data extracted from the SISVAN WEB public reports. All reports available on the platform of the National Food and Nutrition Surveillance System for the years 2016 to 2020 of the Metropolitan Health Region I - PA were included. After defining the reports to be used, there was no data exclusion.

Regarding the ethical aspects of the present research, secondary data from the SISVAN WEB public reports were used, which exempts the submission to the evaluation of the Research Ethics Committee in accordance with Resolution 466/12 of the National Health Council (CNS). However, all established ethical precepts will be considered to ensure the legality of information, privacy and confidentiality of data. The study received no funding, and the authors declared no conflict of interest.

III. RESULTS AND DISCUSSION

Table 1. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2016 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Weight/Age parameter.

Metropolitan I /2016									
Counties	Weight/Age								
	Very low weight for age	%	Low weight for age	%	Adequate or eutrophic weight	%	High weight for age	%	Total
Belém	136	0,74	441	2,4	16.627	90,64	1.141	6,22	18.345
Ananindeua	99	1,69	238	4,08	5.040	86,04	481	8,24	5.858
Benevides	29	2,78	72	6,9	879	84,28	63	6,04	1.043
Marituba	46	1,59	107 3	3,71	2,408	83,4	324	11,23	2.885
Santa Bárbara do Pará	11	1,66	44	6,64	561	84,62	47	7,09	663

Source: Authors, 2022

Table 2. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2017 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Weight/Age parameter.

Metropolitan I /2017									
Counties	Weight/Age								
	Very low weight for age	%	Low weight for age		Adequate or eutrophic weight	%	High weight for age	%	Total
Belém	115	0,72	500	3,15	14.420	90,81	845 532	5,32	15.880
Ananindeua	49	1,15	155	3,65	3.764	88,61	280	6,59	4.248
Benevides	27	1,14	83	3,5	2.020	85,23	240	6,59	2.370
Marituba	44	1,23	159	4,45	2.964	82,89	409	11,44	3.576
Santa Bárbara do Pará	13	1,82	27	3,77	639	89,25	37	5,17	716

Source: Authors, 2022

Table 3. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2018 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Weight/Age parameter.

Metropolitan I /2018									
Counties	Weight/Age								
	Very low weight for age	%	Low weight for age	%	Adequate or eutrophic weight	%	High weight for age	%	Total
Belém	297	1,61	543	2,95	16.570	89,93	1,016	5,51	18,426
Ananindeua	186	3,22	248	4,3	5,004	86,71	333	5,51	5.771
Benevides	22	0,77	83	2,89	2.540	88,38	229	7,97	2.874
Marituba	50	1,27	118	3,01	3.560	90,68	198	5,04	3.926
Santa Bárbara do Pará	9	0,95	45	4,75	847	89,35	47	4,96	948

Source: Authors, 2022

Table 4. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2019 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Weight/Age parameter.

Metropolitan I /2019									
Counties	Weight/Age								
	Very low weight for age	%	Low weight for age	%	Adequate or eutrophic weight	%	High weight for age	%	Total
Belém	300	1,55	458	2,37	16.445	85,19	2.100	10,88	19.303
Ananindeua	685	7,75	404	4,57	7.331	82,59	418	4,73	8.838
Benevides	28	0,95	91	3,1	2.626	89,35	194	6,6	2.939
Marituba	61	1,84	115	3,47	2.959	89,18	183	5,52	3.318
Santa Bárbara do Pará	6	0,74	40	4,9	732	89,71	38	4,66	816

Source: Authors, 2022

Table 5. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2020 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Weight/Age parameter.

Metropolitan I /2020									
Counties	Weight/Age								
	Very low weight for age	%	Low weight for age	%	Adequate or eutrophic weight	%	High weight for age	%	Total
Belém	547	4,96	441	4	9.296	84,22	754	6,83	11.038
Ananindeua	235	3,02	372	4,79	6.744	86,81	418	5,38	7.769
Benevides	22	1,26	57	3,27	1.492	85,65	171	9,82	1.742
Marituba	33	1,6	58	2,81	1.843	89,42	127	6,16	2.061
Santa Bárbara do Pará	4	0,51	26	3,334	678	89,42	71	9,1	779

Source: Authors, 2022

Table 6. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2016 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Height/Age parameter.

Metropolitan I 2016							
Counties	Height/Age						
	Very low height for age	%	Low height for age	%	Age-appropriate height	%	Total
Belém	1.133	6,18	1.661	9,05	15.551	84,77	18.345
Ananindeua	455	7,77	577	9,85	4.826	82,38	5.858
Benevides	2.178	8,27	190	7,24	2.218	84,5	2.625
Marituba	209	7,24	263	9,12	2.413	83,64	2.885
Santa Bárbara	36	5,43	85	12,82	542	81,75	663

Source: Authors, 2022

Table 7. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2017 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Height/Age parameter.

Metropolitan I /2017							
Counties	Height/Age						
	Very low height for age	%	Low height for age	%	Age-appropriate height	%	Total
Belém	667	4,2	1.278	8,05	13.935	87,75	15.880
Ananindeua	244	5,74	428	10,08	3.576	84,18	4.248
Benevides	193	8,14	199	8,4	1.978	83,46	2.370
Marituba	278	7,77	347	9,7	2.951	82,52	3.576
Santa Bárbara do Pará	43	6,01	97	13,55	576	80,45	716

Source: Authors, 2022

Table 8. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2018 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Height/Age parameter.

Metropolitan I /2018							
Counties	Height/Age						
	Very low height for age	%	Low height for age	%	Age-appropriate height	%	Total
Belém	917	4,98	1.559	8,46	15.950	86,56	18.426
Ananindeua	536	9,29	626	8,46	4.609	79,86	5.771
Benevides	142	4,94	237	8,25	2.495	86,81	2.874
Marituba	253	6,44	333	8,48	3.340	85,07	3.926
Santa Bárbara do Pará	53	5,59	98	10,34	797	84,07	948

Source: Authors, 2022

Table 9. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2019 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Height/Age parameter.

Metropolitan I /2019							
Counties	Height/Age						
	Very low height for age	%	Low height for age	%	Age-appropriate height	%	Total
Belém	826	4,28	1.183	6,13	17.294	89,59	19.303
Ananindeua	1.770	20,03	842	9,53	6.226	70,45	8.838
Benevides	152	5,17	262	8,91	2.525	85,91	2.939
Marituba	182	5,49	210	6,33	2.926	88,19	3.318
Santa Bárbara do Pará	41	5,0	81	9,93	694	85,05	816

Source: Authors, 2022

Table 10. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2020 registered in the SISVAN- Food and Nutrition Surveillance System, according to the Height/Age parameter.

Metropolitan I /2020							
Counties	Altura/Idade						
	Very low height for age	%	Low height for age	%	Age-appropriate height	%	Total
Belém	519	4,7	593	5,37	9.926	89,93	11.038
Ananindeua	1.376	17,71	786	9,89	5.624	72,4	7.768
Benevides	128	7,35	149	8,55	1.465	84,1	1.742
Marituba	79	3,83	110	5,34	1.872	90,83	2.061
Santa Bárbara do Pará	36	4,62	77	9,88	666	85,49	779

Source: Authors, 2022

Table 11. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2016 registered in the SISVAN- Food and Nutrition Surveillance System, according to the BMI/Age parameter.

Metropolitan I 2016													
Counties	BMI/Age												
	Pronounced thinness	%	Thinness	%	Eutrophy	%	risk of overweight	%	Overweight	%	Obesity	%	Total
Belém	327	1,78	344	1,88	11.073	60,36	3.998	21,79	1.639	8,93	964	5,25	18.345
Ananindeua	275	4,69	171	2,92	3.234	55,21	1.088	8,57	539	9,2	551	9,41	5.858
Benevides	91	3,47	79	3,01	1.540	58,67	439	16,72	203	7,73	273	10,4	2.625

Marituba	141	4,8 9	96	3,3 3	1.598	55,3 6	491	17,0 2	258	8,9 4	301	10,4 3	2.88 5
Santa Bárbara	31	4,6 8	29	4,3 7	411	61,9 9	95	14,3 3	58	8,7 5	39	5,88	663

Source: Authors, 2022

Table 12. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2017 registered in the SISVAN- Food and Nutrition Surveillance System, according to the BMI/Age parameter.

Metropolitana I /2017													
Counties	BMI/Age												
	Pronounced thinness	%	Thinness	%	Eutrophy	%	Risk of overweight	%	Overweight	%	Obesity	%	Total
Belém	203	1,2 8	289	1,8 2	10.443	65,7 6	3.091	19,4 6	1.144	7,2	710	4,47	15.8 80
Ananindeua	119	2,8	140	3,3	2.444	65,7 6	859	20,2 2	369	8,69	317	7,46	4.24 8
Benevides	89	3,7 6	61	2,5 7	1.378	58,1 4	377	15,9 1	197	8,31	268	11,3 1	2.37 0
Marituba	123	3,4 4	149	4,1 7	1.980	55,3 7	589	16,4 7	375	10,4 9	360	10,0 7	3.57 6
Santa Bárbara do Pará	17	2,3 7	33	4,6 1	454	63,4 1	119	16,6 2	52	7,2 6	41	5,73	716

Source: Authors, 2022

Table 13. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2018 registered in the SISVAN- Food and Nutrition Surveillance System, according to the BMI/Age parameter.

Metropolitan I 2018													
Coounties	BMI/Age												
	Pronounced thinness	%	Thinness	%	Eutrophy	%	Risk of overweight	%	Overweight	%	Obesity	%	Total
Belém	285	1,5 5	398	2,1 6	11.882	64,4 8	3.669	19, 91	1.328	7,2 1	864	4,6 9	18.4 26
Ananindeua	191	3,3 1	205	3,5 5	3.332	57,7 4	1.092	18,9 2	524	9,0 8	427	7,4	5.77 1
Benevides	70	2,4 4	87	3,0 3	1.733	60,3	482	16,7 7	284	9,8 8	218	7,5 9	2.87 4
Marituba	83	2,1 1	77	1,9 6	2.439	62,1 2	819	20,8 6	293	7,4 6	215	5,4 8	3,92 6

Santa Bárbara do Pará	28	2,9 5	34	3,5 9	563	59,3 9	172	18,1 4	82	8,6 5	69	7,2 8	948
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Source: Authors, 2022

Table 14. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2019 registered in the SISVAN- Food and Nutrition Surveillance System, according to the BMI/Age parameter.

Metropolitan I /2019													
Counties	BMI/Age												
	Pronounced thinness	%	Thinness	%	Eutrophy	%	Risk of overweight	%	Overweight	%	Obesity	%	Total
Belém	1.100	5,7	1.010	5,2 3	12.405	64,2 6	2.842	14,7 2	1.157	5,9 9	790	4,09	19.3 04
Ananindeua	865	9,7 9	384	4,3 4	4.780	54,0 8	1.167	13,2	597	6,7 5	1,045	11,8 2	8.83 8
Benevides	103	3,5	126	4,2 9	1.808	61,5 2	494	16,8 1	225	7,6 6	183	6,23	2.93 9
Marituba	145	4,3 7	127	3,8 3	2,157	65,0 1	489	14,7 4	237	7,1 4	163	4,91	3,31 8
Santa Bárbara do Pará	26	3,1 9	39	4,7 8	538	65,9 3	108	13,2 4	57	6,9 9	48	5,88	816

Source: Authors, 2022

Table 15. Nutritional status of children under five years of age in Metropolitan Region I in the State of Pará in 2020 registered in the SISVAN- Food and Nutrition Surveillance System, according to the BMI/Age parameter.

Metropolitan I 2020													
Counties	IMC/Idade												
	Pronounced thinness	%	Thinness	%	Eutrophy	%	Risk of overweight	%	Overweight	%	Obesity	%	Total
Belém	1.464	13,2 6	451	4,0 9	6.617	59,9 5	1.483	13,4 4	551	4,9 9	472	4,2 8	11.0 38
Ananindeua	385	4,96	243	3,1 3	4.820	62,0 4	1.015	13,0 6	566	7,2 9	740	9,5 3	7.76 9
Benevides	50	2,87	54	3,1	1.021	58,6 1	314	18,0 3	161	9,2 4	142	8,1 5	1.74 2
Marituba	63	3,06	63	3,06	1.362	66,08	313	15,19	160	7,76	100	4,85	2.061
Santa Bárbara do Pará	27	3,47	30	3,85	454	58,28	138	17,72	61	7,83	69	8,86	779

Source: Authors, 2022

Weight for age

In table 1, it is possible to observe the data referring to the weight-for-age index in the year 2016, which is classified into 4 cut-off points (very low weight for age, low weight for age, eutrophic and high weight). When analyzing the data, it was noted that the city of Benevides had the highest value, 2.78% (n=29) of children within the classification of very low weight for age, as well as for low weight for age 6.90% (n=72) of children in this situation. When taking into account the eutrophic classification, the city of Marituba is in the worst situation with a percentage of 83.40% (n=561). 11.23% (n=324).

In a study carried out by Araújo et al. [4] with children aged 0 to 59 months living in the municipality of Jordão, state of Acre, it was possible to observe that the general deficit in weight for age was 7.3%, with a higher occurrence among children with indigenous ancestry residing in the state of Acre rural area, highlighting in the work the influence of the place of origin in the presence of this place. The results of this study corroborate those observed in this research, with emphasis on the geographic location of both, the northern region, which, due to social, economic and environmental factors, is historically more susceptible to nutritional deficits.

On the other hand, Santos et al. [5] in their study carried out in a city in the interior of Minas Gerais, regarding the influence of the Bolsa Família Program on the anthropometric index such as weight for age of beneficiary children, observed a high percentage of weight for age of 15.4% of children. Likewise, Junior et al. [6], when analyzing the prevalence of overweight in children admitted to a maternal and child referral hospital in the state of Pernambuco, observed that 17.6% of the children who made up the sample were under the condition of high weight for their age. These data are higher than those observed in the municipality of Marituba, in which lower values can be observed in relation to this finding, but significant when compared to the municipalities of its own health region.

In table 2, it is possible to observe the data referring to the weight for age index in the year 2017, in the very low weight for age classification (PMBI), the municipality of Santa Bárbara do Pará obtained the worst indicator 1.82% (n=13). In the classification of low weight for age (PBI), Marituba had the highest percentage 4.45% (n=159), in addition to having presented an increase of 20% in relation to the previous year, as well as remaining with the smallest eutrophy values of 82.89% (n=2,964), and with the highest value of weight for age 11.44%.

In a study carried out on the prevalence of malnutrition and overweight in children under five years of age and its relationship with socioeconomic, health and demographic factors in six of the largest cities in Maranhão, it was observed that, according to the weight-for-age criterion, the prevalence of malnutrition was 4.5% [7]. These results differ from this study, as they present higher values of weight deficit, with high risk for children exposed to this scenario, since this situation can directly impact the development and growth of these individuals in the long term. However, the prevalence of overweight in the study by Chagas et al. [7] surpassed malnutrition in children under five living in the six most populous municipalities in Maranhão.

In table 3, it is possible to observe the data referring to the weight for age index in the year 2018, in the classification of very low height for age, it can be observed that the city of Ananindeua had the highest percentages 3.22% (n=186). In the classification of low weight for age, the city of Santa Bárbara do Pará presented the highest percentages, 4.75% (n=45). In the classification of normal weight and high weight for age, the city of Benevides had the lowest percentage 88.38% (n=2,540) for normal weight, and the highest percentage for high weight for age 7.97% (n=229).

In a research that sought to identify the prevalence of food insecurity in families benefiting from the Bolsa Família Program and the factors related to this condition, as well as to describe the nutritional status of children under five years of age residing in the city of Colombo, metropolitan region of Curitiba, it was possible to observe that for the parameter studied, 11.6% of the children had high weight for their age, whereas among children aged 2 to 5 years, the prevalence was 8.3% [8]. In addition, the authors of the study attest that malnutrition characterized by stunting and overweight is shown to be a key factor in confirming the nutritional transition in this population [8]. When taking into account the observed data, it is noted that the children in the study, residents of the northern region of the country, present lower percentages of the same parameter, when compared to those from the southern region, since the living and development conditions of each location differ greatly.

On the other hand, the research by Oppitz et al. [9] pointed out that the weight deficit for age (-2 Z scores) had a reduction from 6% in 1989 to 2% in 2006. However, these data reflect the reality of municipalities in the northeast region of the country, which even with a socioeconomic configuration similar to the north still has its particularities. So when we try to compare the data, they don't show big discrepancies, but they still represent different scenarios.

In table 4, it is possible to observe the data regarding the weight for age index in the year 2019. In the very low weight for age classification, the city of Ananindeua had the highest percentages 7.55% (n=185) and also the highest percentages of low weight for age 4.55% (n=404), and in relation to eutrophy, Ananindeua also presented the lowest percentages 82.59% (n=7,331), in the classification of high weight for age, the city of Belém presented the highest percentages 10.88% when comparing with data from other municipalities.

In a cross-sectional study carried out in 17 indigenous villages located in a region between Brazil and Venezuela, with the aim of verifying the nutritional status of individuals residing in that place, through the growth curves, it was determined that the prevalence of low W/A among children under five it was 50.0% [10]. The results found in the study with Yanomami children are quite different from those observed in children from the metropolitan health region I, which is in a better situation in relation to this parameter, even due to the ills faced in this society. Thus, it can be seen that socioeconomic conditions, place of residence and logistical problems directly influence aspects related to the development of the subject.

In the National Survey of Demography and Health of Children and Women - PNDS for the year 2009 [11] the frequency of P/A deficits estimated for the group of children was 1.9%, with the northern region showing an even lower percentage with a P/I deficit of 3.3%, one of the largest among the country's regions. When analyzing the situation of the metropolitan health region I, even higher values of malnutrition are noted, however, it is worth mentioning that there was a large passage of time between the data compared, but even so, the framework for the worsening of the situation remains consistent.

In table 5, it is possible to observe the data referring to the weight for age index in 2020. When classifying very low weight for age, the highest percentage was identified in the city of Belém, with approximately 4.96% (n=547), observed in the low weight classification for age, Ananindeua showed a higher percentage of 4.79% (n=372). With regard to eutrophy, the municipality of Belém had the lowest percentage, 84.22% (n=9,296). In the classification of high weight for age, the municipality of Benevides had the highest percentage, 9.82% (n=171).

In the study by Saldiva, Silva and Saldiva [12] in the northeast region of the country, about a decade ago, about the health and nutrition conditions of children under five years of age, associated with the quality of food consumption by beneficiaries of the Bolsa Família Program from a municipality in the Brazilian semi-arid

region, it was possible to observe that the weight/age deficit was 4.3%, with a high prevalence of malnutrition. This finding is similar to that found in this study, with similar PMBI values, a fact that may be associated with similar development conditions in both regions, configuring a scenario of "food and nutritional risk" for these individuals.

Pereira et al. [13] presented a panoramic configuration of the nutritional status of children in the country, which is considered an important instrument for measuring the health conditions and quality of life of a population. The results observed in their studies show that the North Region showed a tendency towards the presence of nutritional deficits. However, the situation changed with the influence of income transfer programs, corroborating how the findings of this study, which, based on the temporal analysis, showed a direction contrary to the past, with an increase in the numbers of children within the score of high weight for age.

Height for age

From the analyzed data, it is possible to observe, in table 6, the data referring to the A/I index in the year 2016, in which the 3 classifications can be verified (very low height for age (AMBI), low height for age (ABI) and age-appropriate height (AAI)). In the AMBI classification, the municipality of Benevides presented the highest percentage, being 8.27% (n=2,178). In the ABI classification, Santa Bárbara do Pará presented the highest percentage, with 12.82% (n=85) when compared to the other municipalities. Regarding the AAI classification, the city of Ananindeua had the lowest percentage, which was 82.38% (n=4,826).

According to Corrêa et al. [14], the north of the country is the region with the highest percentages of children with AMBI and ABI. A cross-sectional study carried out with children aged 0 to 59 months in the city of Jordão, state of Acre, North of the country, corroborates what was said by Corrêa et al [14], as the results showed a very high percentage in the number of children with AAI deficit, representing a percentage of 35% of the total number of children evaluated [4]. In relation to our findings, we can observe that in the AAI classification, the percentages of the AMB and ABI classifications corresponded to values still considered high, demonstrating that in the metropolitan health region I, cases of malnutrition due to AAI deficit are still visible, leading us to reflect on the situation in which these children find themselves, because, if effective measures are not taken by our governments, the malnutrition caused by the AAI deficit, compromises the entire development of

these children, which can bring harm that lasts for a lifetime adult.

It can be seen in table 7 the data referring to the AI index in the year 2017. When analyzing the percentages, it was possible to verify that, in the AMBI classification, the city of Benevides had the highest percentage 8.14% (n=193). When classifying ABI, the city of Santa Bárbara do Pará presented the highest percentage 13.55% (n=97). In relation to AAI, the city of Marituba had the lowest percentage when compared to the other municipalities 82.52% (n=2,951).

The percentages of AI deficits identified in a study carried out with children aged 06 to 59 months from the Karapotó people - state of Alagoas, identified a percentage equal to 13.4%, a fact that highlights the problems linked to short stature in these individuals, these values are considered high and characterized as public health problems. The factors associated with this prevalence are maternal schooling, low birth weight, family income and housing conditions [15]. These conditions mentioned above are very similar to those found in the northern region, where the highest percentages of children with a height-for-age deficit are found among indigenous and Quilombolas children who live in conditions of poverty or extreme poverty in areas of difficult access and children of illiterate mothers [16, 17]. The percentage found of children from the Karapotó people is very close to that found in the city of Santa Bárbara do Pará, in relation to the AMBI classification.

In table 8, it is possible to observe the data referring to the AI index in the year 2018. In the AMBI classification, the city of Ananindeua had the highest percentage 9.29% (n=253). The municipality of Santa Bárbara do Pará presented the highest percentage 10.34% (n=98) in the ABI classification. The city of Ananindeua had the lowest percentage in the AAI classification, 79.86% (n=4,609).

In the study by Lopes et al. [17], when evaluating the nutritional status of children aged 6 to 59 months, in the state of Maranhão, identified a prevalence of AMBI of 7.7% among the children followed up. Such results are worrying, as they demonstrate a high percentage of children with AAI deficits. These data are considered close to those found in the metropolitan health region I, in the municipality of Ananindeua, where the percentage of children with AMBI was 9.29%, demonstrating that the north and northeast of the country still have high percentages in cases of malnutrition. These results may be associated with social, demographic and economic factors in both regions.

In table 9, it is possible to observe the data referring to the AI index in the year 2019. As for the values referring to the AMBI classification, Ananindeua presented a very high percentage 20.03% (n=1,770). In the ABI classification, the highest percentage was found in the city of Santa Bárbara do Pará 9, 93% (n=81). Regarding the AAI classification, the city of Ananindeua had the lowest percentage, 70.45% (n=6,226).

As for the data found in the city of Ananindeua (20.03%) in the AMBI classification, the percentage was much higher than that observed among children in Porto Alegre when assessing the nutritional status of children aged 0 to 7 years, beneficiaries of the Program Bolsa Família, registered in a health unit in Porto Alegre. The results showed that, of the total of 74 children, only 1.4% had ABI. This study demonstrates the socioeconomic, geographic, environmental, and ethnic differences that exist between the regions and, finally, demonstrates the importance of access to public policies in the prevention of nutritional problems in the country [18].

It was possible to observe, in table 10, the data referring to the AI index in the year 2020. In the AMBI and ABI classification, the city of Ananindeua presented the highest percentages 17.71% (n=1,376) and 9.89% (n=786), respectively. In relation to the classification of AAI, that city had the lowest percentage, 72.4% (n=5,624).

In a review study carried out by Corrêa et al. [14], with the objective of describing the magnitude of the growth deficit in children under five years of age in the states of the northern region, in the period from 2008 to 2017, 35% of the analyzed studies showed a prevalence of growth deficit below 10%, already in 24% of studies that also included indigenous children or only indigenous children, the prevalence of chronic malnutrition was above 30%.

The data obtained in each state in the northern region show high prevalence of stunting among children in these states, the percentage found in the state of Rondônia was 6.3%, in the state of Amapá the prevalence was 31.1%, in the state of Acre the percentage was 30.3%, in the state of Pará 29.5%, and in the state of Amazonas 25.1%. The results found in our research, mainly in the city of Ananindeua, corroborate the study by Corrêa et al. (2020), as the percentages found in the municipality are high, and when comparing with what was found in the state of Pará, we realize the magnitude of the nutritional problem installed in this municipality.

BMI for age

In table 11, it is possible to observe the data referring to the BMI for age in the year 2016, and 6 classifications can be observed (marked thinness, thinness,

normal weight, risk of overweight, overweight and obesity). In the severe thinness classification, Marituba had the highest percentage, 4.89% (n=141). Regarding the thinness classification, Santa Bárbara do Pará presented the highest percentage, 4.37% (n=29). Regarding the eutrophic classification, the city of Ananindeua had the lowest percentage, 55.21% (n=3,234). Regarding the overweight risk classification, the city of Belém had the highest percentage, 21.79% (n=3,998). Regarding the classification of overweight, the city of Ananindeua presented the highest percentage, 9.02% (n=539). In terms of obesity, the municipality with the highest percentage was Marituba, 10.43% (n=301).

With regard to the indices of marked thinness and thinness, indicated through BMI by age, it was found that there was an increase in cases in the cities of Marituba and Santa Bárbara do Pará. In line with this, Gonçalves et al. [19], identified that there was a prevalence of 5.7% for a low Body Mass Index (BMI) in relation to age in children under 6 months of age, monitored by the Food and Nutrition Surveillance System (SISVAN), in Brazil, in the year de 2015. Santos and Bottega [20] pointed out the Bolsa Família Program as a protective factor against infant mortality from malnutrition, showing that the number of families monitored by the program directly influenced these death rates, given that such a government program guarantee to these families the right of access to basic services.

For Torquato et al. [21] just over 24% were overweight. In line with this, an increasing trend of both overweight and obesity was found in the state of Espírito Santo [22]. Such data corroborate the findings of the present study, where an increase in notifications for risk of overweight and overweight and obesity could be observed.

Furthermore, Crescente et al. [23] points to a correlation between the BMI of the child and the parents, such data brings a reflection on the changes in consumption and family lifestyle, where there is a greater intake of foods with high energy density and little nutrition, associated with a sedentary lifestyle children resulting from the overvaluation of the use of electronic media and abandonment of recreational activities.

In table 12, it is possible to observe the data referring to the BMI index for age in the year 2017. In the classification of severe thinness, Benevides had the highest percentage, 3.76% (n=89). Regarding the thinness classification, Santa Bárbara do Pará obtained the highest percentage, which was 4.61% (n=33). In relation to eutrophy, a lower percentage can be observed in the municipality of Marituba, with 55.37% (n=1,980). With regard to the classification of overweight risk, the city

Ananindeua had the highest percentage, 20.22% (n=859), when compared to the other municipalities. Regarding the classification of overweight, the municipality of Marituba presented a very high percentage of 10.49% (n=375). In the classification of obesity, it was observed that the municipality with the highest percentage of children was Benevides, with 11.31% (n=268).

For Torquato et al. [21], during the analysis of the nutritional status of children under two years of age in six public day care centers in Paraíba, a percentage of 5.2% was identified for children in a state of thinness according to BMI for age, with the percentages of healthier children were higher in the urban area of the city. Such data are considered close to those presented in the classification of pronounced thinness and thinness, in the cities of Benevides and Santa Bárbara do Pará, representing that the north and northeast regions of Brazil are still affected with high rates of reported cases of malnutrition.

However, when analyzing the nutritional status of children on prolonged exclusive breastfeeding in the State of Pernambuco, Azevedo et al. [24] found a prevalence of 31.9% for overweight and obesity in children in the control group. This factor may be related to the lack of a set of effects considered beneficial during non-exclusive breastfeeding, such as nutritional, immunological and metabolic ones, which are essential for the protection of the child against the development of possible chronic conditions, as is the case of overweight and obesity.

In table 13, it is possible to observe the data referring to the BMI index for age in the year 2018. In the classification of severe thinness, Ananindeua had the highest percentage, this being 3.31% (n=191), in relation to the classification of eutrophy it presented the lowest percentage 57.47% (n=3,332). With regard to thinness, it was observed that the highest percentage was found in the municipality of Santa Bárbara do Pará, 3.59% (n=34). In the classification of overweight risk, the municipality with the highest percentage was Marituba with 20.86% (n=818). Regarding overweight and obesity, Benevides presented the highest percentages, being 9.88% (n=284) and 7.59% (n=218), respectively.

According to Santos et al. [25], 3.6% of the children analyzed in a day care center in the city of Cuité/PB were in a state of thinness according to the BMI/age parameter, a number similar to that identified in the present study in the cities of Ananindeua and Santa Catarina. Barbara do Pará. Thus, this persistent predominance of thinness in this population may be related to certain sociodemographic characteristics of these families.

Corroborating both studies, Costa et al. [26] pointed out in their findings that 20.8% of preschoolers from private schools in the city of Teresina/PI were at risk of being overweight, 5.2% of children were already overweight and 12.7% were obese. This perspective may be associated with the nutritional transition process that Brazil has been facing, where the presence of lower numbers of malnutrition and a growing prevalence of overweight and obesity cases can be observed, as a result of changes in lifestyle and the process of globalization.

In table 14, it is possible to observe the data referring to the BMI index for Age in the year 2019. In the classification of severe thinness, it can be observed that Ananindeua presented the highest percentage, with 9.79% (n=865), since in relation to eutrophy, the mentioned city had the lowest percentage 54.08% (n=4,780). Regarding the classification of thinness, Belém was the municipality that presented the highest percentage, 5.23% (n=1,100). Regarding the classification of overweight risk, Benevides had the highest percentage, 16.81% (n=494), the same city also had the highest percentage of overweight, 7.66% (n=225). With regard to obesity, the highest percentage was found in the city of Ananindeua, 11.82% (n=1,045).

Alves et al. [27] seeking to assess the nutritional status of children between zero and five years of age in Sobral/CE, identified a prevalence of 5.12% of marked thinness and thinness within their sample. In line with this, Vieira et al. [28] highlights as risk factors for child malnutrition both the family's food insecurity and the inadequacy of the mother and child binomial.

Corroborating the findings of the present study, Vasconcelos et al. [29] found that there was a decline in excess weight in infants between 2008 and 2018, with regard to preschoolers, an increase in this prevalence was identified by about 3.1% per year until 2015, after that, there was a drop in the percentages until the year 2018. Within these two groups, the northern region of Brazil was the one with the lowest prevalence. Thus, it is associated that breastfeeding can be of fundamental importance for the reduction of cases of excess weight in infants, since it can reduce the chances of overweight in childhood.

In table 15, it is possible to observe the data referring to the BMI index for age in the year 2020. In the classification of severe thinness, the highest percentage was identified in the city of Belém, 13.26% (n=1,464). In the classification of thinness, Belém also presented the highest percentages, 4.09% (n=451). With regard to eutrophy, Santa Bárbara do Pará had the lowest percentage, 58.28% (n=454). Regarding the classification of risk of overweight and overweight, the municipality of

Benevides had the highest percentages, 18.03% (n=314) and 9.24% (n=161), respectively. In terms of obesity, the municipality with the highest percentage compared to the others was Ananindeua, with 9.53% (n=740).

When monitoring malnourished children to identify possible risk factors, Eickhoff and Nogueira [30] reveal that such children are more prone to more humid housing conditions, offering food of low nutritional value and living in high-violence neighborhoods. Such factors are considered to have a high influence on the involvement of these children by infectious diseases, in addition to conditioning for an unhealthy lifestyle that can negatively affect the entire life of these individuals.

When analyzing overweight in schoolchildren in the city of Carapicuíba/SP, Eskenazi et al. [31] identified that 26.7% of five-year-old children were overweight, while 10.8% were obese, a figure that can be similar to the present research. These data can be associated with an increase in family income, when these families express their preferences for the purchase of processed foods with low nutritional content, a decrease in the practice of physical activity by children, to the detriment of the overestimation of time in front of the screens and greater active participation of women in the labor market.

Historical series of BMI for age

The historical series was assembled in order to present a set of data related to the main findings of the work. In graph 1, it is possible to observe the data referring to the BMI/A index, in which the eutrophic classification was highlighted during the years 2016 to 2020, however, the city that presented the highest percentage of children with adequate BMI in the year of 2020 was the municipality of Marituba, with a percentage of 66.08% (n=9,536). As for children outside the normal range, the municipality of Santa Bárbara do Pará had the highest percentage of children, 41.72% (n=6,530), in 2020.

A survey analyzed the nutritional status of children from 0 to 5 years of age in 5 health districts of Foz do Iguaçu-PR, and found that 4.3% of them were thin, 62.8% eutrophic, 20.2% risk of overweight and 12.7% obesity [32]. In this sense, about 37.2% of these individuals were outside the normal range, a worrying fact when considering that 32.7% were above the ideal parameter and 4.3% were below it, evidencing serious epidemiological problems linked to the lack of public policies for the less favored.

In the study by Castro [33], where the nutritional status of children benefiting from the PBF before and during the pandemic was analyzed, he observed that in the states of the Northeast region, in 2019, the percentage of eutrophy was 58.07% and in 2020 was 58.25%, showing a

slight improvement in this scenario. But, despite observing very similar parameters in the two years analyzed, the study points to the occurrence of a great difference in relation to the number of children monitored, this can also be observed in this study in metropolitan region I, with different numbers of children approached in different areas each municipality and better percentages in those with fewer children.

Height for age historical series

In graph 2, showing a historical series with data referring to the A/I classification, the AA/I classification was highlighted between the years 2016 to 2020. It was possible to observe that the municipality of Marituba had the highest percentage of children within the normal range 90.83% (n=1,872), in 2020. Ananindeua was the city that presented the highest percentages outside the normal range in all years of the survey, obtaining the highest percentage in 2019, 29.55% (n=2,162).

In a study carried out in the context of the Family Health Strategy/PB, a prevalence of 7.9% of children outside the normal range was identified, for Oliveira et al. [34]. The factors associated with this prevalence in Paraíba are directly linked to the mother's nutritional status, as well as factors related to food and nutritional insecurity to which children are exposed, with inadequate and irregular food having a direct impact on the growth of the little ones.

IV. CONCLUSION

In summary, the results of this study made it possible to identify, with the aid of a temporal analysis, the percentages of children with deficits in W/A, H/A and BMI/A, based on a small sample taken from the North region of the country. In this way, it is possible to identify the nutritional problems caused by the absence or poor diet, which directly impact the nutritional status of children belonging to the metropolitan health region I, in the state of Pará.

The results showed a high number of children with inadequate BMI/A and A/A, demonstrating a pattern outside the normal range, especially in 2019, which may highlight the political and economic crisis that the country has been going through in recent years, in which the scenario of hunger starts to be seen again and affects millions of Brazilians. However, it is worth emphasizing the importance of the ESF program, and SISVAN, in monitoring and identifying these children, so that assertive measures are taken, such as, for example, their inclusion in public health programs and income access programs that can help access to healthy and regular food.

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