DOI: 10.1590/1980-549720190008

ORIGINAL ARTICLE / *ARTIGO ORIGINAL*

Nutrition profile of children in Maranhão state

Perfil nutricional de crianças no estado do Maranhão

Amanda Forster Lopes[I], Maria Tereza Borges Araujo Frota[II], Claudio Leone[I], Sophia Cornbluth Szarfarc[III]

ABSTRACT: ***Introduction*:** Combating malnutrition is among the greatest health challenges and needs to be guided by the reality of each region. Studies that assess nutritional status are essential to support interventions, especially in children. ***Objective*:** To analyze the nutritional status of under-five children attended by the family health strategy in the state of Maranhao. ***Method*:** Cross-sectional study with children of a sample of probabilistic and stratified representative for the state, six to 59 months. The variables age of the child, gender, household situation and Food Insecurity (Brazilian Scale of Food Insecurity) classification were collected through interviews. The z-score (Z) values of height for age, weight for height and Body Mass Index (BMI) for age were calculated. The nutritional status of the children was classified according to the norms of the Ministry of Health. Statistical methods of correlation were used to analyze the data. ***Results*:** Of the 956 children, 9.6% had low or very low height for age. According to the BMI for age overweight was observed in 23.2% of children. The rural children have on average less height and body mass index Z. In total 70.4% of children were food insecure with inverse correlation with height-for-age Z ($r = -0,15$, $p < 0,0001$) and no correlation with BMI z score for age ($r = -0,05$, $p = 0,09$). ***Conclusion*:** Chronic malnutrition can still be considered a public health problem despite the nutritional transition that already occurs in these families.

Keywords: Anthropometry. Nutritional status. Prevalence. Child nutrition disorders. Nutritional transition. Food and nutritional security.

[I]Department of health, Life cycle and Society at Public Health School, Universidade de São Paulo – São Paulo (SP), Brazil.
[II]Department of Physiological Sciences, Universidade Federal do Maranhão – São Luís (MA), Brazil.
[III]Department of Public Health Nutrition at Public Health School, Universidade de São Paulo – São Paulo (SP), Brazil.
Corresponding author: Amanda Forster Lopes. Departamento de Saúde Materno-Infantil, Faculdade de Saúde Pública, Universidade de São Paulo. Avenida Doutor Arnaldo, 715, CEP: 01246-904, São Paulo, SP, Brazil. E-mail: amanda.flopes@yahoo.com.br
Conflict of interests: nothing to declare – **Financial support**: National Council for Scientific and Technological Development (CNPq), *Fundação de Amparo à Pesquisa e ao Desenvolvimento Científico e Tecnológico do Maranhão* (FAPEMA), and Secretariat of Health of the State of Maranhão, 060/10 and n. 436/10 of the Universidade Federal do Maranhão and Public Health School of Universidade de São Paulo.

RESUMO: ***Introdução*:** O combate à má nutrição está entre os maiores desafios de saúde e precisa ser norteado conforme a realidade de cada região. Estudos que avaliem o estado nutricional são imprescindíveis para embasar intervenções, principalmente em crianças. ***Objetivo*:** Analisar o perfil epidemiológico nutricional de crianças menores de cinco anos atendidas pela Estratégia Saúde da Família (ESF) no Maranhão. ***Método*:** Estudo transversal com crianças de 6 a 59 meses, de uma amostra do tipo probabilística e estratificada, representativa para o estado. Foram coletadas, por entrevistas, as variáveis "idade da criança", "sexo", "situação do domicílio" e "classificação de Insegurança Alimentar" (Escala Brasileira de Insegurança Alimentar). Foi realizado o cálculo dos valores de escore z (Z) de estatura para a idade, peso para a estatura e índice de massa corpórea (IMC) para a idade. O estado nutricional foi classificado segundo as normas do Ministério da Saúde. Para a análise dos dados foram utilizados métodos estatísticos de correlação. ***Resultados*:** Das 956 crianças, 9,6% apresentaram estatura baixa ou muito baixa. Segundo o Z de IMC, o excesso de peso foi observado em 23,2% das crianças. As crianças da zona rural têm média Z de estatura e de IMC menor. No total, 70,4% das crianças apresentaram situação de insegurança alimentar, com correlação inversa com a estatura (r: -0,15; $p < 0,0001$) e sem correlação com o Z de IMC (r: -0,05; $p = 0,09$). ***Conclusão*:** A desnutrição crônica ainda pode ser considerada um problema de saúde pública no Maranhão, a despeito da transição nutricional que já ocorre nessas famílias.

Palavras-chave: Antropometria. Estado nutricional. Prevalência. Desnutrição infantil. Transição Nutricional. Segurança alimentar e nutricional.

INTRODUCTION

According to the World Health Organization (WHO), combating all forms of malnutrition is one of the greatest global health challenges in a scenario where almost one in three people suffer from at least one form of malnutrition: acute, chronic, vitamin and mineral deficiency, overweight or obesity, or chronic diet-related noncommunicable diseases[1]. Despite the current concern towards the increase in prevalence of overweight in childhood, which is characteristic of the nutritional transition[2], there is still a significant number of children suffering the consequences of low weight. According to estimates, in 2016 there were four times more children suffering from chronic malnutrition than from overweight or obesity[1].

Chronic childhood malnutrition, characterized as a pathological condition resulting from the lack of macronutrients in various proportions and specific circumstances in the pre or postnatal period, is associated with adverse physiological consequences such as increased mortality rates and prevalence of infectious and functional diseases, such as delayed psychomotor development[3,4]. This condition is related to poor physical, social and economic access to food, reflected in the consumption of insufficient amounts and/or low quality, factors that determine the condition of food and nutritional insecurity[5].

In Brazil, regular and permanent access to food is difficult by a significant portion of the population, which is mainly associated with low income[6]. Thus, programs that invest in the improvement of socioeconomic and environmental aspects of agriculture and health are linked to the global trend of reducing the prevalence of malnutrition, especially in families of lower socioeconomic status[7].

An important upsurge of public-sanitation and health programs has been observed in the Brazilian territory, with emphasis to the Family Health Strategy (FHS). In expansion since 1994, the program is currently considered the first level of health care of the Brazilian Public Health System (SUS)[8] holding as premise to service individuals and families integrally and continuously, by developing actions that promote, protect and recover health[9].

Reflecting the improvement in maternal schooling level, family purchasing power and access to health care and sanitation, the prevalence of children under five years old with chronic malnutrition in Brazil decreased by around 50% between 1996 and 2007[3]. The Northeastern Region was found to have similar data, as since 1974 the prevalence of malnutrition was higher in relation to other regions of the country, but was at only 5.9% in 2007, clearly lower than the last data from 1996, which pointed out 22.2% of children diagnosed with malnutrition[10].

A population-based study conducted in 1996 in the State of Maranhão reported prevalence of 11.9% of infant malnutrition in children under five years of age[11]. Another study carried out 10 years later stated 3.9 and 6.7% of children diagnosed with malnutrition and overweight in Maranhão, respectively[12]. No data from studies other than population-based ones estimating the prevalence of overweight in children under five years of old in this State were found, a relevant deficiency, since Maranhão ranks penultimate among Brazilian States in the Human Development Index)[13]. Moreover, the State has the highest proportion of socially excluded people, with social exclusion index (SEI) of 59.56% — higher than any other State in the region[14] — and indigence rates that are more than double compared to Brazil as a whole, with 25.7% of people living in extreme poverty[15].

Considering the characteristics of Maranhão, studies on the nutritional status and food safety of children under five years allow to improve the judgment of health situation in the State, as well as to identify determining factors of such diseases. These aspects are relevant and can be considered when evaluating effectiveness and discussing the reformulation of public policies[16], in addition to possible contributions to other fields of science[17]. In addition, the incentive to expand and consolidate basic care through the FHS can and should provide important collaboration when it comes to identifying risk situations and food/nutritional orientation.

That being said, the objective of this study was to analyze the nutritional epidemiological profile of children under five years old assisted by FHS in the State of Maranhão and to verify if the nutritional transition process is already ongoing in this population, including families that present food insecurity.

METHOD

Cross-sectional study with data collection between July and September 2010, conducted with children aged 6 to 59 months serviced by FHS in the four geographic macroregions of the State of Maranhão (Santa Inês, Caxias, Imperatriz and Pinheiro) and in the capital, São Luís.

The probabilistic, stratified sample was designed to guarantee the representativeness of each microregion of the State and the capital. The lot of sample unit for each geographical area was processed in four stages. First, the municipality was considered, with five being chosen by region, totaling 20 municipalities plus the capital. Subsequently, FHS teams were considered based on the list provided by the Municipal Health Secretaries, when three teams were randomly picked per municipality, with no distinction between urban and rural areas. Community health agents and families under their care and with children in the required age range were also drawn. If a household had more than one child aged 6 to 59 months, the youngest one would be chosen.

Sample size calculation was based on the assumption that families had low socioeconomic status in Maranhão, with estimation of prevalence of low height of at least 5% among children under five years old. In order to determine the prevalence of low height with standard error (SE) of 1%, minimum sample size was estimated in 850 children under 5 years old. The possibility of a loss of up to 15% for inconsistency of data collected was accepted, so the final sample size of children to be drawn was determined to be 978, which would guarantee a sample larger than 850 children, number considered necessary to reach accuracy when determining the prevalence of low height. This number of children could determine, with the same precision, that is, 1% SE, up to three times the prevalence of overweight.

Children whose caregivers reported, at the time of data collection, that they were diagnosed with sickle cell anemia or were twin were excluded from the sample. After data collection, 10 children were excluded because they had Z scores of weight for height (zW), height for age (zH) and body mass index for age (zBMI) higher than 4.5 or lower than -4.5 due to data inconsistency.

Children's anthropometric measures — weight (kg) and height (cm) — were collected according to WHO's recommendations (2006)[18] by two researchers from Universidade Federal do Maranhão (UFMA) who received specific training of 40 hours in meetings with presentation of the project content, importance of standardization of data collection and theoretical/practical guidelines for anthropometry measurement.

The weight was measured using Omron® scale model HBF-510, with a capacity for 150 kg and graduations of 100 g. Children under two years old were weighed with their mother and then their weight was counted against the mother's. To measure height of children older than 2 years, the Alturexata® anthropometer was used, ranging from 0 to 2.13 m with subdivisions of 0.1 cm. Children under 2 years of age were measured in the horizontal position with a 100 cm width Rollametre® infantometer. All children were measured and weighed barefooted and wearing light clothing. Two measures of weight and height were made and, when the weight measurements differed in more than 100 g and height in more than 1.0 cm, new measurements were performed. Data were annotated in the questionnaire and the mean of measurements was used for the analysis.

From the values of weight and height, and according to age and sex, Z scores for height[19], weight and BMI were calculated based ono the WHO reference framework[20]. Then, the

nutritional status was defined according to the Ministry of Health standards[21], characterizing children with overweight when BMI Z score ≥ + 1.

For collection of other information, interviews were conducted by a trained interviewer, at the participants' households, and primarily with the biological mother of the child. In the absence of this character, the person in charge of the child or the caregiver would be interviewed. Variables considered were age and gender of the child, household situation (urban or rural), and household classification of Food Insecurity.

In order to diagnose food insecurity, the Brazilian Food Insecurity Scale (EBIA) was used. This is a subjective method to evaluate how families feel and react to the expectation of food (in)security, that is, related to the risk of hunger, subjectively constructed by the very experience of food deprivation conditioned by economic and social adversities of the family[22]. The questionnaire consists of 15 closed questions with positive and negative answers. For each positive response, a value of 1 was assigned, and to each negative response, zero, so the score ranged from 0 to 15 points and was used to classify the food insecurity situation in households at four levels: food security (0 points), food insecurity (1 to 5 points), moderate food insecurity (6 to 10 points) and severe food insecurity (11 to 15 points).

Analyses of correlation were performed according to the existing hypotheses, using Z Score for height and BMI as response variable. Age, sex, area of residence (urban and rural) and diagnosis of food insecurity score were also used as variables.

The present study was approved by the Research Ethics Committees of the participating institutions and sticked to the norms of Resolution 466/2012 by the National Health Council and amends on research involving human beings.

RESULTS

The 956 children of the sample were aged 6 to 59 months, with mean of 29 months and standard deviation of 0.5. Distribution according to sex was similar (50.3% boys) and about one third of the subjects lived in the rural area.

Low and very low height for age were observed in 7.7 and 1.9% of children, respectively. According to the Z score classification, the prevalence of marked thinness among children was 0.3, and 20.2% of them were classified above eutrophy, that is, the sum of children at risk of overweight, presenting overweight and obesity. When nutritional status was adjusted for BMI for age, 23.2% of children were classified as overweight (Table 1).

The correlation between Z score for height and children's age was negative (r = -0.2998; 95%CI -0.3581 - -0.2392), a statistically significant data (p <0, 0001). The same analysis, separating boys from girls, showed similar results (Figure 1).

Figure 2 shows the profile of children according to region of residence, observing that subjects living in the rural area had a significantly lower mean Z score for height compared to those living in the urban center (p = 0.0014). As for BMI Z score, mean values of children from urban zones were significantly higher compared to children from rural areas (p = 0.0039).

As for "food insecurity", 29.6% (283) of the children presented were considered to be in food security situation, as 32.3 (309), 22.6 (216) and 15.5% (148) were in mild, moderate and severe level, respectively. The correlation analysis showed that children whose families had the highest EBIA score — which reflects higher food insecurity — had lower height Z score ($p < 0.0001$, Figure 3). No correlation between this variable and BMI Z score was found.

DISCUSSON

Linear growth is an excellent indicator of social inequalities and population welfare[23]. When it is not the result of hereditary factors, delay in height growth reflects the individual's

Table 1. Distribution of nutritional status according to z score of height for age, weight for height, and body mass index for age in children under five years old. Maranhão, 2010.

Categories	N	%	95%CI
Height for age			
Very short height for age	18	1.90	1.20 – 3.00
Short height for age	74	7.70	6.20 – 9.60
Adequate height for age	864	90.40	88.30 – 92.10
Weight for height			
Marked thinness	3	0.30	0.01 – 0.09
Thinness	13	1.50	0.80 – 2.30
Eutrophy	745	78.00	75.20 – 80.40
Risk of overweight	145	15.00	13.00 – 17.60
Overweight	40	4.20	3.10 – 5.60
Obesity	10	1.00	0.60 – 1.90
BMI for age			
Marked thinness	2	0.20	0.10 – 0.80
Thinness	16	1.70	1.00 – 2.70
Eutrophy	718	75.00	72.30 – 77.70
Risk of overweight	163	17.20	14.80 – 19.60
Overweight	45	4.60	3.50 – 6.20
Obesity	12	1.30	0.70 – 2.20

95%CI: 95% confidence interval; BMI: body mass index.

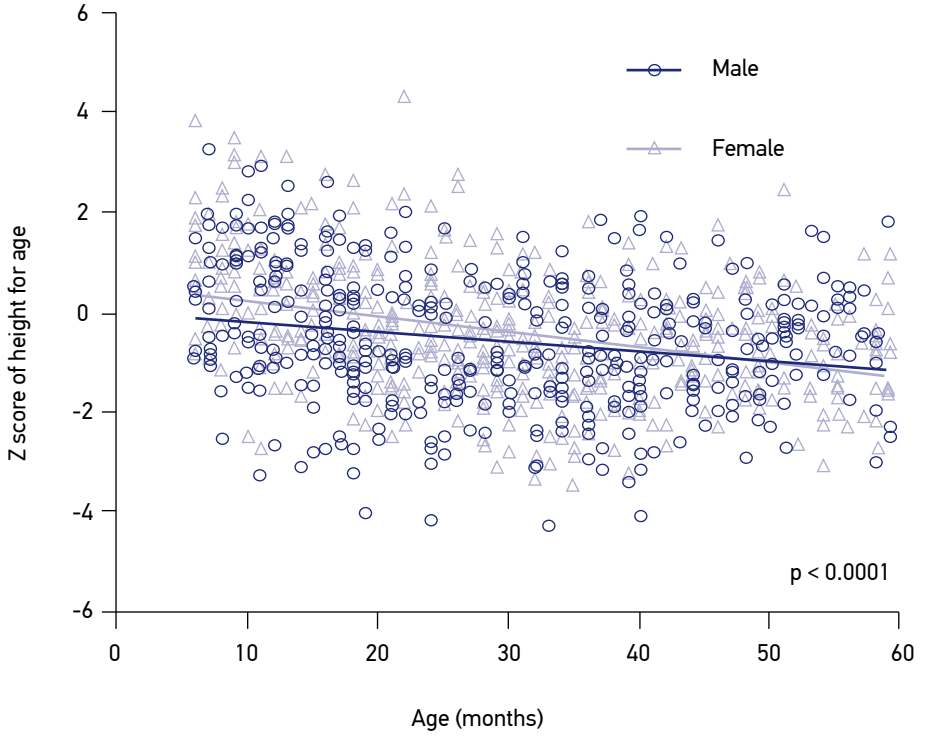
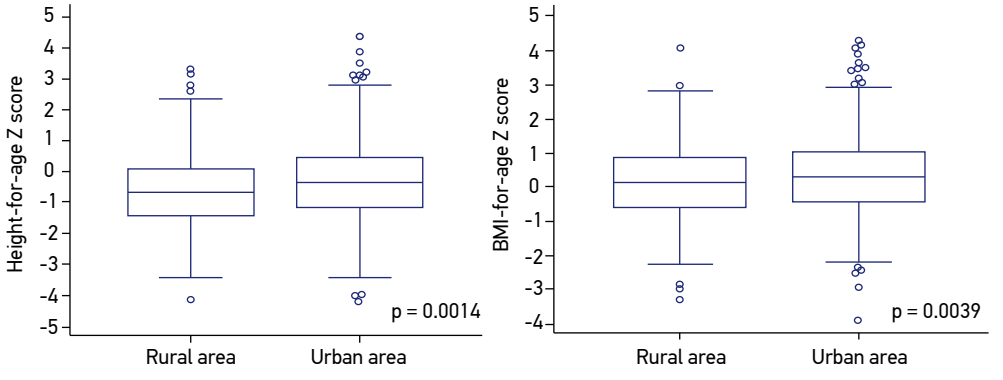


Figure 1. Evolution of Z score of height for age according to the age of children under five years old. Maranhão, 2010.



BMI: body mass index.

Figure 2. Distribution of Z-score of height for age and body mass index for age according to region of residence — rural and urban — of children under five years old. Maranhão, 2010.

exposure to environmental factors[24] that, at some point in their development, have hindered adequate growth.

We were able to observe that, in Maranhão, younger children have a stronger tendency to grow in height. However, although this suggests a progressive improvement in their living conditions, there is still a high prevalence of children with low height for age (9.6%) compared to a previous study conducted in Maranhão (8.5%)[11]. It should also be noted that both prevalence values are higher when compared to Brazil as a whole (7.1%)[25].

These data suggest that the children in Maranhão, or at least a significant portion of them, are not following the trend of normal growth in height previously observed in Brazilian children[25]. This also shows that children living in rural areas have significantly lower height and BMI compared to children from urban areas, similarly to the trend found by authors who compared the nutritional status of children in several developing countries, including Brazil[26,27].

As reported in other studies[28,29], the indicator of food insecurity also showed a significant correlation with the height of the children, which place children living in food insecurity conditions at greater risk of having low height for age, possibly as a consequence of a process of chronic malnutrition, even if in moderate severity. Despite the high prevalence of

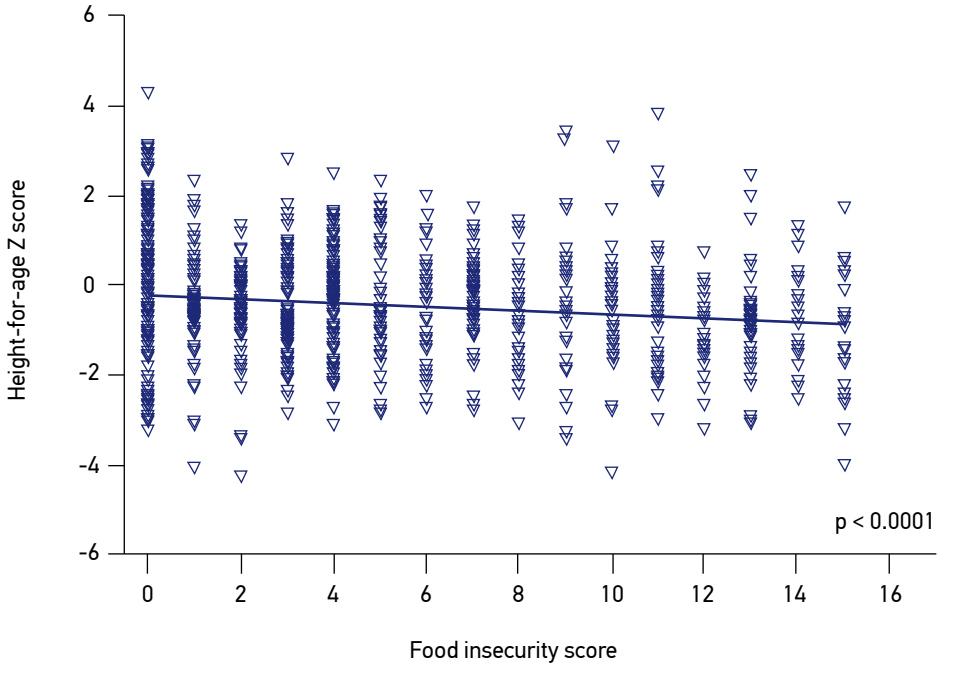


Figure 3. Correlation between Z-score of height for age and food insecurity score for children under five years old. Maranhão, 2010.

children exposed to some level of food insecurity, we could not find an association between food insecurity and BMI, which is comparable to the findings by Gubert et al.[30] in a sample representative of Brazil.

Overall, the results reflect the conditions of low human development and social exclusion in which the population of Maranhão lives[14,15], bringing about the intimate relationship between environment conditions experienced by the child and their nutritional status. In addition, these data reinforce the multiple dimensions of food and nutritional security, suggesting that nutritional status should not be the only parameter relied on to assess food insecurity of an individual or a family[5].

As for nutritional status, we report a significant prevalence of overweight among children (20.2% above eutrophy), when assessed by *Z* scores of weight for height and sex and also by zBMI (23.2%). Once the *Z* score is calculated, both parameters are corrected for age and gender. In this case, it can be considered that BMI calculation, which involves height squared, justifies the small difference observed in the proportion of children diagnosed with overweight in both parameters. BMI *Z* score is recommended for diagnostic screening because it is more sensitive in population studies[31].

These data show a significant increase in the prevalence of overweight compared to what was previously found in the same State (6.7%) in 2006[12], a scenario matching results of several studies carried out in other regions of low socioeconomic status in Brazil[10,32-35].

Finally, one should note that, although there are children with very low *Z* scores, compatible with diagnosis of thinness or marked thinness, this prevalence does not exceed the expected by WHO standards, representing a population under five years of age considered normal[18] in terms of growth.

A significant part of the families (70.4%) had some degree of food insecurity, which is much higher than data found for Brazil as a whole (22.6%) and in the State of Maranhão, as a national survey reported improvement in this condition from 2009 (31.2%) to 2013 (23.7%)[36].

From these findings, it is evident that there is a need for greater articulation to incorporate intersectoriality into public policies aimed at promoting food and nutritional security in Maranhão. The aim is to improve the planning of actions, considering the particularities of this population and involving all aspects foreseen by SUS: health promotion and protection, health surveillance, prevention, diagnosis and treatment of existing diseases and disorders[37].

CONCLUSION

In the under-five population of Maranhão, the prevalence of thinness or marked thinness can be considered very low, while the high prevalence of overweight is concomitant with short height occurrence.

On the whole, interpreting these facts leads to concluding that, in Maranhão, chronic malnutrition can still be considered a public health problem despite the nutritional transition that has occurred among families of lower socioeconomic level, possibly as a result of the gradual improvement of income and access to education and health resources, probably consequence of social protection policies.

On the other hand, the nutritional profile and food insecurity score reflect the need to intensify actions aimed at the integral care of the child, not only individually, but also considering the environment surrounding them, in order for the human right to adequate food be ensured.

REFERENCES

1. World Health Organization. The double burden of malnutrition. Policy brief. Genebra: World Health Organization; 2017.
2. Monteiro CA, Mondini L, Souza ALM, Popkin BM. The nutrition transition in Brazil. Eur J Clin Nutr 1995; 49(2): 105-13.
3. Monteiro CA, Benicio MHD, Konno SC, Silva ACF, Lima ALL, Conde WL. Causes for the decline in child under-nutrition in Brazil, 1996-2007. Rev Saúde Pública 2009; 43(1): 35-43. http://dx.doi.org/10.1590/S0034-89102009000100005
4. Onis M, Blössner M, Borghi E. Prevalence and trends of stunting among pre-school children, 1990–2020. Public Health Nutr 2012; 15(1): 142-8. https://doi.org/10.1017/S1368980011001315
5. Morais DC, Dutra LV, Franceschini SCC, Priore SE. Insegurança alimentar e indicadores antropométricos, dietéticos e sociais em estudos brasileiros: uma revisão sistemática. Ciênc Saúde Coletiva 2014; 19(5): 1475-88. http://dx.doi.org/10.1590/1413-81232014195.13012013
6. Cotta RMM, Machado JC. Programa Bolsa Família e segurança alimentar e nutricional no Brasil: revisão crítica da literatura. Rev Panamericana Salud Pública 2013; 33(1): 54-60.
7. Stevens GA, Finucane MM, Paciorek CJ, Flaxman SR, White RA, Donner AJ, et al. Trends in mild, moderate, and severe stunting and underweight, and progress towards MDG 1 in 141 developing countries: a systematic analysis of population representative data. Lancet 2012; 380(9844): 824-34. https://doi.org/10.1016/S0140-6736(12)60647-3
8. Brasil. Ministério de Saúde. Secretaria de Atenção à Saúde. Departamento de Atenção Básica. Série I. História da Saúde no Brasil. Memórias da Saúde da família no Brasil. Brasília: Ministério de Saúde; 2010. 144 p.
9. Coutinho JG, Gentil PC, Toral N. A desnutrição e obesidade no Brasil: o enfrentamento com base na agenda única da nutrição. Cad Saúde Pública 2008; 24(Supl. 2): S332-40. http://dx.doi.org/10.1590/S0102-311X2008001400018
10. Victora CG, Aquino EML, Leal MC, Monteiro CA, Barros FC, Szwarcwald CL. Maternal and child health in Brazil: progress and challenges. Lancet 2011; 377(9780): 1863-76. https://doi.org/10.1016/S0140-6736(11)60138-4
11. Tonial SR, Silva AAM. Saúde, Nutrição e Mortalidade Infantil no Maranhão. São Luís: Gráfica Universitária da UFMA; 1997.
12. Chagas DC, Silva AAM, Batista RFL, Simões VMF, Lamy ZC, Coimbra LC, et al. Prevalência e fatores associados à desnutrição e ao excesso de peso em menores de cinco anos nos seis maiores municípios do Maranhão. Rev Bras Epidemiol 2013; 16(1): 146-56. http://dx.doi.org/10.1590/S1415-790X2013000100014
13. Comissão Econômica para a América Latina e o Caribe, Programa das Nações Unidas para o Desenvolvimento, Organização Internacional do Trabalho. Emprego, desenvolvimento humano e trabalho decente: a experiência brasileira recente. Brasília; 2008.

14. Silva OP. A exclusão social do semiárido brasileiro [monografia do curso de Ciências Econômicas]. Fortaleza: Universidade Federal do Ceará; 2010.
15. Instituto Brasileiro de Geografia e Estatística. Censo Demográfico 2010: IBGE estados – Maranhão (12º Recenseamento Geral do Brasil). Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2011.
16. Engstrom EM, Castro IRR De. Monitoramento em nutrição e saúde: articulação da informação com a ação. Saúde Rev 2004; 6(13): 45-52.
17. Flores LS, Gaya AR, Petersen RDS, Gaya A. Trends of underweight, overweight, and obesity in Brazilian children and adolescents. J Pediatr 2013; 89(5): 456-61. http://dx.doi.org/10.1016/j.jped.2013.02.021
18. World Health Organization. Child Growth standards: Length/heigth-for-age, weigth-for-age, weigth-for-length and body mass index-for-age. Methods and development. Genebra: World Health Organization; 2006.
19. World Health Organization. Anthro for personal computers, version 3.2.2, 2011: Software for assessing growth and development of the world's children [Internet]. Genebra: World Health Organization; 2010 [acessado em 10 fev. 2018. Disponível em: http://www.who.int/childgrowth/software/en
20. World Health Organization Multicentre Growth Reference Study Group. WHO Child Growth Standards. Genebra: World Health Organization; 2006.
21. Brasil. Ministério da Saúde. Protocolos do Sistema de Vigilância Alimentar e Nutricional SISVAN. Brasília: Ministério da Saúde; 2008.
22. Oliveira JS, Lira PIC, Maia SR, Sequeira LAS, Amorim RCA, Batista Filho M. Insegurança alimentar e estado nutricional de crianças de Gameleira, zona da mata do Nordeste brasileiro. Rev Bras Saúde Mat Infantil 2010; 10(2): 237-45. http://dx.doi.org/10.1590/S1519-38292010000200011
23. Pedraza DF, Menezes TN. Fatores de risco do déficit de estatura em crianças pré-escolares: estudo caso-controle. Ciênc Saúde Coletiva 2014; 19(5): 1495-502. http://dx.doi.org/10.1590/1413-81232014195.21702013
24. Pedraza DF, Sales MC, Menezes TN. Fatores associados ao crescimento linear de crianças socialmente vulneráveis do Estado da Paraíba, Brasil. Ciênc Saúde Coletiva 2016; 21(3): 935-46. http://dx.doi.org/10.1590/1413-81232015213.20722014
25. Monteiro CA, MHD Benicio, Conde WL, Konno SC, Lima ALL, Barros AJD, et al. Desigualdades socioeconômicas na baixa estatura infantil: a experiência brasileira, 1974-2007. Estud Av 2013; 27(78): 35-49. http://dx.doi.org/10.1590/S0103-40142013000200004
26. Fox K, Heaton TB. Child Nutritional Status by Rural/Urban Residence: A Cross-National Analysis. J Rural Health 2012; 28(4): 380-91. https://doi.org/10.1111/j.1748-0361.2012.00408.x
27. Paciorek CJ, Stevens GA, Finucane MM, Ezzati M. Children's height and weight in rural and urban populations in low-income and middle-income countries: a systematic analysis of population-representative data. Lancet 2013; 1(5): e300-9. https://doi.org/10.1016/S2214-109X(13)70109-8
28. Santos LP, Gigante DP. Relação entre insegurança alimentar e estado nutricional de crianças brasileiras menores de cinco anos. Rev Bras Epidemiol 2013; 16(4): 984-94.
29. Cuevas-Nasu L, Rivera-Dommarco JA, Shamah-Levy T, Mundo-Rosas V, Humarán IMG. Inseguridad alimentaria y estado de nutrición en menores de cinco años de edad en México. Salud Pública de México 2014; 56(Supl. 1): s47-53.
30. Gubert MB, Spaniol AM, Bortolini GA, Pérez-Escamilla R. Household food insecurity, nutritional status and morbidity in Brazilian children. Public Health Nutr 2016; 19(12): 2240-5. https://doi.org/10.1017/S1368980016000239
31. 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. Genebra: World Health Organization; 2006.
32. Silva DAS, Nunes HEG. Prevalência de baixo peso, sobrepeso e obesidade em crianças pobres do Mato Grosso do Sul. Rev Bras Epidemiol 2015; 18(2): 466-75. http://dx.doi.org/10.1590/1980-5497201500020014
33. Oppitz IN, Cesar JA, Neumann NA. Excesso de peso entre menores de cinco anos em municípios do semiárido. Rev Bras Epidemiol 2014; 17(4): 860-72. http://dx.doi.org/10.1590/1809-4503201400040006
34. Ferreira HS, Cesar JA, Assunção ML, Horta BL. Time trends (1992-2005) in undernutrition and obesity among children under five years of age in Alagoas State, Brazil. Cad Saúde Pública 2013; 29(4): 793-800.
35. Ramos CV, Dumith SC, César JA. Prevalence and factors associated with stunting and excess weight in children aged 0-5 years from the Brazilian semi-arid region. J Pediatr 2015; 91(2): 175-82. https://doi.org/10.1016/j.jped.2014.07.005

36. Instituto Brasileiro de Geografia e Estatística. Pesquisa Nacional de Amostra por Domicílio: segurança alimentar. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística; 2010.
37. Alves KPS, Jaime PC. A Política Nacional de Alimentação e Nutrição e seu diálogo com a Política Nacional de Segurança Alimentar e Nutricional. Ciênc Saúde Coletiva 2014; 19(11): 4331-40. https://doi.org/10.1590/1413-812320141911.08072014

Received on: 01/13/2017
Final version presented on: 02/26/2018
Accepted on: 04/06/2018

Authors' contribution: Amanda Forster Lopes, Claudio Leone and Sophia Cornbluth Szarfarc worked on the writing of the paper; Maria Tereza Borges Araújo Frota, Claudio Leone and Sophia Cornbluth Szarfarc performed field research.