

ANALYSIS OF NUTRITIONAL STATUS AND RISK FACTORS IN PEDIATRIC PATIENTS WITH INTESTINAL OSTOMY

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ABSTRACT

Objective: To evaluate the nutritional status, food consumption and nutritional, clinical, and social risk factors of pediatric ostomy patients treated as outpatients at a public hospital in Brasília, DF, Brazil. **Method:** This is a cross-sectional, quantitative, and analytical study performed with ostomized children, of both sexes, under 10 years old. A diagnosis of nutritional status was performed using various nutritional assessment instruments, and food consumption was evaluated. **Results:** A total of 24 children was attended with a mean age of 10.29 months. The most common ostomy was colostomy (54%), and the most frequent reason for making a stoma was anorectal anomaly. High frequencies of nutritional deficits were found. The association between nutritional status and the reason for making the stoma was statistically significant ($p = 0.036$). **Conclusion:** The underlying cause for making the stoma can lead to impaired nutritional status. High frequencies of nutritional deficits were found, since part of the children were below the thinness line. Most patients use specialized infant formula. It was possible to observe a high consumption of ultra-processed foods in children who have already started eating solids.

DESCRIPTORS: Ostomy. Child. Nutritional status.

ANÁLISE DO ESTADO NUTRICIONAL E FATORES DE RISCO EM PACIENTES PEDIÁTRICOS COM ESTOMIA INTESTINAL

RESUMO

Objetivo: Avaliar o estado nutricional, o consumo alimentar e os fatores de risco nutricionais, clínicos e sociais de pacientes pediátricos estomizados atendidos ambulatoriamente em um hospital público de Brasília (DF). **Método:** Trata-se de um estudo de caráter transversal, quantitativo e analítico realizado com crianças estomizadas, de ambos os sexos, menores de 10 anos de idade. Foi feito o diagnóstico do estado nutricional utilizando diversos instrumentos de avaliação nutricional e avaliado o consumo alimentar. **Resultados:** No total compareceram 24 crianças com a idade média de 10,29 meses. A estomia mais encontrada foi a colostomia (54%), sendo o motivo mais frequente para a confecção do estoma a anomalia anorretal. Foram encontradas frequências elevadas de déficits nutricionais. A associação entre estado nutricional e o motivo da confecção do estoma apresentou significância estatística ($p = 0,036$). **Conclusão:** A causa de base para a confecção do estoma pode levar ao comprometimento do estado nutricional. Foram encontradas frequências elevadas de déficits nutricionais, uma vez que parte das crianças estava abaixo da linha de magreza. A maioria dos pacientes faz uso de fórmulas infantis especializadas. Foi possível observar alto consumo de alimentos ultraprocessados nas crianças que já iniciaram a alimentação com sólidos.

DESCRIPTORIOS: Estomia. Criança. Estado nutricional.

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Section Editor: Isabel Cristina R V Santos

Received: Feb. 24, 2022 | Accepted: Jun. 30, 2022

How to cite: Madariaga MLP; Haack A; Beckmann L; Horino A (2022) Analysis of nutritional status and risk factors in pediatric patients with intestinal ostomy. ESTIMA, Braz. J. Enterostomal Ther., 20: e2722. https://doi.org/10.30886/estima.v20.1208_IN

ANÁLISIS DEL ESTADO NUTRICIONAL Y FACTORES DE RIESGO EN PACIENTES PEDIÁTRICOS CON OSTOMÍA INTESTINAL

RESUMEN

Objetivo: Evaluar el estado nutricional, el consumo de alimentos y los factores de riesgo nutricionales, clínicos y sociales de pacientes pediátricos ostomizados atendidos en un ambulatorio en un hospital público de Brasilia - DF. **Métodos:** Se trata de un estudio transversal, cuantitativo y analítico realizado con niños ostomizados, de ambos sexos, menores de 10 años. Se realizó el diagnóstico del estado nutricional utilizando diversos instrumentos de evaluación nutricional y se evaluó el consumo de alimentos. **Resultados:** En total fueron 24 niños atendidos con una edad media de 10,29 meses. La ostomía más común fue la colostomía (54%), y el motivo más frecuente para realizar un ostoma fue la anomalía anorrectal. Se encontraron altas frecuencias de déficits nutricionales. La asociación entre el estado nutricional y el motivo de realización del estoma fue estadísticamente significativa ($p = 0,036$) **Conclusión:** La causa subyacente para la realización del ostoma puede conducir a un comprometimiento del estado nutricional. Se encontraron altas frecuencias de déficits nutricionales, ya que parte de los niños se encontraban por debajo de la línea delgada. La mayoría de los pacientes usan fórmula infantil especializada. Se pudo observar un alto consumo de alimentos ultraprocesados en niños que ya iniciaron la alimentación con sólidos.

DESCRIPTORES: Estomía. Niño. Estado nutricional.

INTRODUCTION

Stoma and ostomy come from the Greek word *stóma* and means opening or mouth. The reestablishment of communication between the organ and the external environment, in several situations, receives specific denominations according to the segment to be exteriorized. By surgical procedure, the stoma allows the elimination of waste, secretions, feces and/or urine^{1,2}.

Stomas performed in pediatric patients act as a form of treatment for some disease, such as intestinal obstructions, perforations of the colon, fistulas, protection of high-risk anastomoses, or trauma. Most of the time they are considered stomas of temporary character and aim to propitiate the exit of the feces, to relieve tension and to recover the affected organ. It is known that the restructuring of the gastrointestinal tract depends on the underlying diseases and the necessary surgical interventions³.

The most common causes in pediatrics for making intestinal stomas are related to congenital anomalies, mainly anorectal and congenital aganglionic megacolon. In addition, necrotizing enterocolitis, trauma of external origin, rectal carcinoma, Crohn's disease, ulcerative rectocolitis and familial polyposis are also presented causes, but they are less frequent⁴.

Because of underreporting, there is little data on the number of people with a stoma in Brazil. This occurs because stomas are sequelae or consequences of diseases or traumas, and not a pathology in itself⁵; however, the Brazilian Association of Ostomized People (Abraso) estimates that there are 33,844 people with stomas in the country and that R\$ 153,749,490.36 were spent on ostomy procedures between 2002 and 2008, according to the Brazilian Single Health System Database (Datusus)^{6,7}. Of children with stoma, it was observed that there is no epidemiological data in the information systems made available by Datusus⁸.

Even so, the attention to the person with a stoma has been becoming more and more established over time. In 2009, Ordinance No. 400 established the National Guidelines for Health Care of People with Stomas within the Unified Health System (UHS). It provides guidance regarding the organization and dynamics of the health care units in order to focus on rehabilitation, the care that the patients must have with them in order to prevent complications, and the supply of collection equipment^{9,10}.

Monteiro et al.¹¹ report that the care of the child with intestinal stoma should be done in an integral way with the multiprofessional team. Care must be jointly with parents and/or guardians, and the process of adaptation and rehabilitation must be focused on child development and growth, with special attention to individual demands.

It is in the first years of life that the child starts to develop its potentialities, such as motor and cognitive functions. Thus, nutritional interventions are known to be linked to child development and growth and have the greatest potential to save lives. Therefore, iron and folic acid supplementation during pregnancy, exclusive breastfeeding until the sixth month of life and supplemented until 2 years or more, adequate and healthy complementary feeding, vitamin A supplementation and use of zinc in diarrheal episodes are recommended^{12,13}.

The *Food Guide for Brazilian Children Under 2 Years of Age*, released by the Ministry of Health¹², aims to guide mothers, fathers, and/or guardians on healthy eating for children. It approaches that feeding should be done in a collective way, involving all family members; it guides the degrees of food processing, respect according to the child's hunger and satiety; and reinforces the beginning of the relationship that the child builds with food. The guide also presents strategies for promoting adequate growth, development, and nutrition in children. The expected results from following these guidelines are reduced morbidity and mortality rates, increased neuropsychomotor development, improved social performance and learning ability, and decreased prevalence of obesity and chronic noncommunicable diseases in adulthood¹².

Thus, this study contributes to educate parents, caregivers, and professionals about the importance of adequate and healthy nutrition in childhood and to improve the nutritional status of children followed up in outpatient clinics.

OBJECTIVE

To evaluate the nutritional status, food intake, and nutritional, clinical, and social risk factors of pediatric patients with a stoma seen at the outpatient clinic of Hospital Materno Infantil Dr. Antônio Lisboa, in Brasília (DF).

METHODS

This is a cross-sectional, quantitative and analytical study conducted with children with stomas of both sexes, under 10 years of age, who were served by the nutrition service at the outpatient clinic for people with stomas. The guardians signed the institutional acceptance form and the consent form at the reference center of Hospital Materno Infantil Dr. Antônio Lisboa, in Brasília.

Data collection took place from April to July 2021. The first stage consisted of the application of three structured questionnaires to parents and/or guardians. The first contained identification data, socioeconomic conditions regarding the caregiver (age, education, occupation, place of residence), number of residents in the household, and *per capita* income. The second questionnaire covered the child's identification data, name, age, gestational age, gender, anthropometry, and questions regarding the stoma. The third questionnaire asked about feeding frequency.

The anthropometric evaluation consisted of measuring weight, height, or length. Based on these measurements, the body mass index (BMI) was calculated and the classification of weight-for-age (W/A), height-for-age (H/A)/length-for-age (L/A), and BMI-for-age (BMI/A) indicators was performed, using the World Health Organization (WHO) curves as reference standard.

The WhoAnthro program, developed by the WHO, was used for anthropometric classification and nutritional status assessment of the study children.

Inclusion criteria were children with intestinal stomas, of both genders, aged up to 9 years and 11 months, who had the questionnaires duly filled out at the reference center in the Federal District. As exclusion criteria, the following were adopted: not filling out and/or incomplete filling out of the questionnaires, patients with genetic syndromes, neurological and/or metabolic diseases, and situations that would compromise the assessment of nutritional status or that would make anthropometric assessment impossible (edema, anasarca, limb amputation).

For the tabulation of the data, an Excel spreadsheet was used. Anthropometry data were analyzed in the WhoAnthro program, in which W/A, L/A, and BMI/A were assessed. For data analysis, the χ^2 test and Fisher's exact test were employed. The food consumption of the children in the study was compared with the *Food Guide for Brazilian Children Under 2 Years of Age*¹² and the *Food Guide for the Brazilian Population*¹⁴.

As provided for by Resolution No. 466/2012, of the National Health Council (NHC), the database consultation was performed after authorization from the unit's management and submitted to the Research Ethics Committee of the Foundation for Teaching and Research in Health Sciences. It received a favorable opinion on April 7, 2021, under No. 4,634,272, Certificate of Submission for Ethical Consideration 42777120.0.0000.5553.

RESULTS

Twenty-four pediatric patients with bowel elimination stoma from the outpatient clinic were seen and evaluated from April to July 2021. In total, children with a mean age of 10.29 months attended, and 96% of them were in the age group of 0 to 5 years. Of the sample, 54% were male and 46% were female. As far as place of residence is concerned, 83% of the evaluated population is from the Federal District, 13% from Goiás, and 4% from Minas Gerais.

Of the total number of patients in the survey, it was possible to evaluate the birth weight of 22 children, because the data of two patients were not in the electronic medical record or the child's card. Birth weight is a parameter used to evaluate the health conditions of the newborn. The average birth weight was 2,428 g, considered low weight, i.e., less than 2,500 g, according to the WHO criteria^{14,15}.

Regarding those responsible for the children, it was noted that 92% were mothers, who answered the applied questionnaire, 4% fathers, and 4% grandfathers. The observed mean age of caregivers was 31.6 years, with 29.4 years being the mean age among mothers (Table 1).

Table 1. Socioeconomic characteristics of parents and/or guardians of pediatric patients with stoma assisted in a reference hospital in Brasília, DF, 2021.

Variable	n	%
Years of schooling*		
≤ 9 years	4.0	17
> 9 years	20	83
Income (MW)		
< 1	11	46
≥ 1	13	54
Age of parents and/or guardians (years)		
< 30	14	58
≥ 30	10	42
Residents (amount)		
< 3	4.0	17
≥ 3	20	83

* ≤ 9 years - complete elementary school; MW: minimum wage (R\$ 1,212, as stipulated in 2021). Source: Elaborated by the authors.

Most parents and/or guardians had more than 10 years of schooling (54%), but low purchasing power was observed, since 46% had a per capita income of less than or equal to one minimum wage.

As for feeding, it was seen that 75% of the children studied use infant formula, and 61% do not consume foods other than formula. Infant formulas considered specialized, i.e., extensively hydrolyzed and based on free amino acids, were the most consumed (43%), followed by starter formulas (26%) and infant formulas for early childhood (9%). There was only one child in the sample who was exclusively breastfeeding, and 22% of the focus children never used infant formula (Fig. 1).

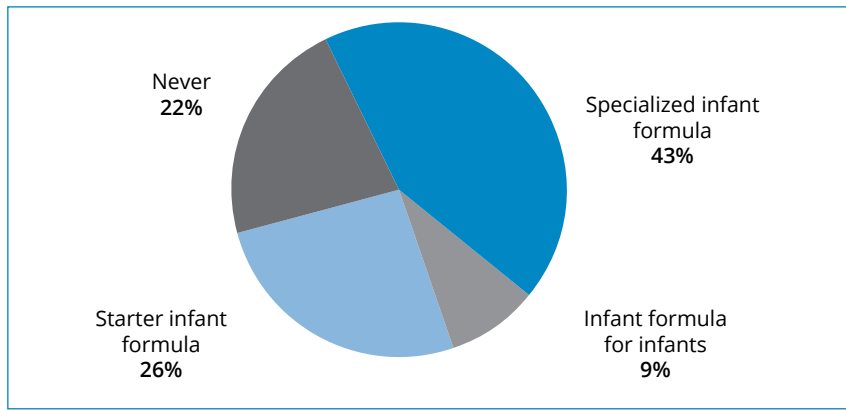


Figure 1. Infant formula consumption in pediatric patients with stoma assisted in a reference hospital in Brasília, DF, 2021.

Source: Elaborated by the authors.

In the study, 12 children who had already started eating solid foods consumed fresh and/or minimally processed foods daily, and 50% used processed foods in small quantities, but 33% of this sample consumed ultra-processed foods, such as snacks, chocolates, chocolate bars, candy bars, and margarine, every day.

As for the type of stoma, 13 colostomies (54%) and 11 ileostomies (46%) were found. The most frequent reason for making a stoma was anorectal anomaly, accounting for 41% of the cases, followed by congenital megacolon, necrotizing enterocolitis, omphalocele, and intestinal invagination. Most patients (83%) had undergone a bowel elimination ostomy for less than a year, and all were temporary. It was evaluated that 33% of the children had another surgery besides the ostomy (Table 2).

Table 2. Clinical variables of pediatric patients with stoma assisted in a reference hospital in Brasília, DF, 2021.

Variable	n	%
Type of stoma		
Colostomy	13	54
Ileostomy	11	46
Nature		
Definitive	0	0
Temporary	24	100
Indication for ostomy		
Anorectal anomaly	10	41
Congenital megacolon	6	25
Necrotizing enterocolitis	4	17
Other causes	4	17
Performing other surgery		
Yes	8	33
No	16	67

Source: Elaborated by the authors.

It was noted that 42% of the patients in the sample were born prematurely, i.e., with a gestational age of less than 37 weeks, and 58% were full-term patients. Of the premature patients, 40% evolved with a diagnosis of necrotizing enterocolitis.

The nutritional assessment, determined by W/A, H/A/L/A and BMI/A, revealed that 54% of the respondents are eutrophic – 21% of the children with thinness and 25% with severe thinness. No patient in the study was overweight or obese (Table 3).

Table 3. Nutritional status of pediatric patients with stoma assisted in a reference hospital in Brasilia, DF, 2021.

Indicator	n	%
Weight/age		
Very low weight	6	25
Low weight	5	21
Appropriate weight	13	54
High weight	0	0
Height/Length/Age		
Short height/length	12	50
Appropriate height/length	12	50
BMI/age		
Severe thinness	6	25
Thinness	5	21
Eutrophy	13	54
Overweight and obesity	0	0

BMI: body mass index. Source: Elaborated by the authors.

DISCUSSION

Regarding the characterization of the patients seen at the outpatient clinic, the present study revealed findings that are similar to those of other studies that have outlined the profile of pediatric patients with stomas, since there is a predominance of children between 0 and 5 years of age^{7,16-18}. This is because most of the diagnoses presented are revealed in the neonatal period. The predominance of males corroborates data from other studies that address this theme^{11,16-18}.

The mother was portrayed as the primary caregiver, confirming research data from Koeppe et al.¹⁶. The average age of the mothers meets that of the study by Egito et al.⁷, in which it was reported that 80% of the mothers assessed were aged 20 years or older.

Income is directly proportional to years of schooling, which differs from the study presented¹⁹. Low purchasing power can be observed in families who have children with bowel elimination stomas^{10,17}.

Income is known to be predominantly conditional on food and nutrition insecurity, which is a reality found in Brazilian households that occurs when there is a decrease in access, consumption, and/or availability of food. When associated with the child population, there is a decrease in caloric, protein, and nutrient supply, leading to deficits in growth and development, and increasing the prevalence of infant mortality¹⁹.

Infant formulas can be classified into:

- Preterm: indicated for preterm infants;
- Starter infant formula: 0 to 6 months of age;
- Follow-up infant formula: 6 to 12 months of age;
- Infant formula for early childhood: from 12 months to 3 years of age;
- Specialized formulas²⁰.

Ordinance No. 478, published on September 6, 2017, by the Federal District Health Secretariat, describes formulas for special purposes as industrialized products with modifications in their composition that meet the needs of patients with specific physiological and/or metabolic conditions. Thus, specialized formulas, such as those used by the children in this study, are products that can replace or supplement oral feeding in malnourished patients or not, in their nutritional needs²¹.

The Program for Home Enteral Nutritional Therapy (PHENT) registers patients in the Federal District for the supply of formulas for special purposes in home care free of charge. Its objectives are to ensure food and nutritional safety, reduce morbidity and mortality risks and infections, improve the patient's quality of life, and decrease hospital length of stay and hospital costs²².

The study by Alves et al.²³ on home enteral nutritional therapy with children who are part of the PHENT registered at the Hospital Materno Infantil Dr. Antônio Lisboa depicted that the main route of administration of infant formula was oral and that 77% of patients make use of extensively hydrolyzed and free amino acid-based formulas. These data corroborate those found in this study, since 56% of the children use specialized formulas and 33% of them are enrolled in the program.

The *Food Guide for the Brazilian Population and the Food Guide for Brazilian Children Under 2 Years of Age*, published in 2014 and 2019, respectively, by the Ministry of Health, aim to promote health and food and nutritional security, in addition to supporting the family in daily care, through recommendations and information on healthy and adequate food^{12,23}. With this, the guides present guiding information for health professionals to provide guidance on nutrition.

The *Food Guide for Brazilian Children Under 2 Years of Age* recommends that breast milk should be the first food offered to the baby, through breastfeeding until the age of 2 or older and exclusively until the age of 6 months¹². In the work presented, six children followed the recommendation of exclusive breastfeeding until the sixth month of life and never used infant formula.

The food guide provides recommendations on food processing for the population under 2 years of age. It recommends that unprocessed or minimally processed foods be the basis of the diet. Processed products should be consumed in small quantities, and ultraprocessed foods should always be avoided¹².

In the study presented, 12 children who had already started to consume solid food consumed daily in natura and/or minimally processed food and 50% used processed food in small quantities; however, 33% of this sample consumes ultraprocessed food, such as snacks, chocolates, chocolate bars, sweets and margarine every day, not following the recommendation of the Ministry of Health¹².

The predominance of colostomy is similar to the data found in the study by Egito et al.⁷, performed with patients with stoma admitted to the wards of the pediatric surgical clinic of the Instituto de Medicina Integral Professor Fernando Figueira, in Recife (PE). There the colostomy patients comprised 76.7% of the studied sample, although the patients had a bowel elimination stoma for 12 months or more. The work of Koepe et al.¹⁶ also verified, in a primary care service located in the municipality of Cabo Frio (RJ), that 100% of the evaluated patients had a colostomy, and 53.8% of the stomas were temporary.

Regarding the reason for the confection of the stoma, the sample presented corroborates data from other studies, since the anorectal anomaly was the most frequent cause for the confection of intestinal elimination stomas, followed by congenital megacolon^{7,20,21}; however, the research by Monteiro et al.¹¹, in the same enterostomal therapy outpatient clinic at a public reference hospital in the Federal District, in 2013, showed a prevalence of congenital megacolon, in 48% of patients.

The association between nutritional status and the reason for stoma preparation was statistically significant ($p = 0.036$). Thus, it is possible to say that the underlying cause for the confection of the stoma can lead to compromised nutritional status. However, because of the scarcity of data in the literature, further research is needed to address this issue.

According to the χ^2 test and the cross frequency between the variables performance of other surgery and nutritional status, it was observed that there was no significant association between the variables ($p = 1$). The surgeries performed were anorectoplasty, closure of patent ductus arteriosus, exploratory laparotomy with bowel resection, cystostomy, and jejunal atresia.

Low birth weight, even when appropriate for gestational age, is considered a risk factor for neonatal complications and can lead to death¹⁴. Necrotizing enterocolitis is known to affect mostly premature infants and is responsible for 10% of deaths in the neonatal intensive care unit. About 5 to 10% of very low birth weight newborns develop the disease, with higher incidence in premature infants with extreme low birth weight²⁴.

Necrotizing enterocolitis has a multifactorial etiology, and some immunomodulatory strategies and microbial optimization have been studied and act as ways to prevent the onset of the disease, such as: use of human milk, donor or not, nutritional supplementation, minimal enteral nutrition or trophic feeding²⁴.

According to the *State of the World's Children* report, published by the United Nations Children's Fund (Unicef) in 2019, child malnutrition still affects millions of children around the world. Malnutrition is known to impair children's growth and development, and unless it is addressed, children will struggle to reach their full potential²⁵. It is observed that one in three children under the age of 5 does not develop adequately, because of chronic and acute malnutrition²⁵. In the study sample, 46% of the children were below the thinness line, i.e., considered malnourished, but no significant association ($p = 0.143$) was found between the use of infant formulas, unprocessed, processed, and ultra-processed foods and nutritional status.

High frequencies of nutritional deficits were found, as 50% of the children were stunted according to the H/A/L/A indicator, 25% were very low weight for age, and 21% were low weight for age according to the W/A indicator. This condition has a direct relationship with chronic malnutrition and food and nutrition insecurity²⁵; however, here there was no significant correlation between the variables economic status and nutritional status, when performed cross frequency between them, by the p-value ($p = 0.135$) of the χ^2 test.

Regarding the relation of nutritional status in children with stoma, the result of the sample resembles that found by the study of Egito et al.⁷, in which it was evaluated that 24.1% of the children presented low stature, 20% low weight and 6.9% diagnosis of thinness, according to BMI/A, resulting in a significant nutritional impairment.

However, more work is needed with children with intestinal elimination stomas and about the relationship with nutritional status, so that knowledge about the particularities can be deepened, as well as to encourage better food choices.

Finally, it is expected that the study will contribute to the knowledge of health professionals about the importance of promoting healthy and adequate nutrition, as well as the possible development of public policies for children with stoma in early childhood through qualified assistance in order to improve quality of life, decrease morbidity and mortality, and ensure healthy nutritional status (Tables 4-5).

Table 4. Cross table between stoma location and nutritional status of pediatric patients with stoma assisted in a reference hospital in Brasília, DF, 2021, evaluated by the χ^2 test.

	Eutrophy	%	Thinness	%	Total	%	p-value
Anorectal anomaly	5	20.83	5	20.83	10	41.67	0.036
Necrotizing enterocolitis	0	0	4.0	16.67	4.0	16.67	
Intestinal invagination	0	0	1	4.17	1	4.17	
Congenital megacolon	7	29.17	0	0	7	29.17	
Omphalocele	1	4.17	1	4.17	2	8.33	
Total	13	54.17	11	45.83	24	100	

Source: Elaborated by the authors.

Table 5. Cross table between performance of other surgeries and nutritional status of pediatric patients with stoma assisted in a reference hospital in Brasilia, DF, 2021, evaluated by χ^2 test.

	Eutrophy	%	Thinness	%	Total	%	p-value
No	9	39.13	7	30.43	16	69.57	1
Yes	4.0	17.39	3	13.04	7	30.43	
Total	13	56.52	10	43.48	23	100	

Source: Elaborated by the authors.

CONCLUSION

In this study, high frequencies of nutritional deficits were presented, since part of the children are below the thinness line, that is, they are considered malnourished. In addition, half of the study population has short stature for age. So, it is possible to say that the underlying cause for making the stoma can lead to compromised nutritional status. Low purchasing power is observed in families that have children with bowel elimination stomas, despite the fact that most parents and/or guardians have more than 10 years of education. It is known that this condition is directly related to chronic malnutrition and food and nutrition insecurity; however, because of the scarcity of data in the literature, further research is needed to address this issue.

The duration of exclusive breastfeeding in children with stoma is much shorter than what is recommended by the WHO. Most patients use infant formulas, with specialized infant formulas being the most widely consumed. All children who have started to eat solids consume in natura and/or minimally processed foods every day and use processed foods in small quantities, as pointed out by the *Food Guide for Brazilian Children Under 2 Years of Age*, however, it is possible to observe a high consumption of ultraprocessed foods.

AUTHORS' CONTRIBUTION

Substantive scientific and intellectual contributions to the study: Madariaga M, Haack A, Beckmann L and Horino A. Concept and design: Madariaga M, Haack A, Beckmann L and Horino A. Data collection, analysis and interpretation: Madariaga M, Haack A, Beckmann L e Horino A. Article writing: Madariaga M, Haack A, Beckmann L and Horino A. Critical review: Madariaga M, Haack A, Beckmann L and Horino A. Final approval: Madariaga M, Haack A, Beckmann L and Horino A.

AVAILABILITY OF RESEARCH DATA

Not applicable.

FUNDING

Not applicable.

ACKNOWLEDGEMENTS

Not applicable.

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