



**HOUSEHOLD FOOD INSECURITY AMONG PATIENTS ON HOME ENTERAL  
NUTRITION IN SOUTH BRAZIL**

**INSEGURIDAD ALIMENTARIA ENTRE PACIENTES CON NUTRICIÓN  
ENTERAL DOMICILIARIA EN EL SUR DE BRASIL**

**INSEGURANÇA ALIMENTAR ENTRE PACIENTES COM NUTRIÇÃO ENTERAL  
DOMICILIAR NO SUL DO BRASIL**

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**ABSTRACT**

The aim was to investigate the food insecurity in the household of patients on Home Enteral Nutrition. Observational, and cross-sectional study, in Curitiba, Brazil, between December 2015 and June 2018. The short version of Brazilian Household Food Insecurity Measurement Scale was applied. This study was carried out among 76 patients. Mean age was 63.9±21.7 years, 55.3% male. The frequency of food insecurity was 61.8%. Government program provided diet to 28.9% of the patients. Receiving diet from program was associated with not having money for healthy and

varied food ( $p=0.016$ ). Social, demographic, economic and clinical characteristics, category and ways of acquiring the formula were not associated with food insecurity ( $p>0.05$ ). The frequency of food insecurity was high and there was an association between receiving commercial formula from government program and not having enough healthy and varied food at home.

### **Keywords**

Health services – Nutrition – Food security

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**CUADERNOS DE SOFÍA**  
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### **RESUMEN**

El objetivo del estudio fue investigar la inseguridad alimentaria en la casa de pacientes con Nutrición Enteral Domiciliaria. Estudio observacional y transversal, en Curitiba, Brasil, entre diciembre de 2015 y junio de 2018. La versión corta de la Escala Brasileña de Medición de la Inseguridad Alimentaria se aplicó. Este estudio se realizó entre 76 pacientes. La edad media fue de  $63,9 \pm 21,7$  años, 55,3% hombres. La frecuencia de inseguridad alimentaria fue del 61,8%. El gobierno proporcionó dieta al 28,9% de los pacientes y recibir dieta se asoció con no tener dinero para alimentos saludables y variados ( $p = 0.016$ ). Las características sociales, demográficas, económicas y clínicas, la categoría y las formas de adquirir la fórmula no se asociaron con la inseguridad alimentaria ( $p > 0,05$ ). La frecuencia de inseguridad alimentaria fue alta y hubo una asociación entre recibir fórmula comercial del gobierno y no tener suficiente comida sana y variada.

### **Palabras claves**

Servicio de salud – Nutrición – Seguridad alimentaria

### **RESUMO**

O objetivo do estudo foi investigar a insegurança alimentar no domicílio de pacientes com Nutrição Enteral Domiciliar. Estudo observacional e transversal, em Curitiba, Brasil, entre dezembro de 2015 e junho de 2018. Foi aplicada a versão curta da Escala Brasileira de Medidas de Insegurança Alimentar. Este estudo foi realizado

com 76 pacientes. A média de idade foi de  $63,9 \pm 21,7$  anos, 55,3% homens. A frequência de insegurança alimentar foi de 61,8%. O governo forneceu dieta para 28,9% dos pacientes, e receber dieta foi associado a não ter dinheiro para alimentação saudável e variada ( $p = 0,016$ ). Características sociais, demográficas, econômicas, clínicas, categoria e formas de aquisição da fórmula não foram associadas à insegurança alimentar ( $p > 0,05$ ). A frequência de insegurança alimentar foi alta e houve associação entre receber fórmula comercial do governo e não ter alimentação saudável e variada em quantidade suficiente.

### Palavras chaves

Serviço de Saúde – Nutrição – Segurança Alimentar

### Introduction

Healthy and adequate food are constitutional rights in Brazil. The organization and provision of nutritional care contribute to comprehensive health care, one of the principles of the Brazilian public health system – *Sistema Único de Saúde* (SUS). In SUS, primary health care (PHC) is part of the healthcare network (HN), and the National Food and Nutrition Policy establishes guidelines to the organization of nutritional care to achieve comprehensive care for people with special dietary needs situations because diseases related to food and nutrition assisted in PHC<sup>1,2</sup>.

Care for special dietary needs is a demand for nutritional care in SUS, and must be organized and qualified as a practice at home<sup>3,4,5</sup>. Home Enteral Nutrition (HEN) is one of the types of Nutritional Therapy (NT), most frequent in elderly. Tube feeding commercial formula, homemade blended diet (food-based formulas), and mixture of both are used for HEN in Brazil. Thus, Food and Nutritional Security (FNS) must be ensured to patients on HEN and households where they live<sup>6,7</sup>. Food security can be a useful measure of household and individual welfare. A household is considered food secure if it can acquire the food needed by its members to be food secure. One of the reasons why household may not assure food security for all its members is that intra-household allocation of the food may not be based on the needs of each individual member. So, food security does not assure nutritional security<sup>8</sup>.

Thus, HEN can be a risk factor for household food insecurity (FI), when diet is inadequate due to the socioeconomic limitation or when there is hardship accessing essential services, leading to the impossibility to buy commercial diet, or food, in adequate quantity and quality, and when there are individual health problems that impair the biological use of nutrients<sup>9,10</sup>. Household food security depends on color or race, gender of person who head the household, income, and average monthly family expenditure on basic food<sup>11</sup>. Also, the extent to which individual food security results in good nutrition depends on a set of non-food factors such as sanitary conditions, water quality, infectious diseases, and access to health

care<sup>12</sup>. Then, the aim of the present study was to investigate the food insecurity in the household of patients on Home Enteral Nutrition.

## Methods

A quantitative, cross-sectional, and observational study was employed to analyze the data of adult and elderly patients on HEN collected between December 2015 and June 2018, beneficiary of the Nutrition Assistance Program for People with Special Dietary Needs (PAN), in nutritional care performed by a nutritionist working in PHC, in Curitiba, Paraná, Brazil. In December 2015, the number registered of adult and elderly patients on HEN in PAN was 65, which represents the initial sample. From December 2015 to June 2018, more patients were registered in PAN. This study was conducted according to the guidelines laid down in the Declaration of Helsinki and all procedures involving research study participants were approved by the Ethics Committee of the Curitiba Secretary of Health and by the Ethics Committee of the Federal University of Paraná (49265615.1.3001.0101, and 49265615.1.0000.0102/2016.8, respectively). Written informed consent was obtained from all subjects.

The criteria for sample selection were to be adult or elderly patients on HEN, beneficiary of the PAN, and receive periodic nutritional care at home. Participants were recruited during nutritional care routine. After the acceptance to participate in this study, a structured questionnaire was applied to the formal or informal caregiver with questions regarding patients on HEN, household, caregiver, HEN and FI. Individuals aged  $\geq 60$  years were considered elderly. The classification of diseases was performed based on the International Classification of Diseases, 10th Revision (ICD-10), classifying them in neurological diseases, cancer and other diseases<sup>13</sup>.

As social security, two categories were used: retirement and other benefits. The Brazilian minimum wage considered was R\$ 954 (US \$ 246.51), value in 2018<sup>14</sup>. A formal caregiver was considered a professional trained in an educational institution to provide care at home, according to the needs of the patient; an informal caregiver was a family or community member, who provides care to dependent people, according to their needs<sup>15</sup>.

For categorization of nutritional formulas for HEN, classification proposed by Brazilian Ministry of Health was used: tube feeding commercial formula, homemade blended diet (food-based formulas), and mixture of both<sup>16</sup>. To categorize time on HEN, PAN classification was used considering the number of months on HEN: less than six months and equal to or greater than six months<sup>17</sup>. FI was assessed using a short version of Brazilian Household Food Insecurity Measurement Scale (EBIA), with five questions. Each affirmative answer corresponds to a point and was considered FNS when the score was zero and FI when the score was one to five. EBIA short version was considered a direct indicator of household FI<sup>18</sup>.

Statistical data were generated with the IBM SPSS Statistics 22.0 (Chicago, IL, USA). Descriptive analysis, with analysis of absolute and relative frequency, mean, median, standard deviation and minimum and maximum values, was performed. The association of FI with the other study variables was tested using Pearson's chi-square test or Fisher's exact test, and  $p < 0.05$  was used to indicate statistical significance.

## Results

The study included 76 patients on HEN. The final sample is bigger than the initial because number of patients on HEN registered in PAN. Mean age was  $63.9 \pm 21.7$  years, 49 (64.5%) was elderly, 42 (55.3%) was male. The most frequent diseases were neurological diseases ( $n=51$ ; 67.1%), cancer ( $n=18$ ; 23.7%) and other diseases ( $n=7$ ; 9.2%). The median time of diagnosed disease was 22 months (min.=one; max.=564). All patients had informal caregivers. The social, demographic and economic characteristics are shown in Table 1. Monthly income between one to three minimum wages was the most frequent. The mean monthly household income was  $2.5 \pm 1.4$  minimum wages, equivalent to R\$2,385 $\pm$ 1,374 per month with a median of 2.1 minimum wages (min.=zero; max.=seven). The median number of residents at home was three (min.=two; max.=eight).

		<b>N</b>	<b>%</b>
<b>Color/race</b>	White	61	80.3
	Parda	8	10.5
	Black	5	6.6
	Yellow	2	2.6
<b>Education</b>	Illiterate	16	21.1
	Incomplete primary education	31	40.8
	Complete primary education	8	10.5
	Incomplete high school	1	1.3
	Complete high school	12	15.8
	Incomplete university education	4	5.3
	Complete university education	4	5.3
<b>Social security</b>	Retirement	36	47.4
	Other benefits	31	40.8
<b>Marital status</b>	Single, separated, widowed	46	60.5
	Married or lives with a partner	30	39.5
<b>Monthly household income</b>	< 1 minimum wage	5	6.6
	$\geq 1$ e <3 minimum wage	49	65.5
	$\geq 3$ minimum wage	22	28.9

**Table 1**  
Demographic and socioeconomic characteristics (N = 76)  
Source: the authors.

The median time of HEN was 11.5 months (min.=0.2; max.=312). Gastrostomy was the main route of administration (n=43; 56.6%) and nasogastric tube was route of administration for 19.7%. Combination of commercial formula and blended diet was observed for 49 (64.5%) and commercial formula exclusively for 27 (35.5%). None of the patients used blended diet exclusively. The main way to get commercial enteral nutrition / enteral nutrition formula was self or family made acquisition (n=56; 73.7%), followed by PAN provision (n=22; 28.9%), donation (n=6; 7.9%) and private health insurance supply (n=2; 2.6%).

The frequency of FI was found to 47 (61.8%) patients on HEN. Sex, age group, skin color, education, marital status, retirement, social benefits or participation in social programs, number of residents at home, total monthly household income, disease, time of HEN and type tube were not associated with FI (p> 0.05) (Table 2). To buy, to receive from PAN, health insurance acquisition, donation and other ways of acquiring the nutritional formula were not associated with FI (p> 0.05). However, 56 (77.3%) patients on HEN that received nutritional formula from PAN and 47 (62.5%) patients on HEN that bought nutritional formula by themselves were in FI (Table 2).

		<b>Food security (n=29) n (%)</b>	<b>Food insecurity (n=47) n (%)</b>	<b>p-value</b>
<b>Gender (N=76)</b>				
Male		13 (17.1)	29 (38.2)	0.151
Female		16 (21.2)	18 (23.7)	
<b>Age group (N=76)</b>				
Adults		9 (11.8)	18 (23.7)	0.520*
Elderly		20 (25.9)	29 (38.6)	
<b>Color/race (N=76)</b>				
White		25 (32.8)	36 (47.4)	0.544*
Parida		3 (3.9)	5 (6.6)	
Black		1 (1.4)	4 (5.3)	
Yellow		0 (0)	2 (2.6)	
<b>Education (N=76)</b>				
Illiterate		7 (9.2)	9 (11.8)	
Incomplete primary education		11 (14.5)	20 (25.9)	
Complete primary education		2 (2.6)	6 (7.9)	
Incomplete high school		0 (0)	1 (1.3)	0.839*
Complete high school		6 (7.9)	6 (7.9)	
Incomplete university education		2 (2.6)	2 (2.6)	

Complete university education	1 (1.3)	3 (3.9)	
<b>Retirement (N=76)</b>			
Yes	16 (21.2)	20 (25.9)	0.284*
No	13 (17.1)	27 (35.5)	
<b>Other benefits (N=76)</b>			
Yes	10 (13.6)	21 (27.6)	0.380*
No	19 (25.0)	26 (34.2)	
<b>Marital status (N=76)</b>			
Single, separated, widowed	19 (25.0)	27 (35.5)	0.484*
Married or lives with a partner	10 (13.6)	20 (25.9)	
<b>Monthly household income (N=76)</b>			
< 1 minimum wage	2 (2.6)	3 (3.9)	0.686*
≥ 1 e < 3 minimum wage	17 (22.4)	32 (42.1)	
≥ 3 minimum wage	10 (13.6)	12 (15.8)	
<b>Number of residents in the household (N=76)</b>			
< 3,3 residents	18 (23.7)	21 (27.6)	0.141*
> 3,3 residents	11 (14.5)	26 (34.2)	
<b>Disease (N=76)</b>			
Neurological	22 (28.9)	29 (38.2)	
Cancer	5 (6.6)	13 (17.1)	0.443*
Others	2 (2.6)	5 (6.6)	
<b>Time of HEN (N=76)</b>			
< 6 meses	8 (10.5)	18 (23.7)	0.339*
> 6 meses	21 (27.6)	29 (38.2)	
<b>Route of administration (N=76)</b>			
Nasogastric tube	6 (7.9)	9 (11.8)	
Nasoenteric	5 (6.6)	9 (11.8)	0.943*
Gastrostomy	17 (22.4)	26 (34.2)	
Jejunostomy	1 (1.3)	3 (3.9)	
<b>Way to get the nutritional formula (N=87)***</b>			
Purchase	21 (27.6)	35 (46.1)	0.843*
PAN	5 (6.6)	17 (22.4)	0.077*
Private health insurance	2 (2.6)	0 (0)	0.142**
Donation	2 (2.6)	4 (5.3)	0.584**
Other	0 (0)	1 (1.3)	0.618**
<b>Category of nutritional formula (N=76)</b>			
Combination of commercial formula and blended diet	17 (22.4)	32 (42.1)	0.402*
Commercial formula	12 (15.8)	15 (19.7)	

Note: HEN=Home Enteral Nutrition; PAN= Nutrition Assistance Program for People with Special Dietary Needs; \*Pearson's chi-square test; \*\*Fisher's exact test; \*\*\* The n value exceeds 76 because the same individual on HEN can receive or acquire the nutritional formula in more than one way.

**Table 2**

Association between food insecurity and social, demographic, economic and clinical characteristics of patients on Home Enteral Nutrition, beneficiaries of the Nutrition Assistance Program for People with Special Dietary Needs, and their household

Source: the authors.

Receiving nutritional formula from PAN was associated with four EBIA issues, when analyzed separately ( $p < 0.05$ ), but the same result was not found to who bought nutritional formula by themselves ( $p > 0.05$ ). No money for a healthy and varied diet was found for 50 (59.1%) households with a patient on HEN that received nutritional formula from PAN, and 31 (40.9%) had money to have a healthy and varied diet ( $p = 0.016$ ). A greater frequency of participants answered that the quantity of food and money to buy food was enough in the last months in the household with a patient on HEN that received nutritional formula from PAN ( $p < 0.05$ ) (Table 3). There was no association between FI and EBIA issues with the category of formula used ( $p > 0.05$ ) (Table 1 and Table 4).

EBIA issues	Nutritional formula from PAN	
	n (%)	p-value
<b>Concern about food ending up at home before being able to buy, receive or produce more food</b>		
Yes	13 (59.1)	0.566*
No	9 (40.9)	
<b>No more food before I had the money to buy more</b>		
Yes	8 (36.4)	0.028**
No	14 (63.64)	
<b>No money to have a healthy and varied diet</b>		
Yes	13 (59.1)	0.016**
No	9 (40.9)	
<b>Adult in the house has ever decreased the amount of food in the meals, or stopped eating meals, because there is not enough money to buy the food</b>		
Yes	8 (36.4)	0.002**
No	14 (63.6)	
<b>Need to ever eat less than believed that should eat because there was not enough money to buy food</b>		
Yes	6 (27.3)	0.015**
No	16 (72.7)	

Note: EBIA = Brazilian Household Food Insecurity Measurement Scale; PAN = Nutrition Assistance Program for People with Special Dietary Needs \* Pearson's chi-square test; \*\* Fisher's exact test.

**Table 3**

Association between issues to investigate food insecurity and receive nutritional formula from Nutrition Assistance Program for People with Special Dietary Needs (n = 22)

Source: the authors.

EBIA issues	n (%)	p-value
<b>Concern about food ending up at home before being able to buy, receive or produce more food</b>		
Combination of commercial formula and blended diet (n=49)	27 (55.1)	0.786*
Commercial formula (n=27)	14 (51.9)	
<b>No more food before I had the money to buy more</b>		
Combination of commercial formula and blended diet (n=49)	10 (20.4)	



Commercial formula (n=27)	5 (18.5)	0.843*
<b>No money to have a healthy and varied diet</b>		
Combination of commercial formula and blended diet (n=49)	19 (38.8)	
Commercial formula (n=27)	10 (37.0)	0.541*
<b>Adult in the house has ever decreased the amount of food in the meals, or stopped eating meals, because there is not enough money to buy the food</b>		
Combination of commercial formula and blended diet (n=49)	5 (10.2)	
Commercial formula (n=27)	6 (22.2)	0.183**
<b>Need to ever eat less than believed that should eat because there was not enough money to buy food</b>		
Combination of commercial formula and blended diet (n=49)	4 (8.2)	
Commercial formula (n=27)	5 (18.5)	0.266**

Note: EBIA = Brazilian Household Food Insecurity Measurement Scale; \* Pearson's chi-square test; \*\* Fisher's exact test.

**Table 4** Association between issues to assess food insecurity and formula type (N=76)  
Source: the authors.

## Discussion

We found a high frequency of FI in household of patients on HEN. The adoption of policies to promote and ensure FNS is responsibility of the public power, as well as to protect, monitor and evaluate the realization of the Human Right to Adequate Food (HRAF). Public policies and programs that aim comprehensive care and prevention of diseases resulting from FI must be implemented involving several sectors. The health sector is responsible for identifying the FI situation and ensure services to treat, rehabilitate and prevent health problems related to FI<sup>19,20</sup>.

In 2013, 22.6% of Brazilian households were in FI<sup>21</sup>. But the FI in Brazil is getting higher. According to information from the 2017-2018 Consumer Expenditure Survey (POF), 36.7% of households in the country had some level of FI, representing at least 84.9 million persons<sup>22</sup>. In 2020, vulnerabilities that were getting worse over the past few years prior to the COVID-19 pandemic and during the pandemic period, associated with economic, social and political crisis, were exposed. It highlighted the urgency for the Brazilian government to prioritize the FNS agenda, implementing mechanisms to ensure the HRAF and expanding existing FNS programs<sup>23</sup>.

However, the frequency of FI specifically in the households of patients on HEN in Brazil is still unknown. Programs with a focus on special dietary needs situations can develop actions to verify the FNS in the households of patients on HEN. These programs systematize care and organize PHC professionals (multidisciplinary team) to HEN care, as proposed by PAN<sup>24</sup>. Guidelines on HEN recommend the analysis of indirect FNS indicators<sup>25</sup>, but not to use a technique or instrument to directly measure FI. Nutritional and dietary interventions should consider the direct results of FI or FNS in household, and not only the indirect indicators from nutritional assessment of the patient on HEN, as they may not represent the reality regarding the household's FNS and the risk of FI of all the

people who live at patient on HEN household. Other indirect indicators are also used to assess FI, such as socioeconomic and demographic conditions. In the present study, association between indirect indicators with EBIA results was not found. However, there are disagreement in relation to FI indirect indicators that can be used at household of patients on HEN<sup>26</sup>. We suggest investigating FI with an instrument that allows its direct assessment in combination with FI indirect indicators, so as not to delay the identification of nutritional risk situation and malnutrition related to reduced food intake of people living in the household. In addition, actions involving several sectors should be realized to achieve the HRAF<sup>27</sup>. However, it is necessary to elucidate how other sectors are involved in the implementation of actions to reach of the HRAF for the patients on HEN and their families and to define the responsibilities of patients on HEN, caregivers, family, and health professionals. It is important that health professionals understand the concept of intersectionality to execute actions that produce real effects on health. Intersectoral actions allow the confrontation and resolution of problems by overcoming the fragmentation of knowledge and structures when considering the individual as a whole<sup>28,29</sup>.

Intersectionality also contributes to overcoming the fragmentation of policies, necessary to reach the HRAF. Special dietary needs are mentioned in the National Food and Nutrition Policy, which is guided by the principles of SUS. In the same way, the National Policy on Food and Nutritional Security presents convergent guidelines to effectuate the principles of SUS and are directed to the promotion of universal access to adequate and healthy food, with priority for FI situations. The National Policy on Food and Nutritional Security also mentions the need for policies, programs and intersectoral actions related to supporting people with special dietary needs, such as HEN<sup>30</sup>. The articulation between different sectors becomes essential to reverse the FI condition at household of patient on HEN. HEN care must be associated with other SUS health care actions<sup>31</sup>.

Nutritional care even for patients on HEN who do not receive commercial formula from PAN was instituted by this program<sup>32</sup>. PAN recommends primarily food-based formulas for adults and the elderly. However, in the present study, no exclusive use of the blended diet was found. This indicates that other factors influence the choice for the type of nutritional formula beyond PAN criteria, such as the prolonged period on HEN and the decision to purchase the nutritional formula with its own financial resources, fitting into status quo. This situation could lead to FI in the households of patients on HEN using a commercial formula, but this association was not found in the present study.

The recommendation of commercial formula is common in hospital discharge of a patient in enteral NT. During hospital care, the commercial formula is recommended because of its ability to provide energy and nutrient needs in a standardized and safe way for patients in acute clinical situations<sup>33,34</sup>. The patient on HEN is discharged from the hospital when there are clinical conditions for health care as an outpatient, in clinic or in home setting. There, lower density of health technology can be used and a blended diet or combination of commercial formula plus blended diet is seen as an adequate alternative to HEN for long-term nutritional

support<sup>35,36,37,38</sup>. This corroborates with the results of the present study, which found that the combined use of commercial formula and blended diet was more frequent compared to commercial formula exclusively. ESPEN guideline recommended that homemade blenderized admixtures should not be utilized in patients on HEN because they are less effective and less safe than enteral nutrition formula or commercially produced 'whole food' solutions<sup>39</sup>.

But, the contraindication of blended diet is unclear and one of the vantages is that it has lower cost compared with commercial formula. However, care programs implemented to special dietary needs are not responsible for providing the food needed to prepare the blended diet<sup>40,41,42</sup>. Patients on HEN with neurological diseases or cancer need comprehensive and palliative care for a variable period, depending on the severity of disease and clinical condition<sup>43,44,45,46</sup>, thus health care can be especially costly for these patients and their families.

When patients and their families do not have enough income, it is obligation of the State to ensure HRAF to individuals or groups unable to obtain it on their own, until they are able to do so, through income transfer, food delivery or other forms of social security. Income has an important influence over power and decision making to buying food and priority should be given to people in FI situation<sup>47</sup>. Income is indeed not an exclusive determinant of food choice and there is disagreement on which FNS economic and financial indicators are associated with HEN<sup>48</sup>. In the present study, most of the families of patients who received commercial formula from PAN reported not having financial resources for healthy and varied food. Financial difficulties in getting FNS at home may be a reason for provision of the commercial formula from PAN, even if the program protocol does not consider this criterion.

Most of the participants in this study reported low total income and more than half were in FI, which is higher than founds for the Brazilian population and for groups with other clinical conditions and diseases<sup>49,50,51,52</sup>. The lower the family income, the greater is the fraction of financial resources to buy food<sup>53,54</sup>. Getting HRAF may be more difficult for families who spend a large part of their income on buying nutritional formulas for patients on HEN<sup>55</sup>, but this was not found in the present study. The proportion of income spent on commercial formulas has not been investigated.

On the other hand, the practice of abusive prices and the imposition of the use of commercial formula when the blended diet has no contraindication - and is the desire of patients on HEN and their families - can be considered disrespect to the FNS. The type of formula should be indicated considering socioeconomic stability, clinical stability, nutritional status, quality of life and physical, social and environmental well-being of patients on HEN<sup>56</sup>. Though not observed in the present study, the use of family income to buy commercial formula can lead to FI in the household, due to inevitable overlapping priorities and consequent restriction of access and purchase of food in sufficient quantity and quality, as well as affecting access to other essential needs. The HRAF is actually gotten when all other human rights are also achieved, since the realization of one right cannot be used to justify the non-satisfaction of others<sup>57,58</sup>.

It should be periodically investigated in all households with patients on HEN that buy nutritional formula by themselves. Providing nutritional formulas to patients on HEN or offering government subsidies to buy commercial formulas, foods, and isolated nutrients can be an important strategy for patients and families with low income and in household FI<sup>59,60,61</sup>. Even HEN having a lower cost to public administration compared to hospital NT, the provision of long-term commercial formulas is still unsustainable for the government. In addition, there is still no funding in SUS for commercial nutritional formulas for HEN<sup>62,63,64,65</sup>. On the other hand, household FI increases the need for health care and, therefore, health care costs<sup>66</sup>. There is greater public expenditure on hospitalizations and prescription of drugs for individuals in FI compared to those in FNS<sup>67</sup>. Individuals with chronic diseases, but in FNS demand lesser budget from public administration<sup>68</sup>. A limitation of the present study is that it does not evaluate the costs of HEN for the patient, family and government. HEN care is complex, since it must cover aspects that go beyond the supply of commercial formula and its costs<sup>69</sup>.

It is important to expand population coverage through an adequate number of health professionals and investments to improve access and quality of services in the PHC to ensure nutritional care and FNS for patients on HEN<sup>70,71</sup>. The focus of government actions should not be the provision of the commercial formula, as this does not ensure the reach of the FNS. Instead, FI must be identified so that actions involving social security are mobilized to reverse the situation of existential vulnerability and lack of dignity<sup>72</sup>. More than half of the patients on HEN in this study did not receive retirement or other benefits.

Low income in families of patients on HEN may justify the lack of a formal caregiver in the present study. The informal caregiver becomes responsible for several procedures that previously, in the hospital, were performed by health

professionals and are part of the patient's routine on HEN. This is consented by experts as a reason for abandoning formal employment<sup>73</sup>. With no work outside the household for informal caregivers, family income may be affected by the need for patient care on HEN. Furthermore, the patient on HEN with a disease or a chronic condition, shows loss of productivity at work or unemployment, especially those individuals with lower levels of maintenance of daily living activities<sup>74,75</sup>.

Limitations of this study include the sample size, no consideration of inflation rates to compare of the income of patients interviewed in different periods between December 2015 to June 2018, and the use of short version of instrument to evaluate household FI, a complex situation. However, the sample represents the population on HEN in the city where the study was realized, and short version of EBIA is a validated instrument to assess FI. Yet, this is a preliminary study. The importance to investigate FI in the household of patients on HEN should be considered in the future studies and in the professional practice.

## **Conclusion**

The present study shows that the frequency of households FI was high among patients on HEN. There was no association between FI and socioeconomic characteristics or categories of diets to HEN. The association between receiving commercial formula from PAN with the lack of money for healthy and varied food to the household has been found. The results of this preliminary study support the need to assess the household FI among patients on HEN, as well as the need of better cooperation from State with these issues. Therefore, nutritional care of patients on HEN must be carried out including actions to ensure the FNS at their households.

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