Association between nutritional status, exclusive breastfeeding and length of hospital stay of children

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Associação entre estado nutricional, aleitamento materno exclusivo e tempo de internação hospitalar de crianças

Asociación entre estado nutricional, la lactancia materna exclusiva y el tiempo de hospitalización de los niños

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ABSTRACT

Objective: To verify the association between nutritional statuses, exclusive breastfeeding and the hospital stay of children.
Method: Cross-sectional study. Convenience sample of 146 children aged 1-48 months and their caregivers. Data were collected in paediatric units at a university hospital of southern Brazil from January to August 2012. Pearson's and Spearman's correlation coefficients were used for data analysis.
Results: The children were classified as: eutrophic (71.9%), risk for overweight (13.0%) obese (6.2%); thin (4.1%); overweight (2.7%) and extremely thin (2.1%). Exclusive breastfeeding proved to be a protective factor for extremely thin (P = 0.029); and currently breastfeeding (P = 0.024) and previous breastfeeding (P = 0.000) were protective factors for overweight, risk for overweight and obese. The hospital stay was 3.29 ± 0.18 days. The stay was longer for the classifications overweight/obese and shorter for extremely thin/thin (P = 0.785).
Conclusion: Nutritional status and exclusive breastfeeding were not risk factors for a longer hospital stay in this sample.
Keywords: Nutritional status. Weaning. Length of stay. Millennium Development Goals.

RESUMO

Objetivo: Verificar a associação entre estado nutricional, aleitamento materno exclusivo e tempo de internação hospitalar de crianças.
Método: Estudo transversal. Amostra por conveniência, com 146 crianças de 1-48 meses e seus responsáveis. Dados coletados em unidades pediátricas de um hospital do sul do Brasil, entre janeiro e agosto de 2012. Para análise, utilizaram-se os coeficientes de correlação de Pearson e de Spearman.
Resultados: As crianças foram classificadas em: eutróficas (71,9%), risco para sobrepeso (13,0%); obesidade (6,2%); magreza (4,1%); sobrepeso (2,7%) e magreza acentuada (2,1%). O aleitamento materno exclusivo demonstrou ser um fator de proteção contra a magreza acentuada (*P*=0,029); estar sendo amamentado (*P*=0,024) ou ter sido amamentado (*P*=0,000) foram identificados como fatores de proteção contra sobrepeso, risco para sobrepeso e obesidade. O tempo de internação hospitalar foi maior para sobrepeso/obesidade e menor para magreza acentuada/magreza (*P*=0,785).
Conclusão: Inadequado estado nutricional e desmame precoce não foram fatores de risco para o maior tempo de internação nesta amostra.
Palavras-chave: Estado nutricional. Desmame. Tempo de internação. Objetivos de Desenvolvimento do Milênio.

RESUMEN

Objetivo: Investigar la asociación entre el estado nutricional, la lactancia materna exclusiva y el tiempo de hospitalización de los niños.
Método: Estudio transversal. Muestra de conveniencia, con 146 niños de 1-48 meses y sus cuidadores. Los datos fueron recogidos en las unidades pediátricas de un hospital en el sur de Brasil, entre enero y agosto de 2012. Para el análisis, se utilizaron los coeficientes de correlación lineal de Pearson y Spearman.
Resultados: Los niños fueron clasificados como de peso normal (71,9%), en riesgo de sobrepeso (13,0%); obesidad (6,2%); delgadez (4,1%); sobrepeso (2,7%) y delgadez severa (2,1%). La lactancia materna exclusiva resultó ser factor protector para la delgadez severa (P=0,029); y estar en periodo de lactancia materna (P=0,024) o haber amamantado (P=0,000) como un factor protector para el sobrepeso, el riesgo de sobrepeso y obesidad. La estancia hospitalaria fue mayor en el sobrepeso/obesidad y menor para delgadez severa/delgadez (P=0,785).
Conclusión: El estado nutricional inadecuado y el destete precoz no fueron factores de riesgo para la mayor duración de la estancia hospitalaria en esta muestra.
Palabras clave: Estado Nutricional. Destete. Tiempo de Internación. Objetivos de Desarrollo del Milenio.

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INTRODUCTION

The nutritional status is considered one of the key indicators of quality of life and a reflection of the development model of a society. Nutritional diagnosis is a form of intervention for reducing situations of risk to the health of children[1].

Childhood is a stage of human development in which the child needs care and protection. Nutrition is a key precursor of the physiological processes of the body and it is essential for the correct growth and development of children[2].

Moreover, nutritional status and breastfeeding are closely related. Exclusive breastfeeding up to six months has a protective effect on the nutritional status of children, and is indicated for a full and nutritious diet. Breastfeeding can be supplemented with other foods up to 2 years of age or older[3]. Early weaning can make children more susceptible to a wide range of diseases, such as respiratory problems, and these diseases are the cause of a large number of hospitalisations among children under five years of age[4].

The mortality rates of children under five are still considered high in many developing countries, although significant progress has been made since 2000, when the United Nations established the Millennium Development Goals, which were approved by its member countries. There are eight goals that should be achieved by 2015, and the fourth includes reducing child mortality. The recommended strategies to achieve this goal include immunisation programmes and the nutrition of infants and young children[5].

Nutritional status can be a predictive factor for a negative clinical outcome of hospitalised patients. Knowledge of the inappropriate nutritional status when admitting children can point to possible risks related to hospitalisation, such as increased hospital stay[6].

Studies on the nutritional statuses of hospitalised children commonly highlight the risks associated with malnutrition, even when overweight and obesity are present in the sample[2, 4, 6]. Care is directed to the overweight and obese when there is interest in verifying its association with risk factors for cardiovascular diseases[1]. The relationship between the nutritional status, either as a deficit or as excessive, and the duration of hospital stays of children up to the age of four has not been widely explored. However, this relationship is important in light of the increased rates of overweight and obesity in young children, as easily observed in public spaces.

Identifying the association of nutritional status with exclusive breastfeeding and how this association affects the clinical outcomes that culminate in a prolonged hospital stay can contribute to the provision of more effective nursing care and support the clinical, political and social actions of nurses.

In view of this requirement, the following questions must be answered: Is there an association between nutritional status and early weaning? Does nutritional status influence the length of hospital stay of children? To answer these questions, this study aims to verify the association between nutritional status, exclusive breastfeeding and the hospitalisation time of children.

METHOD

Cross-sectional, quantitative study conducted at paediatric units of a university hospital in the city of Porto Alegre/RS.

The sample was selected according to convenience and consisted of 146 children aged between 30 days and four years of age. The subjects had been chiefly diagnosed with chronic respiratory disease at the time of hospital admission. The maximum established age was four because respiratory disease is prevalent in children under five[4].

The criteria of inclusion of the children were hospitalisation time of more than 6 hours, and in the company of a responsible adult. The exclusion criteria were hospitalisation for an elective procedure and the impossibility of checking the weight and length of the child.

Data were collected from January to August 2012. The person responsible for the child was interviewed by the researcher. The researcher recorded the resulting data in a form with closed questions related to the demographic and socioeconomic characteristics of the child and the person responsible for the child. Clinical data of the child and total hospital stay were extracted from the medical records at the time of hospital discharge.

The colour of the skin of the child was classified by the responsible adult according to the options offered by the researcher at the time of the interview and based on the recommendation of the Brazilian Institute of Geography and Statistics (IBGE) on race/ethnicity, which classifies the Brazilian population into five categories: white, black, brown, yellow and indigenous[7].

The nutritional status of the children was determined using weight and length. The babies were weighed without clothing or nappies on a calibrated mechanical Filizola® baby scale with a precision of 0.1 Kg. The length was measured in the dorsal position using a anthropometric acrylic ruler, and the correct measurement was ensured by positioning the head and fixing the feet[8]. The length was

measured twice by the researchers and the average value was recorded.

The weight and length data were used to calculate the body mass index (BMI). The BMI for each age and sex was the benchmark for assessing the nutritional status using the Z-score chart[9].

According to the Z-score for children from zero to under five and the BMI for each age, the nutritional status of the child was classified as: extremely thin (< z score = -3); thin (> z score = -3 and < z score = -2); eutrophic (> z score = -2 and < z score = +1); at risk for overweight (> z score = +1 and < z score = +2); overweight (> z score = +2 and < z score = +3); or obese (> z score = +3)[8]. The use of charts of the World Health Organization (WHO) – 2006 and 2007 to classify the nutritional status is characterised as substantial although this result is modified according to age and sex[10].

Sanitation was considered adequate when the adults answered positively to the following three items: water piping/mains, home sewage system and regular rubbish collection. Sanitation was considered inadequate when the adults answered negatively to one of the items above.

The number of school years was used to calculate the education of the adult responsible for the child.

Socioeconomic information was collected using the national economic indicator (IEN) based on 12 consumer goods. The obtained values were divided into levels by quarters: highest intermediate (1st quarter), high intermediate (2nd quarter), lower intermediate (3rd quarter) and low (4th quarter)[11].

Data were analysed using the Statistical Package for Social Sciences (SPSS) version 18.0. The Pearson product-moment correlation coefficient was used for the parametric variables. The Spearman rank correlation coefficient was used for non-parametric variables. For the statistical decision criteria, we considered a confidence interval (CI) of 95% ($p<0.05$). Other data were analysed using descriptive statistics and presented as average, standard deviation of the average, and absolute and relative frequency. The discussion of the results was based on a review of literature on child health, recommendations of the Brazilian Ministry of Health and documents on the Millennium Development Goals.

This article originated from the final monograph of the nursing course[12], which was inserted into a larger research project entitled *"Estado nutricional e situação clínica e de saúde de crianças admitidas em unidade hospitalar"*, and approved by the ethics and research committee of the Hospital de Clínicas de Porto Alegre, protocol 110516 in 2011.

The study observed the bioethical standards of Resolution 466, of December 12, 2012, of the National Health Council[13]. The adult responsible for the child signed an informed consent statement and the researchers signed a statement for the use of patient data for research.

RESULTS

To understand the magnitude of the relationship between the nutritional status with breastfeeding and hospitalisation time, we collected data from 156 children. Of the collected data, the percentage of losses was only around 6.4% (*n* = 10), resulting in a sample of 146 children.

Most of the children were white boys. The age range was between 1 and 48 months. The main diagnoses indicated for hospitalisation ranged evenly between acute viral bronchiolitis, acute bronchitis and viral pneumonia (first admission) for all the children.

Table 1 shows the demographics of the children and the responsible adults.

When asked if the family income covered the basic needs of the family, the negative response was 100% (n = 3/3) for the nutritional status extremely thin, followed by 50.0% (n = 3/6) for thin. The average number of residents per household was five, and 27.4% (n = 40) of the families had a higher number of residents in the household, with a prevalence for the nutritional status thin.

With regard to the health status of the studied sample, the responsible adults were asked if the children had been registered at the health unit, how many consultations the children had attended during the first year of life and whether the children had had all their vaccines (with confirmation of the vaccination card).

Of the total sample, 63.7% (n = 93) of the children were registered at a basic health unit and 36.3% (n = 53) were not registered. Of the children who were registered, 44.1% (n = 41) were in the ministerial programme, 78.0% (n = 32) were receiving the *Bolsa Família* (government benefit) and 22.0% (n = 9) were in the *Pra-nenê* programme.

For vaccination coverage, 73.3% (n = 107) of the children had received all their vaccines and 26.7% (n = 39) had delayed some of the vaccines, according to the age group.

Table 2 shows data regarding nutritional status and vaccination coverage of the children.

Of the children who had completed 12 months of age (*n* = 128), 22.7% (*n* = 29) had attended less than seven consultations and 77.3% (*n* = 99) had attended more than seven consultations. By stratifying the children according to their nutritional status, 100% (n = 3/3) of the children classified as extremely thin, 100% (n = 4/4) classified as thin, 16.3% (n = 16/98) classified as eutrophic, 33.3% (n = 5/15) classified as at risk for overweight, 0% (n = 0/3) classified

Table 1 – Characterisation of the children from 30 days to 48 full months admitted to a hospital paediatrics unit, according to the nutritional status and demographic aspects of each child and its responsible adult/family. Porto Alegre, RS, Brazil, 2012. n=146

Variables	n	%
Sex		
Female	64	43.8
Male	82	56.2
Age group (months)		
1 to 3 months	55	37.7
3.1 to 6 months	38	26.0
6.1 to 12 months	35	24.0
12.1 to 48 months	18	12.3
Declared colour (IBGE)[a]		
White	108	74.0
Brown	22	15.1
Black	16	10.9
Nutritional status (WHO)[b]		
Extremely thin	3	2.1
Thin	6	4.1
Eutrophic	105	71.9
Risk for overweight	19	13.0
Overweight	4	2.7
Obese	9	6.2
Basic sanitation		
Suitable	134	91.8
Unsuitable	12	8.2
Responsible for the child		
Birth mother	113	77.4
Biological father	17	11.6
Non-biological mother	2	1.4
Non-biological father	2	1.4
Other family member	12	8.2
School years of the responsible adult		
Less than eight years	59	40.4
Up to eight years	20	13.7
Less than eleven years	39	26.7
Up to eleven years	27	18.5
More than eleven years	1	0.7
Income (IEN)[c]		
1st quarter	2	1.4
2nd quarter	45	30.8
3rd quarter	56	38.4
4th quarter	43	29.4

Source: Research data, 2012.
[a]Instituto Brasileiro de Geografia Estatística (Brazilian Institute of Geography and Statistics - IBGE); [b]World Health Organization; [c]Indicador Econômico Nacional (National Economic Indicator).

as overweight, and 20% (n = 1/5) of the children classified as obese had attended less than seven childcare consultations in the first year of life (*P* = 0.055).

In relation to exclusive breastfeeding, 49.3% (*n* = 72) of children had not received breast milk before four months of age (with non-exclusive breastfeeding until 6 months of age), 39.0% (*n* = 57) were still being exclusively breastfed and 11.7% (n = 17) had never been breastfed (*P* = 0.046). The children who were exclusively breastfed were between one and seven months old.

With regard to breastfeeding, when nutritional deviations were compared to eutrophy, the data showed that breastfeeding (P = 0.029) is a protective factor for thinness and extreme thinness, and being breast fed (P = 0.024) or having been breastfed (P = 0.000) is a protective factor for overweight, risk for overweight and obese.

Table 3 shows data regarding nutritional status and breastfeeding.

Another aspect that was evaluated among the children was the presence of previous clinical intercurrences, and 37.7% (n = 55) had already been hospitalised one or more times. By stratifying the presence of previous incurrences by nutritional status, the data showed a higher percentage for overweight (*n* = 3; 75.0%), followed by obese (*n* = 5; 55.6%), thin (*n* = 3, 50.0%), eutrophic (n = 37, 35.2%), extremely thin (*n* = 1; 33.3%) and risk for overweight (*n* = 6; 31.6%).

For the total sample, the time of hospitalization was 3.29 (DP = 0.18) days. Stratification by nutritional status showed that the hospital stay was 3.98 (SD = 0.73) days for children at risk for overweight, 3.54 (SD = 0.82) days for obese children, 3.31 (SD = 0.19) days for eutrophic, 3.00 (DP = 1.53) days for overweight, 2.33 (DP = 0.77) days for extremely thin and 1.08 (SD = 0.35) days for thin (*P* = 0.785).

DISCUSSION

The study showed a prevalence of children between 1 and 6 months of age accompanied by a responsible adult with low education and low income monthly. Most children were classified as eutrophic, or standard, although approximately a quarter of the sample presented some kind of inadequacy in relation to nutritional status, which was evenly distributed for both sexes. Children classified as at risk for overweight, overweight and obese surpassed in number the children who were classified as extremely thin or thin.

One third of the sample was not registered at the health unit or in the ministerial programme. This finding is important because more than half of the sample was under 12

Table 2 – Nutritional status and vaccination coverage of children from 30 days to 48 months, admitted to a hospital paediatric unit. Porto Alegre, RS, Brazil, 2012. n=146

Nutritional status (n)	Primary Care Service		Vaccination coverage	
	registered	not registered	complete	incomplete
	n (%)			
Extremely thin (3)	1 (33.3)	2 (66.7)	2 (66.7)	1 (33.3)
Thin (6)	4 (66.7)	2 (33.3)	6 (100)	0 (0)
Eutrophic (105)	66 (62.9)	39 (37.1)	76 (72.4)	29 (27.6)
Risk for overweight (19)	13 (68.4)	6 (31.6)	12 (63.2)	7 (36.8)
Overweight (4)	2 (50.0)	2 (50.0)	4 (100)	0 (0)
Obese (9)	7 (77.8)	2 (22.2)	7 (77.8)	2 (22.2)

Source: Research data, 2012.

Table 3 – Nutritional status and breastfeeding among children from 30 days to 48 months admitted at a hospital paediatric unit. Porto Alegre, RS, Brazil, 2012. n=146

Nutritional status (n total)	Exclusive breastfeeding		
	No longer breastfeeds	Still breastfeeds	Never breastfed
	n (%)		
Extremely thin (3)	3 (100)		
Thin (6)	3 (50)	1 (16.7)	2 (33.3)
Eutrophic (105)	44 (41.9)	55 (52.4)	6 (5.7)
Risk for overweight (19)	11 (57.9)	1 (5.3)	7 (36.8)
Overweight (4)	3 (75.0)		1 (25.0)
Obesity (9)	8 (88.9)		1 (11.1)

Source: Research data, 2012.

months old, which is the maximum age to participate in the children's health monitoring programme (*Pra-Nenê*). Furthermore, 22.7% of the children had not attended the minimum of seven childcare consultations in the first year of life advocated by the Ministry of Health[3], as in the case of the children classified as extremely thin and thin. Data from this study also shows that some of the sample had not completed the vaccination schedule.

As for exclusive breastfeeding, 49.3% of the children did not receive exclusive breastfeeding before completing four months of age, and 11.7% had never received breast milk. Most of these children were under six months old.

These findings highlight the importance of knowing the conditioning factors of the people who are responsible for the child since they govern the child's family environment and influence their growth and development. In this regard, living in an environment of stable union with parents who have a higher level of education is a protective factor for the development of the child[14]. On the other hand, a mother with less than four years of schooling is three times more likely to have an undernourished child than a mother with more years of education[15]. Consequently, the unfavourable social, educational and economic conditions of a family have a negative impact on child growth and may result in a nutritional deficit[16].

However, Brazil has introduced relevant changes that have fostered the prevalence of obesity among children. The economic situation of the country has favoured a "nutritional transition". This nutritional shift from undernourishment to overnourishment is associated to schooling with socioeconomic factors that can lead to the inadequate choice of food and the nutritional problems that are currently and more frequently observed in children[17]. Therefore, a lower socioeconomic level associated with a low

level of education can justify the most prevalent nutritional deviations, such as risk for overweight, overweight and obesity in the studied sample.

Childhood obesity is considered a serious public health problem. Government agencies should therefore rethink public policies and introduce effective measures that identify at risk groups[10]. For the rethinking of public policies, we must understand that the environment can condition the excessive intake of food and low energy expenditure. The conduct of obese children is partly influenced by their family context and the inherent psychosocial factors that have proven decisive in the overweight and, particularly, in the maintenance of obesity[18].

The reformulation of policies should also observe the meaningful recommendations and experiences of nurses. Accordingly, the reduction of child mortality, which is the focus of the fourth Millennium Development Goal, is an opportunity for nurses to use their skills and experiences together with other professionals and instances of children's health care[19].

Effective childcare requires planned management and constant monitoring based on reliable information. For the practices of health professionals to be effective, they must consider that the mother and/or caregiver have a huge influence on the health of the child. Health workers should give priority to the cultural and practical aspects that are part of the family context and include them in the care plan.

The reduction of child mortality – the fourth Millennium Development Goal – is closely related to the scope of the fifth goal – to improve maternal health. The lesser advancements are jointly recorded in the fifth goal. Consequently, these results compromise the reduction of child mortality. Progress in both goals largely depends on the alignment of policies and programmes that promote the health of children and women based on synergistic approaches[19]. Intersector partnerships and multidisciplinary actions can support the achievement of the fourth and fifth goals, especially in relation to primary care.

This bond with primary care offers several strategies that help prevent clinical complications and promote health. Thus, monitoring child growth and development must be the central axis of childcare. Moreover, monitoring identifies early disorders that can affect children's health, nutrition and mental and social capacity, and enables a comprehensive view of the child. In order to monitor children's growth and development, the Ministry of Health recommends a total of seven childcare consultations in the first year of life, including an appointment within the first 15 days and an appointment within the first month[3].

The aim of nutritional surveillance and growth monitoring is to promote children's health and enable an early diagnosis and appropriate treatment in case of deviations of growth.

One of the actions that focus on the comprehensive care of children from zero to five years of age is vaccination coverage. The effectiveness of vaccination coverage of a population depends on three specific factors: health, immunisation programme and characteristics of the population. Lower vaccination coverage is usually associated with populations with lower socioeconomic status. However, this relationship is not linear, and the health care system and the "vaccination programme" must observe this complexity[20].

It is important to note that some of the sample had incomplete vaccination coverage. The vaccine calendars of children registered at the health unit and included in the ministerial programme must be up-to-date and their anthropometric data is collected on a monthly basis, which ensures greater protection both in terms of immunisation and nutritional monitoring[16]. Increased and homogenous vaccine coverage is a good indicator of the capacity of healthcare systems to overcome social disparities[20].

The type of food children receive in the first year of life plays an important role in the etiology of nutritional deviations. Thus, exclusive breastfeeding for six months and mixed breastfeeding for two years or more are protective factors against overweight and obesity, that is, the greater the amount of breast milk received early in life, the greater the protection against obesity[11]. In this context, the Agency for Healthcare Research and Quality, through a meta-analysis of seven studies, found a reduction of 72% (95% CI46-86%) for the risk of hospitalisation for lower respiratory system diseases in the first year of life when infants were exclusively breastfed for at least four months[21]. Breastfeeding according to the established recommendations has a positive impact on the health and development of children[3]. Breastfeeding interferes with the intake of calories and proteins, with the secretion of insulin, with the modulation of fat and with the development and deposit of adipose tissue[18]. These data corroborate the results of the present study, in that exclusive breastfeeding proved to be a protection factor for the nutritional status inadequacies found in the sample.

The identification of the nutritional status of children admitted to hospitals shows that a significant number of these children present alterations. A study that associated the nutritional status of children and adolescents with the length of stay found that 31% of the subjects were overweight/obese and 25% were malnourished and at risk for

malnutrition[8]. It is understandable that children who are overweight and/or obese or extremely thin/thin have a more susceptible immunological status due to the nutritional imbalances, which can contribute to a greater number of hospitalisations in comparison with children considered eutrophic.

The same study found that the average hospital stay was 7.2 (SD = 19.8) for patients with malnutrition and risk for malnutrition, 5.0 (SD = 9.3) for eutrophic children, and 4.1 (SD = 8.2) for children with obesity and overweight[8]. These results express a more prolonged length of stay for malnutrition and risk for malnutrition[8] than in our study, in which the length of stay of children at risk for overweight and obesity was greater. This disparity between the results can be related to different diseases included in the studies of other researchers.

However, knowing the nutritional status of children who are admitted to a hospital service is important to establish the proper therapeutic approach that is needed to maintain and/or recover the health of children during their hospital stay and to plan guidelines for discharge.

There are still several challenges for the development, implementation, and enforcement of actions and programmes that target the appropriate child nutritional status in the early years of life, but these challenges must be identified and addressed to ensure the scientific support that directs care to this population in risk situations. The nutritional status of children can be both a protective factor that contributes to their healthy growth and development and a vulnerability that increases the risk of morbidity and mortality. Advancements in the fourth Millennium Development Goal – to reduce child mortality – largely depend on monitoring the nutritional status of children. Monitoring is the shared responsibility of healthcare managers, the health professionals and the families.

CONCLUSIONS

The study showed that the inadequacy of the nutritional status and early weaning were not risk factors for increased hospitalisation in the studied sample. However, the nutritional statuses extremely thin/thin and obese presented a shorter period of exclusive breastfeeding and a longer hospital stay, although this finding was not statistically significant.

The professionals working in primary healthcare play an essential role in relation to childcare since any changes in the nutritional status of children and other conditions should be identified during consultations in the basic health network. Consequently, health professionals should detect opportunities for assessing the nutritional status and breastfeeding habits of children. Hospitalisation is also the ideal time to intervene and ensure the correct growth and development of children.

The multiple factors associated with the health of children require the coordinated efforts of government agencies, non-governmental organisations, health professionals and society. Reducing infant mortality rates – the fourth Millennium Development Goal – remains a challenge, and nurses have a lot to contribute by providing comprehensive care for children, stimulating breastfeeding, providing guidelines on healthy eating habits to the persons responsible for the children, monitoring growth and development and ensuring full observance of the immunisations schedule.

Some limitations of the study should be considered, such as the use of convenience sampling that may not be representative of the population and the non-performance of a nutritional physical exam. We suggest further investigations on this subject by means of multicentre trials that support measures that prevent health issues among children and a more consistent analysis of the effectiveness of these measures.

From the perspective of the Millennium Development Goals, there is a need to know the interfaces that reduce child mortality and improve maternal health in Brazil in terms of progress, barriers and strategies.

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