

Factors associated with breastfeeding in children aged 6 to 23 months

Thais Fernanda Sehnen de Souza, Larissa Naiana Rauber, Angelica Rocha de Freitas Melhem, Daniele Gonçalves Vieira, Catiusce Cabreira da Silva, Paula Chuproski Saldan

Departamento de Nutrição, Universidade Estadual do Centro-Oeste (UNICENTRO) – Guarapuava (PR), Brasil.

ABSTRACT

Introduction: The period between gestation and 24 months of age corresponds to the moment of opportunities for the development and growth of the child. **Objective:** To analyze factors associated with breastfeeding in children aged 6 to 23 months. **Methods:** Cross-sectional study carried out during the National Polio Vaccination Campaign 2012 in Guarapuava, Paraná Brazil with children aged 6-23 months, comprising a sample of 1,750 individuals. For the identification of the factors associated with breastfeeding, Poisson regression models were applied, estimating Prevalence Ratios (PR) and 95% Confidence Intervals (95% CI). Bivariate models were developed covering each of the independent variables and the dependent variable. **Results:** The independent factors associated with early breastfeeding interruption in 1,355 infants were: use of baby-bottle (PR 4.74, CI 3.45-6.52), use of pacifier (PR 1.47, CI 1.30-1.66), not being breastfed in the first hour of life (PR 1.14, CI 1.05-1.25) and mother working out of home (PR 1.12, CI 1.01-1.24). Maternal schooling lower than 8 years was a protective factor for the continuity of breastfeeding (PR 0.88, CI 0.80-0.96). **Conclusions:** The use of nipples, not being breastfed in the first hour of life and maternal work interfered in the continuity of breastfeeding. From this knowledge it is possible to propose recommendations for actions to promote breastfeeding at the local level.

Keywords: breast feeding; infant; cross-sectional studies; risk factors.

INTRODUCTION

Exclusive breastfeeding (EBF) is indicated by the World Health Organization (WHO) as a priority during the first six months of the child's life, giving continuity to breastfeeding from that period up to two years or more^{1,2}. The period between pregnancy until 24 months of age corresponds to the moment of opportunities for the child's development and growth³.

The series published in The Lancet on Maternal and Child Nutrition highlights that the promotion of breastfeeding (BF) in conjunction with other actions helps to reduce the mortality of children under five years old⁴.

The intake of breast milk (BM) up to two years or more is important because it is an energy source due to the levels of essential fat and fatty acids, proteins, and micronutrients such as vitamin A, calcium, and riboflavin⁵. It is also noteworthy that

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Corresponding author: Thais Fernanda Sehnen de Souza - Departamento de Nutrição, Universidade Estadual do Centro-Oeste – Rua Camargo Varela de Sá, 03 – Vila Carli – CEP: 85040-080 – Guarapuava (PR), Brasil – E-mail: thaisfernandasehnen@gmail.com

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BF provides protection to breastfeeding women against breast and ovarian cancer, type 2 diabetes mellitus, and increases the interbirth interval⁶.

The determinants of breastfeeding include historical, socioeconomic, cultural, and individual factors. Since the lack of ability of health professionals to support breastfeeding, issues related to the baby or the mother, such as low birth weight or risky pregnancy, can compromise or delay the start of breastfeeding. Women with partners who support breastfeeding tend to breastfeed longer, while maternal work negatively influences breastfeeding⁷.

The prevalence of continued breastfeeding up to one year worldwide is 73.3%, being higher in low- and low-middle-income countries and less than 20% in most high-income countries⁶. According to the II Survey on the Prevalence of BF in Brazilian capitals and the Federal District⁸, BF continuity among children aged 9 to 12 months in Brazil was 58.7%, with the southern region having a lower continuity index with 49.5%.

The prevalence of BF in children under one and two years of age in Guarapuava, Paraná, Brazil, in 2012 was 35.8% and 21.1%, respectively, and the median duration of BF was 351.6 days (11.7 months)⁹. The continuity of BF with one year in the municipality was lower than that reported in the 2006 National Demography and Health Survey, 47.5%, as well as the median duration, 14 months, but it was similar for the two-year age group, 24.8%¹⁰.

It is important to study the factors that imply the continuity of BF, identifying what may be interfering in this practice. Thus, the objective of the study was to analyze the factors associated with breastfeeding in children aged 6 to 23 months in the city of Guarapuava, Paraná, Brazil.

METHODS

To carry out the study, part of the data collected in a cross-sectional study was used during the National Vaccination Campaign against Poliomyelitis 2012 in Guarapuava, Paraná, Brazil⁹.

Guarapuava is located in the Center-South of Paraná, is home to the 5th Health Regional in the state, being a reference for 19 municipalities, and has 42 Basic Health Units (UBS). The estimated population in 2016 was 179,256 inhabitants who live predominantly in the urban area (91.4%). According to the 2010 census, the number of children under the age of one and a full year was 2,476 and 2,376, respectively¹¹.

The study population was the group of children aged 6 to 23 months and 29 days who attended the vaccination posts in the urban and rural areas of the municipality from June 11 to 29, 2012. The age group adopted follows the recommendation WHO for studies that assess the continuity and indicators of BF, except for the median duration of BF that considers the age group 0-36 months².

Despite the Ministry of Health's recommendation to continue breastfeeding for two years or more⁵, it was decided to work with children up to 23 months and 29 days old, as studies in the national scenario show that the median duration of breastfeeding is lower than recommended^{8,10}, being 11.2 months in the set of Brazilian capitals and 9.9 months for the South Region⁸. The population that was vaccinated in the first stage of the 2011 campaign and who provided their information to the survey was grouped into two age groups (<1 year and 1-5 years), consequently the sample was stratified into the following age groups: children under one year and children from 12 to 23 months. The number of children aged 12 to 23 months was established according to the population aged between one and five years, considering that there is a homogeneous disposition between the groups aged one, two, three, and four years complete (same number of children in all age ranges). The groups composed research domains and, for each of them, a sample was drawn, whose number met the accuracy requirements established and described below.

The sample size was estimated to allow the analysis of BF indicators (EBF, continuity of BF at one year and two years of age) in different age groups (0-6, 12-15 and 20-23 months) recommended by WHO². To calculate the sample size of children under 12 months, the estimated dominance of EBF in children under six months was used, with a parameter of 40% between two to three months, according to a local study¹², and a sample error of 9%¹³. For children aged 12-23 months, the indicator of continuity of BF at one year of age² (40%) was used for 12-15 months and a sampling error of 6%¹³. The sample size hypotheses were achieved by applying the algebraic expression of Lwanga and Lemeshow¹⁴ described below, where: n = initial sample size, P = proportion in the population, Q = difference in proportion (1- P), d = error sample at a 95% confidence level. Subsequently, a 5% non-response adjustment and 1.4 design effect were applied^{8,13}.

$$n_1 = \frac{P.Q}{(d/1,96)^2}$$

In order to assess the continuity of BF from 6 months, for this study, data from children aged 6-23 months were used, which totaled a sample of 1,750 children, considering that the age group of 6-11 months calculated was half the age group of children under one year.

Since the children were not evenly distributed among vaccination posts (clusters), a two-stage drawing was carried out, with feasibility corresponding to the size of the clusters¹³. In the first stage, vaccination posts were drawn according to the number of children vaccinated in 2011, totaling 32 units. Vaccination stations with the highest number of immunized children were more likely to be drawn in the first stage. In the second stage, children were systematically drawn in the vaccination queue at each service station.

The data collection instrument was a structured questionnaire based on and modified from the one used by the Ministry of Health (MS) in the II Survey on the Prevalence of BF in Brazilian capitals and the Federal District in 2008⁸. A pilot study was carried out with 27 mothers in one Nutritional Assistance Center to check the adequacy of the questions and correct possible issues that could compromise the mothers' understanding. The questions about food were based on the possible foods (ML, tea, different milks, water, fruit juices, porridge, porridge or salt, pot food or soup) that the child ingested the day before the interview (Recall 24 hours) 2 and the remaining questions were related to the child, mother and health service. When the guardian of the child did not know how to answer a question regarding the questionnaire, the data was classified as not informed, not being considered in the analysis.

For data collection, 118 volunteer students from Nutrition and Nursing courses at two local higher education institutions who received four-hour training were selected. After manually checking the questionnaires and coding the questions, the data were entered twice in the Epi Info program version 3.5.3 (Centers for Disease Control and Prevention, Atlanta, USA) and the data comparison feature (Data Compare) was used to verification of data consistency.

Poisson regression models with robust variance¹⁵ were constructed to identify factors associated with BF, obtaining Prevalence Ratios (PR) in bivariate and multiple models, estimated by points and 95% Confidence Intervals (95% CI). The dependent variable of this study was the BF indicator in children aged 6-23 months, characterized in yes when the child's companion replied that he/she took SC on the day before the interview, regardless of the consumption of other foods or liquids, including non-dairy milk, maternal and formula, or not when the child did not take LM³. It should be noted that after six months of life, the ideal is for the child to receive other foods, in addition to breast milk¹⁶. The independent variables were: child's sex (female or male), type of delivery (vaginal or cesarean), birth weight (<2500g or ≥2500g), breastfeeding in the first hour of life (yes or no), use of a pacifier (yes or no), bottle use (yes or no), health service where the child is taken to consult (public or private network/health insurance), maternal parity (primiparous or multiparous), maternal age (<20 or >20 years), maternal education (<8 or ≥8 years of study), maternal work (works or does not work outside the home), lives with the child's father (yes or no) and area of residence (urban or rural)^{8,10,17}. The child's age in months (6-11, 12-17 and 18-23 months) was considered as a control variable.

Bivariate models were developed covering each of the independent variables and the dependent variable. The variables for which values of $p < 0.20$ (Wald test) were selected for the multiple model. To prepare the final model, the stepwise forward procedure was used, with the variables with $p < 0.05$ remaining in the model. In addition to the child's age, maternal age remained in the final

model even though it was not significant because maternal education was influenced by this variable. The area of residence also remained in the final model, as it adjusted the other variables.

The estimates were calculated considering the effect of the design (survey module) and sample weights according to the age group domains, as the estimates involved children of both age groups (6-11 and 12-23 months). Data analysis was performed using the Stata program version 12.0 (StataCorp, College Station, Texas, USA).

The research was approved by the Research Ethics Committee of the Ribeirão Preto College of Nursing at the University of São Paulo (CEP-EERP/USP-253/2012). Waiver of the Informed Consent Form was requested due to the application of a quick questionnaire in the vaccination queue⁸.

RESULTS

In this study, the factors associated with the practice of continuing breastfeeding in 1,355 children aged 6-23 months were analyzed, despite the sample calculation pointing to 1,750 children. The number of refusals in the original study was 149 (8.1%) due to the time it took to answer the questionnaire and due to the long stay in the vaccination queue. In addition, 18 (1%) children were excluded because they did not live in the city of Guarapuava and 16 (0.9%) due to inconsistency in age or lack of information about the date of birth. Vaccination coverage in the municipality in 2012 was 99.0%, reaching 100% for children under one year old and 87.7% for children aged 12-23 months.

In total, 81.8% of the children were accompanied by their mothers and 18.2% by their parents or grandparents. The variables with the highest data not informed in the study were maternal parity and whether the mother lived or not with the child's father, totaling 18.6% ($n=252$), variables that were questioned only when the child's companion was the mother.

Table 1 describes the main characteristics of the mothers and children participating in the study, with 51.3% ($n=695$) of the children being born vaginally, 88.3% ($n=1,196$) having adequate birth weight and 78.6% ($n=1,035$) were breastfed in the first hour of life. In relation to mothers, 68.3% ($n=926$) were 20 years old or more and 56.9% ($n=771$) 8 years or more of study.

In the bivariate analysis (Table 2), a significant association was observed between the interruption of BF in children aged 6-23 months and the following variables: bottle use (PR 5.70; CI 4.32-7.32; $p < 0.001$), pacifier use (PR 1.74; CI 1.59-1.92; $p < 0.001$), maternal work (PR 1.31; CI 1.17-1.47; $p < 0.001$), private service/health insurance that you attend (PR 1.22; CI 1.12-1.33; $p < 0.001$), not being breastfed in the first hour of life (PR 1.18; CI 1.08-1.30; $p = 0.001$), cesarean delivery (PR 1.14; CI 1.06-1.24; $p = 0.002$), maternal primiparity (PR 1.10; CI 0.99-1.23; $p = 0.082$) and male gender child (PR 1.06; CI 0.99-1.15; $p = 0.096$). The lowest maternal

Table 1: Characteristics of mothers and children from 6 to 23 months of age participating in the study in Guarapuava, Paraná, Brazil, 2012.

Characteristics	n	%
Children's age group (months)		
6 † 12	476	35.1
12 † 18	490	36.1
18 † 24	389	28.7
Sex		
Female	706	52.1
Male	649	47.9
Birth type		
Vaginal	695	51.3
Caesarean	655	48.3
Not informed*	5	0.4
Birth weight (grams)		
>2500	1,196	88.3
≤2500	131	9.7
Not informed*	28	2.1
Breastfed in the first hour of life		
Yes	1,035	78.6
No	282	21.4
Not informed*	38	2.8
Use of a pacifier		
Yes	619	45.7
No	728	53.7
Not informed*	8	0.6
Baby bottle use		
Yes	1,077	79.5
No	273	20.1
Not informed*	5	0.4
Attending health service		
Public	877	64.7
Private/health insurance	459	33.9
Not informed*	19	1.4
Maternal parity **		
Primiparous	543	40.1
Multiparous	560	41.3
Not informed*	252	18.6
Maternal age (years)**		
<20	178	13.1
≥20	926	68.3
Not informed*	251	18.5
Maternal schooling (years of study)**		
≥8	771	56.9
<8	333	24.6
Not informed*	251	18.5
Maternal job**		
Does not work	743	54.8
Works	361	26.6
Not informed*	251	18.5
Lives with the child's father**		
Yes	942	69.5
No	161	11.9
Not informed*	252	18.6
Area of residence		
Urban	1,230	90.8
Rural	125	9.2

*Data not answered by the child's companion.

**Data collected when the child's companion was the mother.

education (PR 0.78; CI 0.68-0.89; p<0.001), residing in the rural area of the municipality (PR 0.81; CI 0.68-0.97; p=0.022) and maternal age less than 20 years (PR 0.89; CI 0.76-1.04; p=0.140) were protective factors for the continuity of BF.

In the multiple analysis, the independent factors associated with interruption of BF in children aged 6-23 months in Guarapuava were: using a bottle (PR 4.74; CI 3.45–6.52; p<0.001), use pacifier (PR 1.47; CI 1.30-1.66; p<0.001), the fact that the child was not breastfed in the first hour of life (PR 1.14; CI 1.05-1.25; p=0.003), the mother working outside the home (PR 1.12; CI 1.01-1.24;

Table 2: Bivariate models considering the interruption of breastfeeding in children aged 6 to 23 months of age and independent variables in Guarapuava, Paraná, Brazil, 2012.

Variable	Gross PR	95% CI	p*
Sex			
Female	1.00		
Male	1.06	0.99–1.15	0.096**
Birth type			
Vaginal	1.00		
Caesarean	1.14	1.06–1.24	0.002**
Birth weight (grams)			
≥2500	1.00		
<2500	1.05	0.94–1.16	0.385
Breastfed in the first hour of life			
Yes	1.00		
No	1.18	1.08–1.30	0.001**
Use of pacifier			
No	1.00		
Yes	1.74	1.59–1.92	<0.001**
Baby bottle use			
No	1.00		
Yes	5.70	4.32–7.32	<0.001**
Attending health service			
Public	1.00		
Private/health insurance	1.22	1.12–1.33	<0.001**
Parity			
Multiparous	1.00		
Primiparous	1.10	0.99–1.23	0.082**
Maternal age (years)			
≥20	1.00		
< 20	0.89	0.76–1.04	0.140**
Maternal schooling (years of study)			
≥8	1.00		
<8	0.78	0.68–0.89	0.001**
Maternal job			
Does not work	1.00		
Works	1.31	1.17–1.47	<0.001**
Lives with the child's father			
No	1.00		
Yes	0.97	0.84–1.11	0.610
Area of residence			
Urban	1.00		
Rural	0.81	0.68–0.97	0.022**

PR: prevalence ratio. 95% CI: confidence interval.

*Wald test. **Variables selected for the multiple model.

$p=0.038$) and as a protective factor for the continuity of BF, the fact that the mother has less than 8 years of study (PR 0.88; CI 0.80-0.96; $p=0.009$), after controlling for the effect of the child's age in months, maternal age and area of residence (Table 3). The interaction between the variables, education and maternal work (PR 1.17; CI 1.05-1.30; $p=0.005$) was tested, but the final model did not change.

DISCUSSION

The results of the research showed that the independent factors associated with the interruption of BF were: use of a bottle and pacifier, the fact that the child is not breastfed in the first hour of life and the mother works outside, while the maternal education below 8 years was a protective factor for the continuity of BF.

The use of a bottle is frequent among children who are still being breastfed, a factor that influences early weaning. A study showed that the proportion of children who used a bottle corresponded to the frequency of ingestion of other types of milk, that is, the bottle is a means of replacing the SC by artificial milk¹⁸.

Even though the study did not aim to investigate which foods or liquids were offered in the bottle, it is known that currently it is common, in addition to the supply of non-breast milk, the consumption of tea for relief of colic in the first months of life of babies, thus causing the use of baby bottles. Therefore, these fluids when offered via a bottle can interfere with the practice of breastfeeding, since they reduce the baby's suckling at the breast and, consequently, the production of BM^{5,16}.

Like the bottle, the use of a pacifier is also associated with the interruption of EBF and the low prevalence of BF^{16,19}. A cohort study with children followed from birth to 3-5 years old showed that

73.5% of children used a pacifier at some point in their lives and the habit of using this tool contributed to early interruption of BF²⁰.

The findings of the present study concerning the use of bottles and pacifiers corroborate the investigated literature as factors that interfere in the discontinuity of BF in children aged 6-23 months. In addition to interference with breastfeeding, studies show that bottle-feeding causes dental caries, but there is no conclusive data on its use and dental malocclusion^{21,22}. In addition to the aforementioned harms, these products are also vehicles of contamination due to inadequate hygiene, thus bringing yet another risk to child development^{16,23}.

The early initiation of breastfeeding is considered a simple intervention that prevents neonatal morbidity and mortality and assists in the practice of EBF until six months of life²⁴. In the present study, the fact that the children did not breastfeed in the first hour of life influenced the interruption of BF. A study confirmed that mothers who breastfeed exclusively according to WHO recommendations have a greater interest in maintaining BF for twelve months or more, as long as there is a favorable context for this practice^{7,25}. The success of continuing breastfeeding does not depend exclusively on the mother, but on a combination of factors and interventions that includes the family, the health service, public policies in favor of breastfeeding and conditions on returning to work⁷.

Maternal work is one of the main reasons for early weaning⁷, as some mothers, when they return to work after maternity leave, substitute BM for other types of milk and stop breastfeeding entirely. Although Brazil has advanced in terms of maternity leave, this does not guarantee the continuity of BF, as most companies do not have breastfeeding rooms equipped to milk and store BM. Informal work also negatively influences breastfeeding practices and the duration of EBF, especially BF, as mothers need to return to work to increase family income²⁶.

In terms of maternal work, there is a need for a support network for mothers to continue breastfeeding with the return to work activities, but this comes up against labor issues and maternity leave. In the municipality, only in the public service, the mother is entitled to 180-day maternity leave and no company has a breastfeeding support room, which makes milking and storing BM difficult. The lower maternal education found in this study as a protective factor for the continuity of BF may mean that those mothers with less education are also mothers who do not have a formal job, thus reinforcing the interference of these variables in BF continuity.

In this study, maternal education less than eight years was considered a protective factor for the continuity of BF. A study with children under one year old in Cuiabá, Mato Grosso, Brazil, found that women who have only completed elementary or high school were more likely to stop exclusively breastfeeding their children before the age of four months, showing that mothers with higher education seem to receive more information about the importance of EBF and tend to follow the recommendations¹⁷.

Table 3: Factors associated with the interruption of breastfeeding in children aged 6 to 23 months in Guarapuava, Paraná Brazil, 2012.

Variable*	Gross PR (95% CI)	Adjusted PR (95% CI)**	P
Baby bottle use			
No	1.00		
Yes	5.70 (4.31–7.52)	4.74 (3.45–6.52)	<0.001
Use of pacifier			
No	1.00		
Yes	1.74 (1.58–1.91)	1.47 (1.30–1.66)	<0.001
Breastfed in the 1st hour			
Yes	1.00		
No	1.18 (1.08–1.30)	1.14 (1.05–1.25)	0.003
Maternal job			
Does not work	1.00		
Works	1.31 (1.17–1.47)	1.12 (1.01–1.24)	0.038
Maternal education (years of study)			
≥8	1.00		
<8	0.78 (0.68–0.89)	0.88 (0.80–0.96)	0.009

PR: prevalence ratio. 95% CI: confidence interval

*Variables controlled for the child's age in months, maternal age and area of residence. **Poisson regression.

A study carried out in the Brazilian regions, as well as the present study, demonstrated that the lower maternal education is a protective factor to the continuity of BF after six months, due to the mothers staying more time at home with the child and not to enroll the child in daycare centers early²⁷.

The study had different limitations, highlighting the cross-sectional design that does not allow the identification of the time of exposure to the factors that contribute to the non-continuity of BF in the first years of life, as well as the causal effect of the exposure of interest. The variables affected by reverse causality are education and maternal work. Another limitation is because the number of children in the study is lower than initially planned since the data were collected until vaccination coverage reached 80% for both age groups, which may compromise the statistical power of the study.

As a strength of this study, we highlight the similar profile of the sample studied with the data from the Information System on Live Births in 2010 for the municipality²⁸, showing that the data are representative of the population under two years old. Of the children and mothers studied, 51.3% were born vaginally and 56.9% had eight or more years of study versus 51.5% and 57.0% of the reference population, respectively²⁸. The sample from a vaccination campaign with high vaccination coverage in the municipality in 2012 (99%)²⁹ also reinforces the representativeness of the population.

The study brings unprecedented data to the municipality on the factors that influence the continuity of BF and from this knowledge it is possible to propose some recommendations for actions to promote BF at the local level focusing on the main factors evidenced and related to the interruption of this practice. It is necessary to work in the short, medium and long term to make parents and family members aware of the negative interference of the nipples in the BF. The use of these utensils comes up against

cultural issues that are not simple to change, but they need to face and dialogue with family members.

Health professionals working with obstetrics need to be made aware and trained to promote breastfeeding in the first hour of life given the benefits of this practice for establishing breastfeeding, duration of EBF and BF. The two existing hospitals in the municipality work as a reference for 19 other municipalities in the region, in this sense, the fact that promoting the benefits of the 10 Steps to the Success of BF aiming at the accreditation and expansion of the Iniciativa Hospital Amigo da Criança (IHAC) may have an impact in the medium term. and long-term improvement and prevalence of breastfeeding in the first hour of life, EBF and breastfeeding continuity. One of the hospitals already has the Human Milk Bank (HMB) integrated into the service, which opened in the second half of 2013 and provides human milk for babies admitted to the neonatal intensive care units of the two hospitals. The HMB, in addition to collecting and processing the LM, develops a work to promote BF by helping mothers with breastfeeding difficulties. The hospital that has the HMB is seeking the accreditation of IHAC.

In addition to health professionals in the hospital network, primary care health professionals also need to be trained to support mothers and babies when they leave the hospital and start attending UBS for routine consultations, vaccinations and childcare. With this training in mind, the Ministry of Health has been proposing the Estratégia Amamenta e Alimenta Brasil since 2012 as a tool to qualify the daily practical activities of primary care professionals to promote and strengthen BF and healthy complementary food for children under two years old from the local context³⁰.

Considering the results, it is important to present these data to the municipal manager to raise awareness and develop actions in favor of the continuity of BF in the municipality focusing on the main factors related to the interruption of this practice.

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