

# Breastfeeding duration comparison of children enrolled in municipal preschools in 2004 and 2018

## *Comparação da duração do aleitamento materno entre crianças de escolas municipais de educação infantil em 2004 e 2018*

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### ABSTRACT

#### Objective

To describe and compare the duration of breastfeeding of children enrolled in municipal preschools in *Pelotas* (RS), Brazil, in 2004 and 2018, taking into account sociodemographic and health factors.

#### Methods

Cross-sectional study, with children aged zero to six years. Data collection included interview with parents and children anthropometric assessment. Data was entered on EpiData 3.1 and analyzed on Stata 14.0. Median duration of breastfeeding was assessed according to the independent variables. Two children life tables were elaborated for the years 2004 and 2018. The statistical significance of the median analysis was based on the Wilcoxon Rank Sum test for dichotomic exposure and Kruskal Wallis test for polytomous exposure.

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## Results

A total of 1902 children were studied. In 2004, the median duration of breastfeeding was five months (IQR: 2.0;12.0) which increased one month for each weight category increase at birth. In 2018, the median was six months (IQR: 2.0;17.0) and increased two months for each weight category increase at birth. The life table showed that around 20.0% of the children in 2004 and 33% of the children in 2018 continued to be breastfed after 11 months of age.

## Conclusion

The breastfeeding median increased in the period under review. The greater the birth weight, the longer the breastfeeding median duration.

**Keywords:** Breastfeeding. Child. Child's nutrition.

## RESUMO

### Objetivo

Descreve e compara a duração do aleitamento materno de crianças matriculadas em Escolas Municipais de Educação Infantil, de Pelotas (RS) Brasil, em 2004 e 2018 segundo fatores sociodemográficos e de saúde.

### Métodos

Estudo transversal, com crianças de zero a seis anos de idade. A coleta de dados incluiu entrevistas com os pais e avaliação antropométrica das crianças. Os dados foram digitados no EpiData 3.1 e analisados no Stata 14.0. A duração da mediana do aleitamento materno foi analisada de acordo com as variáveis independentes. Foram elaboradas duas Tábuas de vida, para as crianças de 2004 e de 2018. A significância estatística das análises de mediana, foi baseada no teste de Wilcoxon Rank Sum para as exposições dicotômicas, e no teste de Kruskal Wallis para as exposições politômicas.

### Resultados

Foram estudadas 1902 crianças ao total. Em 2004, a mediana da duração do aleitamento materno foi de cinco meses (IIQ: 2,0;12,0) e aumentou um mês a cada aumento de categoria de peso ao nascer. Em 2018, a mediana foi de seis meses (IIQ: 2,0;17,0) e aumentou dois meses a cada aumento de categoria de peso ao nascer. A Tábua de vida mostrou que cerca de 20,0% das crianças em 2004 e 33,0% das de 2018 tiveram aleitamento materno continuado após os 11 meses de idade.

### Conclusão

A mediana aumentou no período analisado. Quanto maior o peso ao nascer, maior a mediana de aleitamento materno

**Palavras-chave:** Aleitamento materno. Criança. Nutrição infantil.

## INTRODUCTION

A systematic review study on the prevalence of Breastfeeding (BF) in Brazil between 1998 and 2013 found that the rates of BF in children under six months of age and continuation of BF after 12 months, despite increasing over the years, are still lower than the rates recommended by the World Health Organization (WHO) [1,2]. More recent national data also show a positive evolution in the prevalence of exclusive breastfeeding at four and six months of age, with absolute increases of 55.3 and 42.8 percentage points, respectively, between 1986 and 2019 and smaller increases in the prevalence of continued BF in the first year of life and in children under two years of age, whose differences in the same period were, respectively, 22.7 and 23.5 percentage points [3].

The BF trends among four baby birth cohorts from the city of Pelotas (1982, 1993, 2004 and 2015), that considered about 20,000 participants, observed improvement in breastfeeding indicators from 1982 to 2015. The prevalence of exclusive breastfeeding was null in the 1982 cohort and increased by up to 45% in the 2015 cohort, and the prevalence of weaning at three months of age decreased, being 48% among 1982 children, 43% among 1993 children, 26% among 2004 children and 24% among 2015 children, representing a significant improvement between the 90s and 2000s [4].

With changes in breastfeeding encouragement policies over the years, such as the expansion of maternity leave guaranteed by Act 11,770 dated September 9, 2008, the right to breastfeeding work breaks, adoption of the Kangaroo Method and the implementation of the Breastfeeding and Feeding Brazil Strategy [5-7], it becomes important to assess the duration of breastfeeding at different times. In addition, it is important to highlight that the maintenance of breastfeeding in children who attend early childhood education schools may be lower than the prevalence found in the general population, since these children spend most of the day without the presence of their mothers [8,9].

Thus, the objective of the present study is to describe and compare the duration of breastfeeding of children enrolled in the Municipal Schools for Early Childhood Education, in *Pelotas* (RS), Brazil, in 2004 and 2018 taking into account sociodemographic and health factors.

## **METHODS**

This study was developed with data obtained from two cross-sectional studies that included children enrolled in *Escolas Municipais de Educação Infantil* (EMEI, Municipal Schools for Early Childhood Education) in the years 2004 and 2018, in the city of *Pelotas* (RS), Brazil. These two studies used similar data collection methods, since they had the same main objective, which was to perform anthropometric assessment and investigate children's health. In 2004 there were 25 EMEI and the study included 24 of them, in 2018 there were 29 EMEI and all were included for the anthropometric assessment. However, due to logistical issues and the financial budget for the research, only five schools were randomly chosen to apply a questionnaire in order to investigate issues associated with children's health. All children enrolled in the 24 EMEI in 2004 were included, with one school being excluded from the study, due to logistical issues. In 2018, due to research budget restrictions, children enrolled only in five schools were included; they were randomly selected in order to ensure the heterogeneity of the population that represents the 29 EMEI all together. More details on these studies can be found in other publications [10-13].

All school children were eligible for the surveys. Previously scheduled meetings were held with management and the teachers to present the project and agree on how data collection would be carried out. The interviews were conducted at the school by undergraduate students from the School of Nutrition of the Federal University of *Pelotas* (UFPEL), previously trained by a nutritionist, who coordinated the research. Permission for data collection was requested from parents or guardians of the children through the Free and Informed Consent Form, which presented a brief explanation about the research and the contact of those responsible for the study to answer any questions. The questionnaires applied in the two surveys were divided into blocks and addressed sociodemographic characteristics, health and child nutrition. Children who were not found at school at least three times or whose guardians did not accept to participate in the survey were considered losses or refusals.

The children weight and height measurements in the 2004 study were collected following the technique standardized by Lohmann [4]. For the measurements a portable 150 kg electronic digital scale, SECA brand, and precision of 100 g and a wooden anthropometer. locally made according to the AHRTAG [5] model were used to measure the weight and height of the children in the 2018 study, a 150 kg capacity Tanita Solar Scale (model 1631) digital scale with 200 g accuracy was used; the SECA brand anthropometer, model 417 for children aged 0 to 2 years, and the SECA brand (model 213) for children over 2 years of age were used, following the technical guidelines of the *Sistema de Vigilância Alimentar e Nutricional* (Food and Nutrition Surveillance System) [2]. Nutritional status was classified according to body Mass Index for Age (BMI/A) and Height for Age index (H/A).

Anthropometric data from the 2004 study were reanalyzed according to the growth curves for children under five years of age issued by the World Health Organization (WHO) in 2006. Children who had a BMI/A  $<-2$  z-score were classified as thin and those with z-score  $\geq -2$  and  $\leq +1$  with normal weight. For analysis purposes, children who were at risk of overweight or overweight were grouped, adopting z-score  $>+1$  and  $\leq +3$  to classify them as overweight, and children with z-score  $>+3$  were classified as obese. Children who presented H/A  $<-2$  z-score were classified as having low H/A and those who presented z-score  $\geq -2$  as adequate H/A [2].

The study outcome was defined as the duration of breastfeeding measured in months and stemmed from the following question: "Did <CHILD NAME> breastfeed?" if the answer was yes: "How long? \_\_\_ years \_\_\_ months or ( ) still breastfeeding?". This question was asked to all mothers or guardians of children, from zero to six years of age, who were attending schools. All affirmative answers, regardless of the use of any other food, were considered for the outcome. For every "yes" answer, the respondent was asked how long the child had been breastfed and the answer was recorded as number of months.

Independent variables were divided into demographics: gender (male and female); socioeconomic: maternal education (in complete years) and monthly family income (in minimum wages); child health: birth weight (in kilograms), current nutritional status according to BMI/A (thinness, normal weight, overweight and obesity) and H/A index (short stature and adequate stature), hospitalizations during the last year (no, yes) and diarrhea in the last two weeks (no, yes); maternal characteristic: parity (primiparous or multiparous).

A database was created in the Epidata 3.1 software for each of the studies. After double typing and comparison and detection of potential errors (validate), the data were transferred to the statistical package Stata version 15 for analysis. The analysis of anthropometric data in the two years of the survey was performed using the Anthro Plus program and later the anthropometric indices were imported into Stata. To assess the duration of breastfeeding, the median, Interquartile Range (IQR) was calculated and reviewed according to the independent variables. The statistical significance of the BF median analysis according to the sociodemographic and health factors of the dichotomous exposures was based on the Wilcoxon Rank Sum test, and of the polytomous exposures, on the Kruskal Wallis test, non-parametric; these tests are based on ranks and are commonly used for asymmetric data or heterogeneous variances.

A life table was developed for each of the studies that indicated the number of children who were breastfed, weaned and on the brink of being weaned each month, calculating the probability of the child being weaned each month and the cumulative probability of the child still being breastfed at the end of each month. The time interval adopted for the construction of the table was calculated from the date of birth of the child and the date on which the interview was carried out, children who were still being breastfed on the day of the interview were censored.

The 2004 study was approved by the Ethics Committee of the School of Medicine of UFPel affiliated to the *Conselho Nacional de Ética em Pesquisa* (National Council for Ethics in Research) and the 2018 study was authorized by the Municipal Education Department of *Pelotas* and approved by the Research Ethics Committee of the UFPel Nursing and Midwifery School under the opinion nº 2,781,251. Parents and teachers were assured complete confidentiality of the information obtained during the studies and at the end of the data collection process, parents and/or guardians had access to the research data.

## RESULTS

The total number of children assessed was 1902. In 2004, in the 24 EMEI, 1354 children were evaluated; none were younger than 12 months; in 2018, in the five EMEI, 548 children were evaluated and eight (1.4%) were younger than 12 months. Table 1 presents the main characteristics of the children and their mothers. In 2004, 10.6% were born with Low Birth Weight (LBW) and 4.1% of children were obese.

The median duration of breastfeeding was 5.0 months, with an interquartile range of 2.0 to 12.0. A total of 15.1% children were born with LBW and 16.3% were obese. The median duration of children breastfeeding was 6.0 months, with an interquartile range of 2.0 to 17.0. We can observe that the children evaluated in 2018 had a lower frequency of hospitalizations and episodes of diarrhea compared to children in 2004. At the same time, in 2018 the proportion of mothers with 11 years education or more and families earning three or more minimum wages was higher than in 2004.

**Table 1** - Main characteristics of children enrolled in Municipal Early Childhood Schools in the city of *Pe/otas* (RS), Brazil, 2004 and 2018.

Variables	2004 (n=1354)		2018 (n=548)					
	n	%	n	%				
Gender								
Male	715	52.8	267	48.7				
Female	639	47.2	281	51.3				
Age (months)								
0 to 24	105	7.8	59	10.6				
24.1 to 36	188	13.9	83	14.8				
36.1 to 48	226	16.7	110	19.7				
48.1 to 60	298	22.0	146	26.1				
≥ 60.1	537	39.7	161	28.8				
Birth weight (grams)								
<2500	124	10.6	80	15.1				
2500 to 2999	268	22.8	101	19.1				
3000 to 3499	442	37.6	181	34.2				
3500 to 3999	267	22.7	134	25.3				
>4000	73	6.2	34	6.4				
Stature/age								
Short stature	59	4.4	22	3.9				
Adequate stature	1293	95.6	537	96.1				
BMI/age (Kg/m <sup>2</sup> )								
Thinness	6	0.4	2	0.4				
Eutrophy	1149	85.0	315	56.4				
Overweight	142	10.5	151	27.0				
Obesity	55	4.1	91	16.3				
Hospitalization (last year)								
Yes	500	41.2	49	8.9				
Diarrhea (last two weeks)								
Yes	162	13.4	53	9.7				
Parity								
Primiparous	262	21.6	223	40.7				
Multiparous	951	78.4	325	59.3				
Maternal education (years)								
1 to 5	419	34.8	100	17.1				
6 to 10	596	49.5	203	34.7				
≥11	189	15.7	282	48.2				
Family income (NMW)								
<1	278	23.0	55	10.0				
1 to 3	751	62.1	355	64.8				
>3	180	14.9	138	25.2				
BF duration	Mdn	IQR	M	SD	Mdn	IQR	M	SD
	5.0	2.0;12.0	8.9	10.3	6.0	2.0;17.0	10.8	11,3

Note: BF: Breastfeeding; IQR: Interquartile Range; Mdn; Median; M: Mean; SD: Standard Deviation; NMW: National Minimum Wage.

In 2004, the median breastfeeding rate was higher among girls and among children aged 36 to 60 months. Children with birth weight greater than 3500g, who were not hospitalized in the previous year, and daughters of mothers with more than 11 years of schooling had a higher median BF duration, with a statistically significant difference ( $p < 0.05$ ). In 2018, the median duration of breastfeeding was the same between boys and girls; there was a significant difference only in relation to birth weight, so that the higher the child's birth weight, the higher the median value ( $p < 0.001$ ) (Table 2). Table 3 presents the prevalence of breastfeeding at six months, the increase of breastfeeding was statistically significant in almost all variables.

**Table 2** - Median and interquartile range of the breastfeeding duration according to the characteristics of children enrolled in Municipal Early Childhood Schools in the city of Pelotas (RS), Brazil, 2004 and 2018.

Variables	Duration of breastfeeding (months)					
	2004			2018		
	Mdn	IQR	<i>p</i> -value	Mdn	IQR	<i>p</i> -value
Gender						
Male	4.0	2.0;11.0	0.067	6.0	3.0;16.0	0.817
Female	6.0	2.0;12.0		6.0	2.0;17.0	
Age (months)						
0 to 24	4.0	2.0;9.0	0.164	4.5	2.0;9.5	0.216
24.1 to 36	5.0	2.0;10.0		9.5	2.0;18.0	
36.1 to 48	6.0	2.0;12.0		7.0	3.0;12.0	
48.1 to 60	6.0	2.0;12.0		6.0	3.0;16.0	
≥ 60.1	4.0	2.0;12.0		6.0	2.0;23.0	
Birth weight (grams)						
<2500	3.0	1.0;7.0	0.002	2.0	0.0;12.0	0.000
2500 to 2999	4.0	2.0;10.0		6.0	3.0;14.0	
3000 to 3499	5.0	2.0;12.0		6.0	3.0;14.0	
3500 to 3999	6.0	3.0;13.0		8.0	4.0;18.0	
>4000	6.0	3.0;12.0		10.0	2.0;22.0	
Stature/age						
Short stature	4.5	2.0;10.5	0.421	5.0	1.0;17.0	0.316
Adequate stature	5.0	2.0;12.0		6.0	3.0;17.0	
BMI/age (Kg/m <sup>2</sup> )						
Thinness	2.5	2.0;6.0	0.178	15.0	0.0;30.0	0.231
Eutrophy	5.0	2.0;12.0		6.0	2.0;12.0	
Overweight	4.0	1.0;9.0		8.0	3.0;18.0	
Obesity	5.5	2.0;22.0		8.0	3.0;24.0	
Hospitalization (last year)						
No	6.0	2.0;12.0	0.000	6.5	3.0;17.0	0.301
Yes	4.0	2.0;9.0		6.0	2.0;12.0	
Diarrhea (last two weeks)						
No	5.0	2.0;12.0	0.213	6.0	2.0;17.0	0.914
Yes	4.0	1.0;12.0		7.0	2.5;15.0	
Parity						
Primiparous	4.0	1.0;11.0	0.112	6.0	2.0;14.0	0.106
Multiparous	5.0	2.0;12.0		7.0	3.0;17.0	
Maternal education (years)						
1 to 5	4.0	2.0;10.5	0.036	6.0	2.0;17.5	0.801
6 to 10	5.0	2.0;12.0		7.0	2.0;18.0	
≥ 11	6.0	3.0;18.0		6.0	3.0;14.0	
Family income (NMW)						
<1	4.0	2.0;12.0	0.975	7.0	3.0;14.0	0.912
1 to 3	5.0	2.0;12.0		6.0	2.0;17.0	
>3	5.0	3.0;9.0		6.0	4.0;14.0	

Note: *p*-value based on the Kruskal Wallis test. IQR: Interquartil Interval; Mdn; Median; NMW: National Minimum Wage.

**Table 3** - Prevalence of breastfeeding at 6 months of age according to the characteristics of children enrolled in Municipal Early Childhood Schools in the city of Pelotas (RS), Brazil, 2004 e 2018.

Variables	Breastfeeding at six months				p-value
	2004		2018		
	n	(%)	n	(%)	
Breastfeeding					
Gender					
Male	290	51.2	163	61.7	0.003
Female	279	45.0	166	59.7	0.000
Age (months)					
0 to 24	38	44.2	31	52.5	0.206
24.1 to 36	81	48.2	56	68.3	0.002
36.1 to 48	103	51.0	66	64.7	0.015
48.1 to 60	132	52.8	76	56.3	0.292
≥ 60.1	215	44.8	83	59.7	0.001
Birth weight (grams)					
<2500	49	39.5	31	39.2	0.544
2500 to 2999	115	44.1	57	57.0	0.019
3000 to 3499	209	48.6	116	64.4	0.000
3500 to 3999	140	53.2	93	69.4	0.001
>4000	35	50.7	23	67.6	0.078
Stature/age					
Short stature	25	48.1	10	50.0	0.546
Adequate stature	542	47.9	302	60.8	0.000
BMI/age (Kg/m <sup>2</sup> )					
Thinness	2	33.3	1	50.0	0.643
Eutrophy	489	48.7	167	57.0	0.007
Overweight risk/overweight	52	41.3	94	67.1	0.000
Obesity	24	50.0	50	61.0	0.150
Hospitalization (last year)					
No	372	53.6	304	61.7	0.003
Yes	197	40.0	25	51.0	0.091
Diarrhea (last two weeks)					
No	499	48.5	295	60.2	0.000
Yes	69	44.5	34	65.4	0.007
Parity					
Primiparous	120	47.4	122	55.2	0.055
Multiparous	448	48.1	207	64.5	0.000
Maternal education (years)					
1 to 5	177	43.4	38	60.3	0.009
6 to 10	287	49.2	124	61.4	0.002
≥ 11	101	54.6	167	60.3	0.132
Family income (NMW)					
<1	124	46.4	32	60.4	0.044
1 to 3	353	48.0	208	59.3	0.000
>3	87	49.2	89	64.5	0.004

Note: p-value based on the Fisher's exact test. NMW: National Minimum Wage.

Tables 4 and 5 present the duration of breastfeeding for each month of life of the children in the 2004 and 2018 study, respectively. In 2004, out of 1186 children who started the period being breastfed, 131 had their BF discontinued before the first month of life, with an 11.0% probability of weaning during this period.

**Table 4** - Life table on the duration of breastfeeding among children enrolled in 24 Municipal Schools for Early Childhood Education in *Pelotas* (RS), Brazil, 2004.

Age (months)	Number of BF children at the beginning of the period	Breastfeeding interruption during the period	Number of children censored	Number of children at risk of interruption of BF	Probability (%) of the child weaning	Probability (%) of the child being breastfed	Cumulative probability (%) of the child still receiving BF at the end of the period
0	1186	131	0	1186	11.0	89.0	87.2
1	1055	79	0	1055	7.5	92.5	80.7
2	976	130	0	976	13.3	86.7	70.0
3	846	152	0	846	18.0	82.0	57.4
4	694	80	0	694	11.5	88.5	50.8
5	614	45	0	614	7.3	92.7	47.1
6	569	126	0	569	22.1	77.9	36.6
7	443	28	0	443	6.3	93.7	34.3
8	415	41	0	415	9.9	90.1	30.9
9	374	34	0	374	9.1	90.9	28.1
10	340	10	0	340	2.9	97.1	27.3
11	330	11	0	330	3.3	96.7	26.4
12	319	62	0	319	19.4	80.6	21.2
13	257	8	0	257	3.1	96.9	20.6
14	249	8	0	249	3.2	96.8	19.9
15	241	8	0	241	3.3	96.7	19.3
16	233	3	0	233	1.3	98.7	19.0
17	230	2	0	230	0.9	99.1	18.9
18	228	38	0	228	16.7	83.3	15.7
19	190	3	0	190	1.6	98.4	15.5
20	187	10	0	187	5.4	94.6	14.6
21	177	2	0	177	1.1	98.9	14.5
22	175	3	0	175	1.7	98.3	14.2
23	172	2	0	172	1.2	98.8	14.1
24	170	75	0	170	44.1	55.9	7.9
25	95	1	0	95	1.0	99.0	7.8
26	94	1	0	94	1.1	98.9	7.7
27	93	2	0	93	2.2	97.8	7.5
28	91	6	0	91	6.6	93.4	7.0
29	85	2	0	85	2.4	97.6	6.9
30	83	24	0	83	28.9	71.1	4.9
32	59	2	0	59	3.4	96.6	4.7
33	57	2	0	57	3.5	96.5	4.6
34	55	1	0	55	1.8	98.2	4.5
36	54	30	0	54	55.6	44.4	2.0
38	24	1	0	24	4.2	95.8	1.9
39	23	1	0	23	4.4	95.6	1.8
40	22	1	0	22	4.6	95.4	1.7
41	21	1	0	21	4.8	95.2	1.6
42	20	3	0	20	15.0	85.0	1.4
44	17	3	0	17	17.6	82.4	1.2
46	14	1	0	14	7.1	92.9	1.1
47	13	1	0	13	7.7	92.3	1.0
48	12	12	0	12	100.0	0.0	0.0

**Table 5** - Life table on the duration of breastfeeding among children enrolled in five Municipal Schools of Early Childhood Education in *PeLOTas* (RS), Brazil, 2018.

Age (months)	Number of BF children at the beginning of the period	Breastfeeding interruption during the period	Number of children censored	Number of children at risk of interruption of BF	Probability (%) of the child weaning	Probability (%) of the child being breastfed	Cumulative probability (%) of the child still receiving BF at the end of the period
0	543	69	0	543	12.7	87.3	87.2
1	474	25	0	474	5.3	94.7	82.6
2	449	34	0	449	7.6	92.4	76.4
3	415	28	0	415	6.8	93.2	71.2
4	387	34	0	387	8.8	91.2	65.0
5	353	23	0	353	6.5	93.5	60.7
6	330	45	0	330	13.6	86.4	52.5
7	285	20	0	285	7.0	93.0	48.8
8	265	21	1	264	8.0	92.0	44.9
9	243	14	0	243	5.8	94.2	42.3
10	229	8	1	228	3.5	96.5	40.8
11	220	7	0	220	3.2	96.8	39.5
12	213	34	1	212	16.0	84.0	33.2
13	178	2	0	178	1.1	98.9	32.8
14	176	9	0	176	5.1	94.9	31.1
15	167	4	0	167	2.4	97.6	30.4
16	163	3	1	162	1.8	98.2	29.8
17	159	5	1	158	3.2	96.8	28.9
18	153	12	2	151	8.0	92.0	26.6
19	139	4	1	138	2.9	97.1	25.8
20	134	3	1	133	2.3	97.7	25.2
21	130	1	1	129	0.8	99.2	25.0
22	128	3	0	128	2.3	97.7	24.4
23	125	3	1	124	2.4	97.6	23.9
24	121	43	2	119	36.1	63.9	15.2
25	76	1	3	73	1.4	98.6	15.0
26	72	1	0	72	1.4	98.6	14.8
27	71	1	2	69	1.4	98.6	14.6
28	68	1	0	68	1.5	98.5	14.4
29	67	3	1	66	4.6	95.4	13.7
30	63	9	1	62	14.5	85.5	11.7
31	53	2	0	53	3.8	96.2	11.3
32	51	2	1	50	4.0	96.0	10.8
36	48	19	2	46	41.3	58.7	6.4
42	27	5	7	20	25.0	75.0	4.8
48	15	9	5	10	90.0	10.0	0.5

Before 12 months of age, the period most likely for the child to be weaned was at six months (22.1%) and the period with the lowest probability was at 10 months (2.9%). About 257 (21.7%) children experienced continued breastfeeding after the first year of life and out of these only 170 (14.3%) were breastfed until the age of two. In 2018, out of the 543 children who started the period being breastfed, 69 were breastfed for less than a month, with the probability of weaning in this period being 12.7% and only 30% of the children had been weaned during this period. Before 12 months of age, the period most likely for the child to be weaned was at six months (13.6%) and the period with the lowest probability was at 11 months (3.2%). About one third of the children experienced continued breastfeeding after the first year of life and out of these, 121 (22.3%) were breastfed until 24 months of age.

## DISCUSSION

This study showed that BF duration among children enrolled in municipal early childhood education schools increased in the period reviewed, confirmed by the change in the median, which went from five months to six months between 2004 and 2018. The results of the two studies showed an uneven increase among the children when considering their birth weight, and the group of children with LBW, considered the most vulnerable, showed the smallest increase.

The increase in the duration of breastfeeding from 2004 to 2018 may be a reflection of government initiatives such as the marketing regulation and monitoring of infant foods, the adoption of the Baby-Friendly Hospital and Kangaroo Method initiative, the creation and expansion of coverage of Human Milk Banks and the implementation of the Breastfeeding and Feeding Brazil Strategy [6,7,14]. Also local actions, such as training courses for primary care health professionals and courses promoted by the *São Francisco de Paula* University Hospital team, which is certified as a Baby-Friendly Hospital, encouraging breastfeeding, may have contributed to the increase in prevalence of BF. In addition, day care centers can play an important role in the maintenance of BF, especially by encouraging professionals to breastfeed in the school setting itself and also through day care centers offered in the workplace or that are located close to the job site, making it easier for mothers to breastfeed their children with safety and support [15].

In Brazil, in the last three decades the breastfeeding median increased from 2.5 months in the 1970s to 14 months in 2006-07 [16]. A population-based study carried out in *Campinas* (SP), between 2004-2005, with 2857 children under two years of age, found median BF values of four months, similar to what was found in the present study, for the same age group in 2004 [17]. The National Survey of Demographics and Health of Children and Women-PNDS 2006 showed a median of 11.9 months [18]. The difference in BF duration among the children in this study compared to the values found in the literature does not seem to be necessarily due to the differences in socioeconomic status shown in different studies, since ENANI data show the association between a higher breastfeeding frequency among children of underprivileged families [16-19]. At the same time, mothers who need to work and thus leave their children in day care centers tend to have greater difficulty in continuing to breastfeed [8].

The association between LBW and BF duration, assessed by the median, in both studies is consistent with the literature data. A cohort study carried out in *Pelotas* (RS), with children born in 2004, indicated that, among children with LBW, breastfeeding occurred for a shorter period when compared to children with adequate birth weight; however, the difference between the medians was not statistically significant [20]. A survey carried out at the *Centro de Convivência Infantil* (Children's Living Center) in *Marília* (SP), revealed a median duration of BF of 15 months among children who were born with adequate weight and of 12 months among those who presented LBW, with a significant association between LBW and the shorter duration of breastfeeding ( $p=0.01$ ) [9]. This association can be explained by the fact that LBW is considered one of the factors that contributed to early weaning, since low birth weight newborns have greater difficulty in breastfeeding, being more susceptible to weaning after a short period of breastfeeding [21,22]. Thus, the present study revealed that there is inequality in the practice of breastfeeding considering birth weight, which often happens due to factors that impair the successful breastfeeding process, such as the need for intensive care, lack of suction stimulus for the release of prolactin and emotional aspects that involve the situation of a low birth weight newborn [19]. Hence, we found that the most vulnerable group, whose benefits of feeding on breast milk are essential, is the group that is benefiting the least.

When reviewing the duration of breastfeeding through the life table, we can observe that half of the children in the 2004 study had already been weaned at four months of age, while among the children in 2018, this proportion was 30.0%. Just like those children evaluated in 2004, about half (50.7%) of the children participating in a study carried out in 2008 in the city of *Tubarão* (SC), had BF discontinued at four months of age, according to a survival analysis [23]. The proportion of children evaluated in 2018 who had already been weaned at four months of life is in agreement with the result of a study that assessed the duration of breastfeeding of Brazilian participants in the first phase of the Multi-Centre Body Composition Study in 2015 using a table of life, where approximately 30% of children were weaned before four months of life [20]. When reviewing the proportion of children who had continued BF after the first year of life, a difference was found between the two studies, revealing about 10 percentage points more in the year 2018. This result may reflect the encouragement of BF through public policies, which increasingly show the population the importance of extended breastfeeding, causing BF rates to progressively grow in Brazil [24].

Support measures for women in the first two years of their children's lives could be beneficial for a longer duration of BF, given that many children under 24 months whose mothers have a job need to remain in preschool, which can make it difficult or even make it impossible for them to feed on breast milk. Early childhood education, like day care centers and preschools, has the potential to be a great pillar for BF. The creation of a welcoming setting in the school itself, where mothers can go to breastfeed their children at any time, is essential to ensure the continuity of BF. In the same way, mothers should be guided and encouraged to express the milk and store it at school to be offered in their absence; to that effect, schools need to prepare people to host and receive this mother who wants to continue offering her milk to her child. In Brazil, there is still no exclusive legislation that requires schools to have breastfeeding support programs, but the school that presents this initiative will comply with the recommendations of the Ministry of Health, according to the document published in 2018 "The day care center as a promoter of breastfeeding and adequate and healthy food: booklet for managers" [25]. The municipality of *Curitiba* (PR), in partnership with the Municipal Department of Education and the Municipal Department of Health, developed the *Mama Nenê* Program that supports breastfeeding continuity after infants start attending municipal day care centers [26]. A study carried out with children from zero to two years of age enrolled in 40 day care centers of one of the regional centers of education in the city of *Curitiba* (PR) showed that almost all of the institutions included in the survey had different strategies to encourage and support breastfeeding practices, such as specific place for breastfeeding, exposed materials about the Program and support material with procedures for expressing and storing breast milk arranged in the "breastfeeding corner" environment. However, it was found that only 9.4% of mothers breastfed their children in the school setting. Mothers' workplace far from day care and lack of time on the part of working mothers were identified as barriers to breastfeeding [27].

Therefore, it is important to establish partnerships between managers and professionals from early childhood education schools, health professionals, especially from Basic Health Units and managers of the private sector, in the case of mothers who need to return to formal work. In this case, institutional support is essential. Not forgetting the support of the breastfeeding mother's own family, as it is essential that everyone encourages and provides appropriate situations so that the child who attends an early childhood education school can receive exclusive breast milk up to the sixth month and even up to two years of age at least, as recommended by the WHO and the BoH, and that entering school does not constitute a barrier to this practice, which is so important for the health of the baby and for the affective bond between mother and child [25]. In addition, it is recommended that women receive interventions at the community level with actions that include group counseling in order to clarify doubts and enhance the benefits of maintaining breastfeeding, even after the child is attending kindergarten.

The possibility of places for children to stay in the maternal workplace setting or the extension of maternity leave can also contribute to the encouragement of breastfeeding, maternal and child health and nutrition, and consequently of the population in general, due to the known benefits of breastfeeding for health also in the long term [24].

As an advantage, this study brings original contributions, as it included all children enrolled in EMEI in 2004 and a sample of children enrolled in 2018, using the same methodology. The results of the present study corroborate the results of other studies that show an increase in the prevalence of BF in Brazil, adding information about children from municipal schools. Among the limitations, self-reported data collection can influence the results in both directions. Mothers who breastfed and stopped recently, but do not remember the exact month, may be overestimating the result; on the other hand mothers who breastfed for a short time or who stopped for a longer time, especially mothers of older children who had not been breastfed for some time, may have underestimated the result. However, this limitation does not seem to influence the comparison of results, because many studies [9,17,23] mentioned also the use the self-reported surveys and this same strategy has been used in 2004 and 2018 moments. The difference in sample size from 2004 and 2018 may lead to lower reliability of some analyses; however this accuracy was not strongly affected, as the difference in standard error between the two samples was not significant. Still as a limitation, it should be considered that no information was obtained on exclusive breastfeeding, which does not allow a comparison with the recent results of the National Child Nutrition Study, in which more than half of the children who were evaluated until six months of age, were fed only on breast milk [3].

Although an increase in the duration of BF was observed between 2004 and 2018, it still falls short of the WHO recommendations that all children be exclusively breastfed until six months of age and in a complementary way until two years of age [28]. The impact of LBW on BF indicates the need to follow up more closely women who present risk factors that can influence birth weight and, after birth, follow-up the BF process.

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## CONCLUSION

There was an increase in the median duration of breastfeeding from 2004 to 2018, but with an unequal increase in relation to birth weight; low birth weight infants who would benefit most from being fed breast milk were those who exhibited the lowest median duration of breastfeeding.

The incorporation of policies to support women in the first two years of their children's lives could be beneficial for a longer duration of BF, given that many children under 24 months whose mothers have a job have to remain in early childhood education schools, which can make it difficult or even impossible for them to feed on breast milk. The possibility of places for children to stay at their mothers' workplace or the extension of maternity leave may improve maternal and child health and nutrition, and consequently of the population in general, due to the known health benefits of breastfeeding also in the long term.

In addition, it is recommended that women receive interventions at the community level with actions that include group counseling in order to answer questions and enhance the benefits of maintaining breastfeeding, even after the child is attending kindergarten.

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## CONTRIBUTORS

AO LINHARES responsible for preparing the research project, coordinating the field work, performed the analysis and interpretation of the data. Wrote, reviewed and approved the final version of the article. LS SILVEIRA responsible for data collection, collaborated with the analysis and interpretation of the data.

Wrote, reviewed and approved the final version. DP GIGANTE responsible for the research Project, reviewed the data analysis, reviewed and approved the final version of the article.

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