



-  Alice Bouskelá<sup>2</sup>  
 Jane de Carlos Santana Capelli<sup>1</sup>  
 Camilla Medeiros Macedo da Rocha<sup>1</sup>  
 Flavia Farias Lima<sup>1</sup>  
 Naiara Sperandio<sup>1</sup>  
 Vania de Matos Fonseca<sup>2</sup>

<sup>1</sup> Universidade Federal do Rio de Janeiro, Curso de Nutrição, Campus UFRJ-Macaé Professor Aloisio Teixeira. Macaé, RJ, Brasil.

<sup>2</sup> Instituto Nacional de Saúde da Mulher, da Criança e do Adolescente. Fundação Osvaldo Cruz - Fiocruz. Rio de Janeiro, Brasil

#### Correspondência

Alice Bouskelá  
alice\_bouskela@hotmail.com

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## Evolution of exclusive breastfeeding in the first 15 years of the 21<sup>th</sup> century: a study in the municipality of Macaé, Rio de Janeiro, Brazil

*Evolução do aleitamento materno exclusivo nos primeiros 15 anos do século XXI: um estudo no município de Macaé, Rio de Janeiro, Brasil*

### Abstract

This study aims to investigate the prevalence rate and the temporal trend of exclusive breastfeeding (EBF) in infants under four months of age attended at the Basic Health Units of Family Health Strategies (UBS/ESF) in Macaé, between 2001 and 2015. A time series study was conducted to evaluate the evolution of the prevalence rates of EBF at four months, considering the given period, with descriptive character and use of secondary data, DATASUS - Database of the Unified Health System via Basic Care Information System - SIAB/SUS. The EBF trend analysis was performed using the Jointpoint Regression Program software for Windows version 4.5.0.1. A total of 56,454 records were analyzed. For the total number of children studied, EBF presented a statistically significant increase from 47.2% to 69.0% between 2001 and 2004. For the following period, the practice of EBF varied until the prevalence of 73.5% in 2015, with a maximum value of 76.8% in 2013, but these variations did not show statistical significance in this time interval, with an average annual rate of 71.4% in the last ten years. An optimistic evolution dynamic regarding EBF has been established for

more than a decade in the city of Rio de Janeiro, confirming that investment in policies and in various promotion, protection and support actions can have a positive impact and should remain for the continuous and necessary increase in breastfeeding

**Keywords:** Breastfeeding. Trends. Time Series Studies. Health Policy.

### Resumo

O estudo tem como objetivo investigar a taxa de prevalência e a tendência temporal do aleitamento materno exclusivo (AME) em lactentes menores de quatro meses atendidos nas Unidades Básicas de Saúde das Estratégias de Saúde da Família (UBS/ESF) de Macaé, entre 2001 e 2015. Realizou-se estudo de série temporal que avaliou a evolução das taxas de prevalência de AME aos quatro meses, considerando o dado período, com caráter descritivo e uso de dados de base secundária, DATASUS – Banco de Dados do Sistema Único de Saúde via Sistema de Informação da Atenção Básica – SIAB/SUS. A análise de tendência de AME foi realizada por meio do *software Jointpoint Regression Program* para *Windows* versão 4.5.0.1. Foram analisados 56.454 registros. Para o total de crianças estudadas, o AME apresentou um aumento estatisticamente significativo de 47,2% para 69,0% entre 2001 e 2004. Para o período seguinte, a prática de AME sofreu variações até a prevalência de 73,5%, em 2015, com valor máximo de 76,8%, em 2013, mas as mesmas não apresentaram significância estatística nesse intervalo de tempo, com uma taxa anual média de 71,4% nos últimos dez anos. Uma otimista dinâmica de evolução quanto ao AME se estabeleceu durante mais de uma década no município fluminense, confirmando que o investimento em políticas e em diversas ações de promoção, proteção e apoio podem ter impacto positivo e devem permanecer para o contínuo e necessário aumento da prática de amamentação.

**Palavras-chave:** Aleitamento Materno. Tendências. Estudos de Séries Temporais. Política de Saúde.

## INTRODUCTION

Breastfeeding (BF) is recognized as the wisest natural strategy of bonding, affection, protection and nutrition for the child, in addition to the most sensitive, economic and effective intervention to reduce child morbidity and mortality.<sup>1,2</sup>

There is increasing evidence that breast milk is a valuable functional food due to its numerous physiological effects and positive repercussions on the nutritional status of infants, such as on their short and long term health.<sup>3,4</sup> Reports recently published by the World Health Organization (WHO) recognize these benefits, whether of immediate impact, such as a proven reduction in the incidence and severity of intestinal and respiratory infections and lower risk of mortality in exclusive breastfeeding children (EBF), or protection against chronic diseases, such as obesity.<sup>5,6</sup>

After a "world epidemic of weaning", resulting from the industrial revolution, national and international efforts were joined in the mid-1970s and in Brazil, in 1981, the National Program of Incentive to Breastfeeding (PNIAM) was instituted with the objective of encouraging breastfeeding and reducing early weaning. Proposals emerged such as the implementation of joint accommodation, the initiation of breastfeeding immediately after birth, the creation of laws on childcare in the workplace and the increase in the time of maternity leave.<sup>7,8</sup>

As a result of such policies, national surveys dealing with the prevalence of BF indicators in the country demonstrate expansion of EBF and continue on an upward trend until 2006, but with a troubling stabilization for the following years (2006-2013).<sup>9,10</sup>

As a municipality in the Northern Region of the state of Rio de Janeiro, known for its oil activity, Macaé has invested in several actions in favor of BF, but the scarcity of studies on the subject interferes in the evaluation of local policies and programs. Thus, the objective of this study was to investigate the prevalence and temporal trend of EBF in infants under four months of age, within the Basic Care of the city of Macaé, over the first 15 years of the 21<sup>st</sup> century.

## METHODS

A time series study was conducted to assess the evolution of the prevalence of EBF, considering the period from 2001 to 2015. It presented a descriptive character with the use of secondary database. The study had as unit of analysis the municipality of Macaé, located in the northern region of the state of Rio de Janeiro (RJ), known as the "National Petroleum Capital".<sup>11</sup>

Macaé has a territorial area of 1,216.846 Km<sup>2</sup> and, according to the last demographic census, a resident population of 206,728 inhabitants, being the 13th most populated city in the

state of RJ, classified as medium size. The population is predominantly urban, with 202,859 households and 3,869 rural households, according to information from the Brazilian Institute of Geography and Statistics (IBGE).<sup>12</sup> The data collection occurred from February to April 2017 and was carried out through the DATASUS website - Database of the Unified Health System via the Basic Care Information System - SIAB/SUS.<sup>13</sup>

The variables captured in this database were: infants under four months of age in EBF and infants under four months of age assisted in the Basic Health Units of Family Health Strategies (UBS/ESF) of that location, from January 2001 to December 2015.

The database was built using Microsoft Excel for Windows® 2010 software. In the descriptive analysis, absolute EBF data were used, and subsequently, the annual and monthly prevalence were calculated, as shown below.

#### **EBF monthly prevalence (MP\_EBF)**

$$MP\_EBF = \frac{\text{total number (no.) of infants < four months in EBF in each month} \times 100}{\text{total number of infants < four months assisted in the UBS/ESF in the respective month}}$$

#### **EBF annual prevalence (AP\_EBF)**

$$AP\_EBF = \frac{\sum \text{monthly prevalence of infants < four months in EBF} \times 100}{12}$$

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From the data retrieved in DATASUS, the trend analysis of EBF was performed through the Jointpoint Regression Program software for Windows version 4.5.0.1, available from the National Cancer Institute - NCI, USA. This segmented linear regression analysis was used to identify the possible jointpoints that reflect significant changes in the trend studied, considering, as a regressor variable, the aforementioned prevalence and, as independent variable, the year.

The program was applied to calculate, using the Jointpoint method, the annual percentage change (APC) and evaluate the trend of each segment analyzed, estimating statistically significant values considering a confidence level of 95%. The trend analysis was performed descriptively and analytically using tables and figures. The description considered "increase" or "reduction" from the statistical significance ( $p < 0.05$ ) of the trend (slope/decline). And, for the non-significant APC values, they were considered "stable".

The study in question used secondary data, in the public domain, available in DATASUS, without the possibility of identifying subjects, in accordance with Resolution No. 466/2012 of the National Health Council/Ministry of Health.<sup>14</sup> Thus, it did not require the appreciation of a Research Ethics Committee for the respective assessment of risks to human beings. In any case, this study is part of the research project "*Amamenta e alimenta na Atenção Primária à Saúde do município de Macaé – Rio de Janeiro*", approved by the respective committee of the Campos dos Goytacazes School of Medicine, under the number CAAE: 30378514.1.0000.5244.

In addition, the study had the authorization to use the data for analysis and dissemination of results, which was granted by the Coordination of the Technical Area of Food and Nutrition - CATAN/Municipal Secretariat of Health of Macaé - SEMUSA Macaé, Rio de Janeiro..

## RESULTS

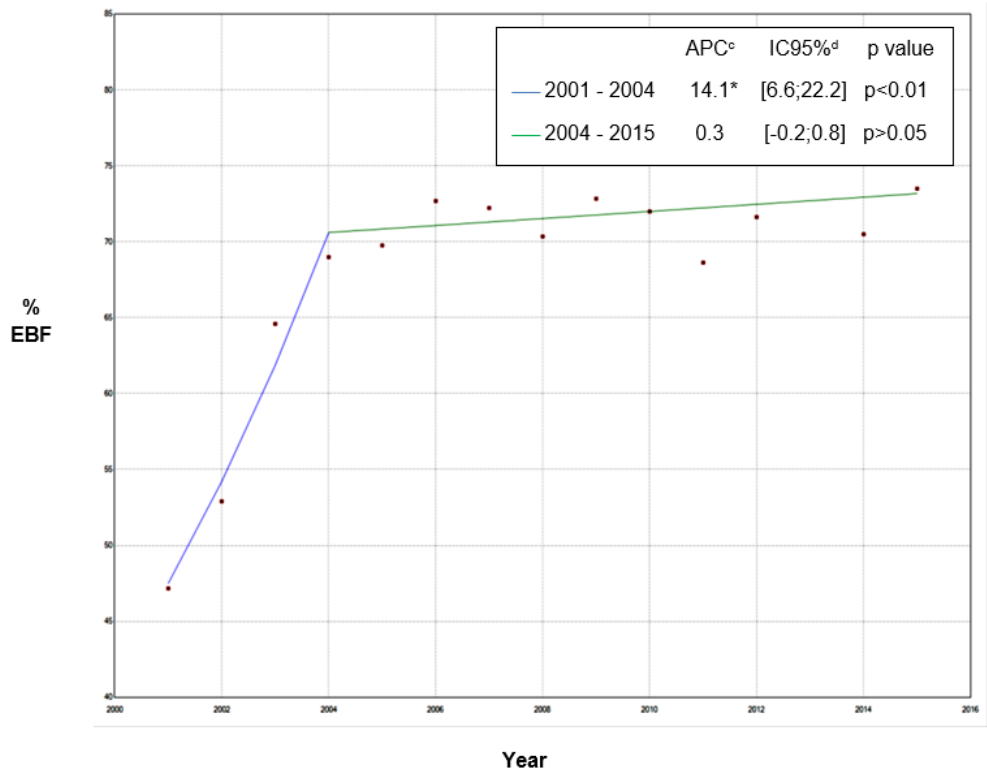
A total of 56,454 records of infants under four months of age assisted by UBS/ESF in the municipality of Macaé-RJ were analyzed between 2001 and 2015. The annual prevalence rates of EBF at four months are shown in table 1. For the total number of children studied, EBF showed a statistically significant increase from 47.2% to 69.0% between 2001 and 2004. For the following period, the practice of EBF varied until the observed prevalence rate of 73.5% in 2015, with a maximum value of 76.8% in 2013, but these variations were not statistically significant in this time interval, with an average annual prevalence rate of 71.4% in the last ten years (figure 1)

**Table 1.** Taxas de prevalências de aleitamento materno exclusivo (AME) aos quatro meses de idade por ano de estudo. Macaé-RJ, 2001-2015.

Year	Value observed % (SE) <sup>a</sup>	Modelled value
2001	47,2 (0,9)	47,5
2002	52,9 (0,9)	54,2
2003	64,6 (0,8)	61,9
2004 <sup>b</sup>	69,0 (0,7)	70,6
2005	69,8 (0,7)	70,8
2006	72,7 (0,7)	71,1
2007	72,2 (0,7)	71,3
2008	70,4 (0,7)	71,5
2009	72,8 (0,8)	71,8
2010	72,0 (0,8)	72,0
2011	68,6 (0,7)	72,2
2012	71,6 (0,7)	72,5
2013	76,8 (0,7)	72,7
2014	70,5 (0,8)	72,9
2015	73,5 (0,7)	73,2

<sup>a</sup> Standard error of estimation; <sup>b</sup>Joinpoint.

**Figure 1.** Trend in the prevalence of exclusive breastfeeding (EBF) in infants under four months of age, Macaé-RJ, 2001-2015



<sup>c</sup>Annual Percentage Change; <sup>d</sup>I Confidence interval at 95% level; \*Statistically significant data.

The prevalence rates observed in this study are classified as "good" (50-89%) according to the breastfeeding indicators, according to WHO parameters, published in 2008.<sup>15</sup>

**DISCUSSION**

This study allowed us to know the temporal trend of EBF in the municipality of Macaé and to analyze this evolution in light of the unique background of the local health service. Between 2001 and 2004, an upward trend was observed with a statistically significant increase in the prevalence rates of EBF, reaching a value of 69.0%. In the period of 2004-2015, the prevalence of EBF remained stable and did not show statistical significance, but with a positive result of an average annual prevalence rate of 71.4%.

In the 1990s, Labbok and collaborators<sup>16</sup> evaluated the EBF trend, between 1990 and 2000, in developing countries, observing an increase from 46.0% to 53.0% in children under four months, and from 34.0% to 39.0% in children under six months. The authors suggest that the breastfeeding support interventions that marked the time of the study, supported by the implementation of the Global Strategy for Infant and Young Child Feeding,<sup>17</sup> were responsible for this progress.

When assessing the population surveys of the previous decades, the 1970s and 1980s, Venâncio & Monteiro<sup>7</sup> portrayed the two-decade time trend regarding breastfeeding in Brazil and confirmed the expected increase in its frequency and duration. Between 1975 and 1989, the median duration of breastfeeding, considering children who were one, two, three, four, six, and 12 months old, more than doubled considering the entire country, going from two and a half months to five and a half months. In a remarkable way, in 1975, the percentage of four-month-old breastfed children was 40.0%, rising to 57.0% in 1989. The above-mentioned authors point out that the then current socio-political and cultural context was pointed out as the articulator of such a process, being characterized by pro-breastfeeding government policies initiated in the 1980s, such as the creation of PNIAM, responsible for an extensive press campaign.

At the international level, Brazil signed the Innocenti Declaration, in 1991,<sup>18</sup> incorporating the Child Friendly Hospital Initiative of the WHO/United Nations Children's Fund (UNICEF) into the activities of PNIAM, and promoting annually, in August, the World Breastfeeding Week (WBW). After this milestone, other important events occurred for the legal protection of breastfeeding, such as the approval of the joint accommodation system in 1993,<sup>19</sup> and the Brazilian Norm for the Marketing of Food for Infants (NBCAL), approved by the National Health Council in 1988, and regulated by Law No. 11.265/2006;<sup>20</sup> the extension of maternity leave to 120 days and the creation of five-day paternity leave in the 1988 Constitution.<sup>21</sup>

In a later moment, other policies and programs of the Brazilian government occurred in favor of breastfeeding, such as the Prenatal and Birth Humanization Program,<sup>22</sup> the Mother Kangaroo Method,<sup>23</sup> the Human Milk Banks (HMB),<sup>24</sup> the Neonatal Screening,<sup>25</sup> the Food Guide for children under two years<sup>26,27</sup> and the distribution of the Child Health Booklet to all children born in Brazil.<sup>28</sup>

Currently, the incentive to breastfeeding in Basic Care happens through *Estratégia Amamenta e Alimenta Brasil* (EAAB), of the Ministry of Health (MH), which is the result of the integration, in 2012, of *Rede Amamenta Brasil* and *Estratégia Nacional para a Alimentação Complementar Saudável* (Enpacs). EAAB aims to reinforce and encourage the promotion of

breastfeeding and healthy eating for children under two years of age within the scope of the Unified Health System (SUS), through the qualification of professionals working at UBSs.<sup>29</sup> However, despite the efforts made on behalf of the BF, the situation of this extremely valuable practice remains below the national and international targets.<sup>30</sup> According to UNICEF and WHO,<sup>31</sup> considering 194 nations, only 40.0% of children under six months of age are exclusively breastfed; and only 23 countries have EBF rates above 60.0%.

In Brazil, the prevalence of EBF in 2008, according to the 2nd Survey on the Prevalence of Breastfeeding in Brazilian Capitals and the Federal District, was 41.0%,<sup>32</sup> being considered a "reasonable" percentage according to the WHO.<sup>15</sup> Some factors may contribute negatively to this prevalence, some of them being: the return of the mother to work, lack of support from the health team, the great dissemination of advertisements of formulas, socioeconomic level, education and even cultural aspects.<sup>33</sup>

In updating the trend of the BF indicators in Brazil, Boccolini et al.<sup>10</sup> observed that the prevalence of EBF in infants under six months of age had an upward trend until 2006, that is, they increased from 4.7% in 1986 to 37.1% (in 2006). However, there was relative stabilization between 2006 and 2013 (36.6%), which should impose, according to the authors, an evaluation and review of policies and programs to promote, protect and support breastfeeding. In fact, due to the extensive territorial dimension of Brazil and the different local initiatives to promote EBF, it is possible to observe oscillations in relation to EBF rates. As an example, in the municipality of Bauru-SP, the prevalence of EBF in children under six months almost tripled in the studied period, going from 8.5% in 1999 to 24.2% in 2006. For this positive outcome, the authors acknowledged the actions organized to promote and support breastfeeding among mothers in the municipality, as well as investments in training professionals who work in the public network of Basic Health Care and in maternity hospitals, and in promoting breastfeeding in the local media through the organization of events.<sup>34</sup> Queluz et al.<sup>35</sup> detected, in the city of Serrana-SP, a prevalence of SBF in children under six months, in 2009, of 29.8%, a result similar to the previous study. In Londrina, Paraná-PR, Souza et al.<sup>36</sup> found a prevalence of EBF of 33.8% in infants under six months in 2008, highlighting the intense commitment of local health professionals to develop actions to improve the breastfeeding rates.

In Pelotas-RS, in 2010, Stephan et al.<sup>37</sup> found that 33.7% of the mothers interviewed exclusively breastfed until six months. This study was conducted in a Family Health unit in the municipality and the results were not different from other studies conducted in the country. In Palmas-TO, Borges et al.<sup>38</sup> found that the majority (64.0%) of the interviewees practiced EBF, highlighting that this satisfactory result, above the national average, was due to the guidance



and assistance of the HMB professionals present in the local public maternity hospital, as reported by the mothers who participated in the study.

In the municipality of Macaé-RJ, some important milestones for Public Health occurred in 2003 and 2004, a period of significant increase in EBF rates that may justify such progress. In the first year, the celebration of SMAM began at the Center for Women and Children's Attention (NUAMC), a specialized center of medium complexity in the municipality. Several actions to encourage breastfeeding began to occur throughout the year, with the unrestricted involvement of the respective multiprofessional team.<sup>39</sup> In 2004, the Dr. Fernando Pereira da Silva Municipal Public Hospital (HPM) was opened, a reference hospital for the North region of Rio de Janeiro, both for emergency procedures and with its own maternity ward.<sup>40</sup> The HPMame project was an example of an opportunity to educate all health professionals in the municipality, whether from the public or private sector, on the subject of breastfeeding.<sup>41</sup> In the same year, the Ministry of Health chose Macaé to participate in the pilot plan to implement the new SIAB, due to its merit of presenting a remarkably well organized database.<sup>42</sup>

Other actions also contribute to the maintenance of good EBF rates in the city, given the support provided in specialized centers, such as the Adolescent Reference Center (CRA), and the promotion of courses for pregnant and breastfeeding women that address this theme.<sup>43,44</sup> This was possible through the Municipal Health Secretariat, which promotes similar incentive through other partnerships, such as with the theater group Grutas, acting under the *Estratégia Saúde da Família* (ESF) program, addressing the doubts about breastfeeding with fun dialogs.<sup>45</sup> Other examples of joint activities would be with CATAN and with the Federal University of Rio de Janeiro/Campus UFRJ-Macaé Professor Aloisio Teixeira, initiated in 2010, due to the implementation of the Nutrition course and other health areas in August 2009. Since 2012, they have intensified and provided waiting rooms, workshops, lectures and training for the general public, community health agents and other professionals working in the municipality.<sup>46,47</sup>

Finally, it is important to consider that the DATASUS/SIAB health information system provides data on children in EBF under four months of age monitored by the UBS/ESF of Macaé, making it impossible to know the reality of EBF in children under six months for that municipality. In addition, studies with secondary data may present reservations regarding the quality of information by underreporting or incomplete data, in addition to aspects related to the lack of standardization in data collection. Another limitation refers to the ESF coverage in the city, which corresponds to approximately 60.0% of the total population residing in Macaé, at the end of the period portrayed by this study. Thus, it is not possible to extrapolate the results found for the entire population of infants under four months.

## CONCLUSION

The results presented revealed an optimistic evolution dynamic regarding EBF during more than a decade in a city of Rio de Janeiro, at the beginning of the 21<sup>st</sup> century. It was possible to demonstrate how much this important practice can suffer positive changes over the years, suggesting that investment in promotion, protection and support actions can really impact the increase in its prevalence. It is essential to continue to encourage breastfeeding so that the indicators reach high levels.

Nevertheless, this study portrays a municipality that gathers a differentiated organizational political context in favor of breastfeeding, with a beneficial return for the resident child population, as well as for the entire community of Macaé. Thus, it is estimated to contribute to the evaluation and reflection on municipal policies and programs related to breastfeeding

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### Contributors

Bouskelá A, Capelli JCS and Rocha CMM participated in all stages: from the design of the study, participation in the collection, analysis and interpretation of data, participation in the writing of the study and the final review of the manuscript. Lima FF, Sperandio N participated in the interpretation of the data, writing and review of the manuscript. Fonseca VM participated in the final review of the manuscript.

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