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Original Article

Association between food insecurity and exclusive breastfeeding during the first month of life*

Associação entre insegurança alimentar e aleitamento materno exclusivo no primeiro mês de vida

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Laudicéia Vidal da Silva[1]
Mohamed Saido Balde[1]
Alba Otoni[1]
Ariene Silva do Carmo[2]
Wendell Costa Bila[3]
Luana Caroline dos Santos[4]
Márcia Christina Caetano Romano[1]

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[1]Universidade Federal de São João del-Rei. Divinópolis, MG, Brazil.
[2]Universidade Federal de Ouro Preto. Ouro Preto, MG, Brazil.
[3]Universidade do Estado de Minas Gerais. Divinópolis, MG, Brazil.
[4]Universidade Federal de Minas Gerais. Belo Horizonte, MG, Brazil.

Corresponding author:
Márcia Christina Caetano Romano
Rua Belvedere, 530 - Manoel Valinhas.
CEP: 35500-287. Divinópolis, MG, Brazil.
E-mail: marciachristinacs@ufsj.edu.br

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ABSTRACT

Objective: to analyze the association between food insecurity and exclusive breastfeeding during an infant's first month of life. **Methods:** this cross-sectional study was conducted with 141 mother–infant dyads. Clinical, socioeconomic, postpartum depression, food security, and infant feeding data were collected. Multiple logistic regression analysis was performed. **Results:** the prevalence of food insecurity was 17.7%, whereas the prevalence of exclusive breastfeeding during the first month of life was 69.5%, with no statistically significant association between these variables. Infants whose mothers had completed high school were 4.32 times more likely to be exclusively breastfed (p=0.03). Mothers who received family support in infant care were 3.73 times more likely to practice exclusive breastfeeding (p=0.02). **Conclusion:** no association was found between food insecurity and exclusive breastfeeding during the first month of life. Higher maternal educational attainment and family support were identified as independent factors associated with the outcome. **Contributions to practice:** assessing maternal educational attainment and promoting family support provide essential guidance for nursing practice in planning effective interventions to promote and encourage exclusive breastfeeding.

Descriptors: Breast Feeding; Food Insecurity; Sociodemographic Factors; Postpartum Period.

RESUMO

Objetivo: analisar a associação entre a insegurança alimentar e o aleitamento materno exclusivo no primeiro mês de vida do bebê. **Métodos:** estudo transversal realizado com 141 binômios (mães e bebês). Foram obtidos dados clínicos e socioeconômicos referentes à depressão pós-parto, segurança alimentar e alimentação da criança. Aplicou-se o modelo de regressão logística múltipla para a análise de dados. **Resultados:** a prevalência de insegurança alimentar foi de 17,7%, enquanto a de aleitamento materno exclusivo no primeiro mês atingiu 69,5%, sem associação estatisticamente significativa entre essas variáveis. Bebês de mães com ensino médio completo apresentaram chance 4,32 vezes maior de estarem em aleitamento materno exclusivo (p=0,03). Mães com suporte familiar nos cuidados com o bebê tiveram 3,73 vezes mais chance de aleitamento materno exclusivo (p=0,02). **Conclusão:** não se constatou uma associação entre a insegurança alimentar e o aleitamento materno exclusivo no primeiro mês de vida. Maior escolaridade materna e o apoio da rede familiar foram fatores independentes associados ao desfecho. **Contribuições para a prática:** a avaliação do nível educacional materno e o estímulo ao suporte familiar são subsídios fundamentais para a práxis da enfermagem no planejamento de ações eficientes de promoção e incentivo ao aleitamento materno exclusivo.

Descritores: Aleitamento Materno; Insegurança Alimentar; Fatores Sociodemográficos; Puerpério.

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Introduction

During the first six months of life, exclusive breastfeeding (EBF) is considered the ideal form of nutrition for infant growth and development, highlighting its importance for physiological maturation. This feeding practice is characterized by the infant receiving breast milk directly from the breast or expressed breast milk, including donor human milk, without any additional liquids, solid foods, or semi-solid foods. The only exceptions are drops or syrups containing vitamins, oral rehydration solutions, mineral supplements, or medications[1].

An infant's first month of life is a crucial period for establishing effective and sustained breastfeeding. Successful breastfeeding during this critical stage considerably increases the likelihood of maintaining this practice over the long term. Consequently, this scenario requires financial, programmatic, and scientific investments aimed at promoting breastfeeding and strengthening maternal and child health[2].

Establishing EBF often poses significant challenges for women, particularly during the immediate postpartum period (from the 1st to the 10th day after childbirth) and the late postpartum period (from the 11st to the 45th day after childbirth). This transition exposes postpartum women to intense hormonal, physiological, psychological, and social changes, creating a context of increased vulnerability that may directly affect breastfeeding success[3].

Different biological, social, and environmental factors influence EBF. For instance, cesarean delivery and low birth weight may hinder breastfeeding. Conversely, breastfeeding support and family support in preparing for the newborn's arrival facilitate its establishment[4]. Postpartum depression is also recognized as a relevant factor because it interferes with the mother's ability to breastfeed, affecting EBF during the postpartum period[5]. In addition, sociodemographic factors, such as low maternal educational attainment and low family income, as well as poor-quality prenatal care, have been identified as barriers to this practice[6].

Studies investigating the relationship between food insecurity and EBF are scarce, particularly during the postpartum period, and there is still no consensus regarding this association or the mechanisms underlying this phenomenon. Evidence suggests that mothers experiencing moderate food insecurity report a greater intention to breastfeed[7]. Conversely, a systematic review found that children from food-insecure households were less likely to be breastfed[8]. A recent scoping review identified only 12 studies addressing this topic, with conflicting findings, leading the authors to emphasize the need for further research to clarify the relationship between these factors[9].

It should be noted that the overall prevalence of EBF in Brazil is 59.7% among infants younger than four months, declining to 45.8% among those younger than 180 days of age[10]. These rates remain below the targets recommended by the World Health Organization (WHO) and the United Nations Children's Fund[11], highlighting the need for further investigations capable of generating evidence to improve public policies aimed at promoting exclusive breastfeeding nationwide[12]. From this perspective, the objective of this study was to analyze the association between food insecurity and exclusive breastfeeding during an infant's first month of life.

Methods

Study design and setting

This is a cross-sectional study conducted in accordance with the Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) guidelines. The study was carried out in a municipality located in the Central-West region of the state of Minas Gerais, Brazil, approximately 120 km from the state capital, Belo Horizonte.

Population

The eligible population comprised all infants

born in February 2024 who met the inclusion criteria. Participants were identified using a list obtained from the Municipal Health Department, totaling 185 infants. Of these, 24 were excluded because their families had moved to another municipality after the child's birth, and 20 families declined to participate. Thus, the final sample consisted of 141 mother–infant dyads. The inclusion criteria were residence in the municipality where the study was conducted and the absence of neonatal clinical conditions that could compromise breastfeeding, such as prematurity, syndromes, or other health conditions.

Data collection instruments

Data collection was conducted by a nurse and an undergraduate nursing student, both previously trained for this purpose. Before and throughout the data collection period, an experienced researcher provided training and supervision regarding the application of the instruments and the adopted procedures.

During home visits, mothers completed structured questionnaires addressing maternal and neonatal clinical characteristics and sociodemographic information. Additionally, the *Escala Brasileira de Insegurança Alimentar* (EBIA)[13], the Brazilian Association of Research Companies socioeconomic classification criterion[14], the Edinburgh Postnatal Depression Scale[15], and the food consumption indicators questionnaire for children younger than six months linked to the Food and Nutrition Surveillance System[16] were administered.

Data collection period

Data were collected between February and April 2024. The dependent variable was EBF, assessed using the food consumption indicators questionnaire for infants younger than six months, from which the EBF indicators were derived. Classification was based on maternal reports of an infant's food intake during the 24 hours preceding the interview, with the response options "yes", "no", and "do not know"[16]. The key questions investigated the consumption of breast milk and other liquids or foods. EBF was defined as the exclusive consumption of breast milk on the previous day, without the intake of any other liquids or solid foods, including water and teas. Infants were classified as not being exclusively breastfed when they had consumed foods or liquids other than breast milk on the previous day, such as water, tea, fruit juice, fruit, cow's milk, infant formula, porridge, savory foods, or unspecified items. This category also included mixed breastfeeding and exclusive feeding with infant formula or cow's milk[1,16].

The primary independent variable was household food insecurity (yes/no), measured using the EBIA, which consists of 14 items. Classification was based on the total number of affirmative responses, as follows: 0 points indicated food security; 1–5 points, mild food insecurity; 6–9 points, moderate food insecurity; and 10–14 points, severe food insecurity[13]. In the present study, a score of zero was categorized as the absence of food insecurity, whereas all other scores indicated its presence.

The analytical model included biological, environmental, and sociodemographic variables previously recognized as being associated with the outcome[4–6]. Maternal sociodemographic variables included age group (younger than 25 years, 25–34 years, and 35 years or older); self-reported skin color (White and non-White); educational attainment (incomplete/complete elementary school, incomplete/complete high school, and incomplete/complete higher education); family socioeconomic classification (classes A, B1, B2, C1, C2, and E, where A represents the highest socioeconomic level and E the lowest)[14]; living with a partner; formal employment; and support from the father and other family members in infant care.

Maternal and infant clinical characteristics were also assessed, including planned pregnancy; parity (number of previous children); number of prenatal visits (≥6, <6)[17]; infant sex (female, male); signs and symptoms of depression[15]; gestational age

(term, preterm); mode of delivery (vaginal, cesarean); and Apgar scores at the 1st and 5th minutes (≥7, <7). Infant nutritional status was assessed using the Body Mass Index-for-age classification [eutrophic (Z-score ≥ -2 and ≤ +1), thinness (Z-score ≥ -3 and < -2), severe thinness (Z-score < -3), risk of overweight (Z-score > +1 and ≤ +2), overweight (Z-score > +2 and ≤ +3), and obesity (Z-score > +3)]. Finally, head circumference-for-age was assessed and classified as adequate (Z-score ≤ +2 and ≥ -2), below the expected range (Z-score < -2), or above the expected range (Z-score > +2)][18].

Statistical analysis

Data were initially entered into Microsoft Excel® and subsequently exported to SPSS version 23.0. After verifying database consistency, descriptive, univariate, and multivariate analyses were performed.

Categorical variables were expressed as absolute and relative frequencies. Factors associated with EBF were identified using multiple logistic regression. Explanatory variables with a p-value <0.20 in the univariate analysis (binary logistic regression) were entered into the multivariate model using the backward method and subsequently validated using the forward method, with the sequential removal of variables showing the lowest statistical significance (highest p-value). This iterative process continued until only variables with p<0.05 remained in the final model. Potential confounding variables described in the literature, such as socioeconomic status, age group, and educational attainment, were also tested.

The goodness-of-fit of the final model was assessed using the Hosmer–Lemeshow test, and the Odds Ratio (OR) with a 95% Confidence Interval (CI) was adopted as the measure of association.

Ethical aspects

The study was approved by the Research Ethics Committee of *Universidade Federal de São João del-Rei*, under Opinion 6.621.243/2023 and Certificate of Presentation for Ethical Consideration 68353923.9.0000.5545.

Results

A total of 141 postpartum women participated in the study. Of these, most were between 25 and 34 years of age (61.0%), and slightly more than half (50.4%) self-identified as non-white. The remaining sociodemographic characteristics of the study population are presented in Table 1.

Table 1 – Sociodemographic characteristics of study participants (n=141). Divinópolis, MG, Brazil, 2024

Variables	n (%)
Maternal age (years)	
<25	28(19.9)
25 a 34	86 (61.0)
≥ 35	27 (19.1)
Maternal skin color	
White	70 (49.6)
Non-white	71 (50.4)
Maternal educational attainment	
Incomplete/complete elementary school	11 (7.8)
Incomplete/complete high school	70 (49.6)
Incomplete/complete higher education	60 (42.6)
Family socioeconomic classification*	
A	1 (0.7)
B1	8 (5.7)
B2	75 (53.2)
C1	31 (22)
C2	26 (18.4)
Mother lives with a partner	
Yes	132 (93.6)
No	9 (6.4)
Mother has formal employment	
No	36 (25.5)
Yes	105 (74.5)
Father supports infant care	
Yes	133(94.3)
No	8 (5.7)
Family support in infant care	
Yes	127(90.1)
No	14 (9.9)

*A: Highest socioeconomic class; B (B1 and B2): Upper-middle class; C (C1 and C2): Traditional middle class

Among the assessed families, 25 (17.7%) experienced food insecurity. The prevalence of EBF was 69.5%. Regarding maternal characteristics, 96.5% attended more than six prenatal visits, and 70.2% had planned their pregnancy. Cesarean section was the most frequent mode of delivery, accounting for 51.7% of births. Moreover, a substantial proportion of mothers (40.4%) exhibited signs and symptoms of postpartum depression. Most infants (71.6%) were eutrophic and showed good vitality at both the first and fifth minutes of life, with rates of 95.0% and 99.3%, respectively (Table 2).

Table 2 – Food insecurity and clinical and anthropometric characteristics of study participants. Divinópolis, MG, Brazil, 2024

Variables	n (%)
Food security classification	
Food security	116 (82.3)
Food insecurity	25 (17.7)
Exclusive breastfeeding	
Yes	98 (69.5)
No	43 (30.5)
Planned pregnancy	
Yes	99 (70.2)
No	42 (29.8)
Number of previous children	
0	66 (46.8)
1	54 (38.3)
2	16 (11.3)
3	5 (3.6)
Number of prenatal visits	
<6	5 (3.5)
≥ 6	136 (96.5)
Infant sex	
Female	64 (45.4)
Male	77 (54.6)
Signs and symptoms of depression	
No	84 (59.6)
Yes	57 (40.4)
Gestational age	
Preterm	12 (8.5)
Term	129 (91.5)
Mode of delivery	
Cesarean	73 (51.7)
Vaginal	68 (48.2)
1-minute Apgar score	
<7	7 (5)
≥ 7	134 (95)
5-minute Apgar score	
<7	1 (0.7)
≥ 7	140 (99.3)
Body Mass Index-for-age classification	
Severe thinness	4 (2.8)
Eutrophic	101 (71.6)
Risk of overweight	14 (9.9)
Overweight	8 (5.7)
Obesity	5 (3.6)
Head circumference-for-age classification	
Below the expected range	8 (5.7)
Adequate	126 (89.3)
Above the expected range	7 (5)

(the Table 2 continue...)

The multivariate analysis found no association between EBF and food insecurity. However, maternal educational attainment and family support were significantly associated with the outcome. Infants whose mothers had completed high school were 4.32 times more likely to be exclusively breastfed (OR: 4.32; 95% CI: 1.13–16.42) than those whose mothers had only completed elementary school. Likewise, mothers who received support from family members were 3.73 times more likely to practice EBF than those who did not receive such support (OR: 3.73; 95%CI: 1.17–11.85), as shown in Table 3.

Table 3 – Multiple logistic regression model for the outcome of exclusive breastfeeding among study participants. Divinópolis, MG, Brazil, 2024

Variables	Univariate regression			Multivariate regression		
	Odds Ratio	95%CI*	p-value	Odds Ratio	95%CI	p-value†
Food security classification						
Food security	1					
Food insecurity	1.67	(0.68; 4.10)	0.250			
Maternal age (years)						
<25	1					
25 to 34	0.53	(0.19; 1.46)	0.220		–	–
≥ 35	0.64	(0.19; 2.20)	0.480			
Maternal skin color						
Non-white	1					
White	0.80	(0.39; 1.64)	0.540		–	–
Maternal educational attainment						
Elementary school	1			1		
High school	4.05	(1.09; 15.03)	0.030	4.32	(1.13; 16.42)	0.030
Higher education	2.22	(0.60; 8.17)	0.220	2.31	(0.61; 8.68)	0.210
Family socioeconomic classification‡						
C1+C2	1					
A+B1+B2	0.71	(0.33; 1.50)	0.370		–	–
Mother lives with a partner						
No	1					
Yes	3.09	(0.78; 12.14)	0.100		–	–
Mother works outside the home						
Yes	1					
No	1.19	(0.51; 2.75)	0.680		–	–
Father supports infant care						
No	1					
Yes	2.41	(0.57; 10.12)	0.230		–	–
Family supports infant care						
No	1			1		
Yes	3.50	(1.13; 10.82)	0.020	3.73	(1.17; 11.85)	0.020
Planned pregnancy						
No	1					
Yes	1.03	(0.47; 2.25)	0.930		–	–
Number of previous children						
3	1					
2	1.50	(0.19; 11.53)	0.690			
1	4.73	(0.71; 31.46)	0.100		–	–
0	3.71	(0.57; 23.99)	0.160			
Number of prenatal visits						
<6	1					–
≥ 6	0.56	(0.06; 5.15)	0.600		–	
Infant sex						
Male	1					
Female	0.89	(0.43; 1.84)	0.770			
Signs and symptoms of depression						
Yes	1					
No	1.43	(0.69; 2.96)	0.330			
Gestational age						
Preterm	1					
Term	1.71	(0.51; 5.72)	0.380			
Mode of delivery						
Cesarean	1					
Vaginal	0.96	(0.47; 1.97)	0.920			
1-minute Apgar score						
< 7	1					
≥7	1.76	(0.37; 8.23)	0.470			
Body Mass Index-for-age classification						
Thinness	1					
Eutrophic	1.55	(0.46; 5.14)	0.470			
Overweight/Obesity	1.25	(0.31; 4.9)	0.750			
Head circumference-for-age classification						
Altered	1					
Adequate	1.60	(0.53; 4.82)	0.400			

*CI: Confidence interval; †Significance level; ‡C1+C2: Traditional middle class; A+B1+B2: Higher-income and middle-class population

Discussion

In the present study, food insecurity was not statistically associated with EBF during the first month of life. This finding is consistent with that of another study[9], but contrasts with the results of a systematic review, which found that mothers experiencing food insecurity were less likely to breastfeed their infants. It is noteworthy that the prevalence of food insecurity in studies reporting this association ranged from 44.3% to 87%[8], considerably higher than the prevalence observed in the present study (17.7%). The lower prevalence of food insecurity may have reduced the statistical power of the analyses, which could explain our findings.

Although the prevalence of food insecurity among the participants was lower than that reported in previous studies, irregular access to food and food vulnerability, characterized by inconsistent and insufficient access to foods that support a healthy diet, were identified among the households included in this study. This finding is relevant because it runs counter to the Sustainable Development Goals[11] and highlights the urgent need to strengthen programs and policies aimed at promoting food and nutrition security[19].

The multivariate analysis indicated that completing at least high school education and receiving family support in infant care increase the likelihood of practicing EBF during the first month of life. Consistent with our findings, the literature shows that infants born to mothers with higher educational attainment are 1.44 times more likely to be exclusively breastfed. These findings suggest that education enhances maternal competence for breastfeeding by increasing mothers' confidence and skills related to breastfeeding[20]. Similarly, previous studies have shown that mothers with a high school or higher education are 1.27 times more likely to exclusively breastfeed their children than those with lower educational attainment (elementary school)[21]. Furthermore, mothers with higher educational levels, such as undergraduate and graduate education, are significantly more likely to maintain EBF for six months, with an adjusted odds ratio 2.55 times higher than that of mothers with lower educational attainment[22].

A likely explanation for these findings is that higher educational attainment contributes to a better understanding of recommendations regarding EBF and its benefits, thereby reinforcing maternal self-care and breastfeeding practices[22]. In addition, a higher educational level promotes greater health literacy, which serves as a facilitating factor for maintaining EBF[23].

In addition to educational attainment, family support in infant care was associated with EBF in the present study. Likewise, a study involving Indonesian children demonstrated a significant association between family support and EBF, showing that mothers who received such support were 4.12 times more likely to exclusively breastfeed than those who did not[24]. Family support, particularly from partners, clearly has a positive impact on the successful early initiation of breastfeeding because it strengthens maternal emotional stability and enhances maternal self-efficacy[25]. Consequently, mothers who receive family support initiate breastfeeding earlier and are more likely to maintain EBF throughout the recommended first six months of life[26].

The prevalence of EBF was 69.5% during the first month of life among the infants assessed in this study. This percentage is close to the target recommended by the WHO, which established a global goal of 70% by 2030[3]. In other settings, the prevalence of EBF has ranged from 66.1% to 77.5%, demonstrating that this health indicator is determined by multiple factors and depends on the socioeconomic and healthcare context[27].

One possible explanation for the adequate prevalence of EBF observed in the present study is that most women attended more than six prenatal visits and most infants presented good vitality at birth. Evidence indicates that pregnant women who attend more than six prenatal visits generally have greater access to information about maternity leave and receive breastfeeding support, which consequently increa-

ses their likelihood of exclusively breastfeeding until the infant reaches six months of age[28].

Returning to the prevalence of signs and symptoms of postpartum depression observed among the participants in this study, these findings highlight the need for greater attention to this condition. Frequently neglected within maternal healthcare, postpartum depression has a global prevalence ranging from 13% to 30% and is associated with serious consequences, particularly an increased risk of suicide. In this context, epidemiological studies on this topic are essential to support and promote the development of public policies focused on perinatal mental health[29].

Although the present study did not identify a direct association between food insecurity and EBF during the first month of life, the findings underscore the persistence of critical public health challenges, including food vulnerability and maternal depression. Conversely, the study confirms the important role of maternal educational attainment and family support in establishing breastfeeding. Therefore, developing multiprofessional interventions integrating education, mental health, nutrition, and social assistance is imperative to reduce structural inequalities and promote the achievement of global breastfeeding targets at the national level[11].

Study limitations

Among the limitations of this study, the relatively small sample size should be highlighted, as it may have reduced the statistical power to detect significant associations that could have been observed in larger populations. Furthermore, the cross-sectional design precludes establishing temporal causal relationships between the variables. There is also a potential risk of recall bias because dietary intake was assessed using a 24-hour dietary recall. Despite these limitations, the findings provide relevant contributions to the understanding of EBF during the first month of life and its associated determinants.

Contributions to practice

Social and contextual factors were found to play an important role in maintaining EBF during the first month of life. These findings contribute to identifying priority groups for interventions and to the development of intersectoral strategies aimed at promoting breastfeeding and reducing health inequalities.

Finally, the right to access high-quality public education, together with policies expanding paternity leave to support EBF, should be emphasized as essential measures for advancing the Sustainable Development Goals.

Conclusion

The study found no direct association between food insecurity and exclusive breastfeeding. However, it demonstrated that higher maternal educational attainment and family support in infant care are factors associated with maintaining this practice during early life. The study also identified a high proportion of households experiencing food vulnerability, although the prevalence of exclusive breastfeeding during the first month of life was consistent with international targets.

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Authors' contributions

Study conception and design or data analysis and interpretation; manuscript drafting or critical revision for important intellectual content; final approval of the version to be published; and agreement to be accountable for all aspects of the work, ensuring that

questions related to the accuracy or integrity of any part of the manuscript are appropriately investigated and resolved: **Silva LV, Balde MS, Otoni A, Carmo AS, Bila WC, Santos LC, Romano MCC.**

Data availability

The authors declare that the data are fully available within the body of the article.

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