Infant formula use during Rooming-in Care hospitalizations of newborns: a cross-sectional study

Uso de fórmulas infantis durante a internação do recém-nascido no alojamento conjunto: estudo transversal

Uso de fórmula infantil durante la estancia del recién nacido en la unidad de alojamiento conjunto: estudio transversal

Mariana Torreglosa Ruiz[I] ; Melissa de Paula Cornélio[I] ; Jéssica Aparecida da Silva[I] ; Cynthya Viana de Resende[I] ; Marianne Guterres Ferreira[II] ; Marialda Moreira Christoffel[II] ; Elisa da Conceição Rodrigues[II] ; Ana Maria Linares[III]

[I]Universidade Federal do Triângulo Mineiro. Uberaba, MG, Brazil; [II]Universidade Federal do Rio de Janeiro. Rio de Janeiro, RJ, Brazil; [III]University of Kentucky. Lexington, KY, United States

ABSTRACT
Objective: to assess factors associated with early and undue use of infant formulas during Rooming-in Care hospitalizations. **Method:** a cross-sectional study conducted with primiparous women treated between December 2023 and April 2024 in university hospitals from Minais Gerais and Rio de Janeiro. Chi-square and Fisher's exact tests were applied. Prevalence ratios were calculated, as well as Poisson regression with robust variance. **Results:** a total of 102 dyads were included; 42.2% of the neonates were offered formulas and 22.5% were offered them before breastfeeding initiation. The bivariate analysis pointed to an association with Child-Friendly maternity hospitals (p<0.001), pre-natal guidelines (p=0.007), skin-to-skin contact (p=0.006) and breastfeeding in the first hour of life (p=0.003) as protective factors for breastfeeding. C-sections (p=0.016) emerged as a risk factor. None of the variables was able to explain formula use through the regression analysis. **Conclusion:** two out of five neonates were offered formulas. However, no factors warranting their early and undue use were found.
Descriptors: Rooming-in Care; Breast Feeding; Infant, Newborn; Infant Formula.

RESUMO
Objetivo: avaliar fatores associados ao uso precoce e indevido de fórmulas infantis durante a internação no Alojamento Conjunto. **Método:** estudo transversal, realizado com primíparas assistidas em hospitais universitários de Minais Gerais e Rio de Janeiro entre dezembro de 2023 e abril de 2024. Aplicaram-se testes qui-quadrado e exato de Fisher. Calcularam-se as razões de prevalência e a regressão de Poisson, com variância robusta. **Resultados:** incluíram-se 102 díades; 42,2% dos neonatos receberam fórmula; e 22,5% receberam antes do início da amamentação. Análise bivariada apontou associação com maternidade Amiga da Criança (p<0,001), orientações pré-natal (p=0,007), contato pele-a-pele (p=0,006) e aleitamento na primeira hora (p=0,003) como fatores protetores da amamentação. A cesárea (p=0,016) se apresentou como fator de risco. Nenhuma variável explicou o uso de fórmula através da regressão. **Conclusão:** dois em cada cinco neonatos receberam fórmula. Contudo, não foram encontrados fatores que justificassem o uso precoce e indevido.
Descritores: Alojamento Conjunto; Aleitamento Materno; Recém-Nascido; Fórmulas Infantis.

RESUMEN
Objetivo: evaluar los factores asociados al uso temprano e inadecuado de fórmula infantil durante la hospitalización en la Unidad de Alojamiento Conjunto. **Método:** estudio transversal realizado con primíparas asistidas en hospitales universitarios de Minas Gerais y Río de Janeiro entre diciembre de 2023 y abril de 2024. Se aplicaron las pruebas de chi-cuadrado y exacta de Fisher. Se calcularon razones de prevalencia y regresión de Poisson con varianza robusta. **Resultados:** se incluyeron 102 díadas; el 42,2% de los neonatos recibieron fórmula; y el 22,5% la recibió antes del inicio de la lactancia materna. El análisis bivariado mostró una asociación con maternidad Amiga del Niño (p<0,001), orientación prenatal (p=0,007), contacto piel con piel (p=0,006) y lactancia materna en la primera hora (p=0,003) como factores protectores para la lactancia materna. La cesárea (p=0,016) se identificó como un factor de riesgo. Ninguna variable explicó el uso de fórmula mediante regresión. **Conclusión:** dos de cada cinco recién nacidos recibieron fórmula. Sin embargo, no se encontraron factores que justificaran su uso temprano e inadecuado.
Descriptores: Alojamiento Conjunto; Lactancia Materna; Recién Nacido; Fórmulas Infantiles.

INTRODUCTION

Breastfeeding is recognized as a factor that protects and promotes childhood development[1,2], with short- and long-term effects on maternal health[2,3]. Due to its relevance already widely acknowledged in the global literature, the World Health Organization strongly recommends that children should be exclusively breastfed up to their six month of life and that, in ideal conditions, this is maintained concomitantly with food introduction for at least two years[4], in addition to the weaning process to be gradual, natural and gentle.

Ruiz MT, Cornélio MP, Silva JA, Resende CV, Ferreira MG, Christoffel MM, Rodrigues EC, Linares AM
Infant formula use during Rooming-in Care

DOI: https://doi.org/10.12957/reuerj.2025.91546

At the global level, 80% of all newborns are breastfed at some moment of their life, 46% start to be breastfed in their first hour of life and 48% remain in an exclusive breastfeeding regime up to the age of six months old, according to the recommendation.

In Brazil, 96.2% of the children are breastfed at least once in their life, 62.4% are already breastfed in their first hour of life and 45.8% remain in an exclusive breastfeeding regime up to their sixth month of life[6]. Both in Brazil and in the world, more than half of the children undergo early weaning. The motivation factors to maintain breastfeeding or to choose the weaning option are complex and multifactorial. Breastfeeding initiation delays and non-exclusivity during the dyad's Rooming-in (RI) hospitalization are pointed out as reasons that can substantially contribute to weaning[7,8].

Using infant milk formulas during the breastfeeding process, manly in the first few days and more specifically before initiating breastfeeding, is an aspect that lacks special attention.

The dissemination strategies employed by milk formula makers are planned to explore the parents' fears and concerns at a moment marked by extreme vulnerability[9]. Nearly 50% of all breastfeeding women believe that their milk is weak or insufficient, which is the main reason for weaning at the global level. Another vulnerability point is related to the physiological aspects inherent to children's crying since, in the first few weeks, neonates can cry for one to three hours, either continuously or sporadically[10].

This response to their physiological adaptation can be erroneously interpreted as hunger or feed beliefs about milk insufficiency in postpartum women, who lack this information[10]. In addition to that, the pressure exerted by family members because of an erroneous conception about the physiology of lactation can exert a direct influence on mothers choosing to incorporate formulas without any reason[11].

Several data indicate that one-third of all neonates are fed with formulas even before initiating breastfeeding and during their first three days of life[10]. This factor can exert a large impact on breastfeeding initiation, maintenance and duration, mainly in the case of exclusive breastfeeding. Incorporating infant formulas early in time delays breastfeeding initiation, which can substantially impair breastfeeding success[10].

This study is justified by the high weaning rates in Brazil and in the world, by the mothers' belief of producing insufficient milk as a reason for weaning, by the erroneous interpretation regarding neonatal physiological adaptation and by the influence and impact of using infant milk formulas in exclusive breastfeeding.

Given the above, the objective of this study was to asses factors associated to early and undue use of infant formulas during RI hospitalizations.

METHOD

This is a cross-sectional study nested in a Randomized Clinical Trial (RCT). The recommendations set forth in STrengthening the Reporting of OBservational studies in Epidemiology were adopted during its development[12] and the data were collected between December 2023 and April 2024.

The study was conducted in RI units from a maternity hospital located in Minas Gerais (Center A) and from a second maternity institution in Rio de Janeiro (Center B). Both of them are public school hospitals linked to their respective universities. Center A is a reference in the municipality and region for the resolution of high-risk pregnancies and infections discomforts during the pregnancy-postpartum period. It has 12 RI beds and a standard operational protocol for breastfeeding assistance; however, the procedures only contemplate breastfeeding clinical management actions. Center B also stands out as a reference for high-risk pregnant women's and newborns' health. It has nine RI wards with five beds each (totaling 45) and the institution was granted the Child-Friendly Hospital recognition in December 2020.

The study population consisted in dyads with favorable conditions for breastfeeding. The study participants were primiparous women aged over 18 years old, with singleton pregnancies and live births, gestational age between 37 and 42 weeks, birth weight over 2,500 g regardless of the delivery type, hemodynamically stable, conscious, oriented in time and space and waiting to be served in the RI areas of the participating centers at the data collection time. The reason to choose dyads with primiparous women was heterogeneity of the sample, which would not be influenced by previous breastfeeding experiences.

Postpartum women and neonates with medical contraindications for breastfeeding were not included, neither were newborns with malformations that precluded or hindered breastfeeding. Postpartum women whose neonates were immediately separated from them after clamping the umbilical cord due to maternal-neonatal complications where one or both of them were hospitalized in critical care units, referred to other institutions or already discharged (rehospitalization) were also not included. Postpartum women in use of illicit drugs were also excluded, as well as postpartum women or

Ruiz MT, Cornélio MP, Silva JA, Resende CV, Ferreira MG, Christoffel MM, Rodrigues EC, Linares AM
Infant formula use during Rooming-in Care

DOI: https://doi.org/10.12957/reuerj.2025.91546

neonates with intellectual and/or sensory deficits, highlighting this information with medical diagnoses in their respective clinical histories. After checking the selection criteria, no exclusion criterion was defined for the study.

Inclusion and recruitment of the participants were intentional for this study. Non-probability sampling was used. In turn, sample calculation for the larger study (RCT) considered the results from a pilot study that recruited 40 participants, equally distributed between both centers. Such calculation was performed in Open Epi® and confirmed in PASS®, considering a 5% significance level and 80% statistical power, foreseeing the inclusion of 88 women. Estimating a possible 15% sample loss, the final sample calculation recommended including 102 women.

After having their doubts solved and consenting to take part in the study, the women were invited to answer a form created and validated by the researchers. This form contained sociodemographic, clinical and obstetric data. Comprised by three sections, the first one referred to the sociodemographic variables (such as age in years old, self-declared skin color, living with a partner or not, schooling level, family income, paid activity and if it was formal or informal, and origin). Clinical variables such as smoking habit, health problems and medication use were addressed in the second section. The third section encompassed obstetric data such as attending pre-natal appointments, number of consultations and guidelines related to breastfeeding during the pre-natal period with due mention of the sources and professionals providing them. The variables referring to the delivery were as follows: delivery type, presence of any companion during delivery, skin-to-skin contact and breastfeeding in the first hour of life. Variables on the neonates' birth weight, length and gestational age were also collected.

The LATCH scale was used to determine possible initial difficulties in the breastfeeding process[14]. Its objective is to signal the need for immediate intervention, referrals and necessary support after hospital discharge. The following items are assessed with this scale: L – Latch, A – Audible swallowing, T – Type of nipple, C – Comfort and H – Hold). The scores for each item vary from zero to two. When the items are added up, scores equal to or lower than six indicate difficulties in the human breastfeeding process and need for support[14].

Finally, infant formula use during hospitalization and the moment they were administered (before, during, or before and during breastfeeding) were researched by means of the interviews and by evaluating data from the medical records.

The data collected through *Google Forms*® were imported into a *Microsoft Excel*® spreadsheet, and then to the *Statistical Package for the Social Sciences*, version 23.0. A descriptive analysis of the data related to the sociodemographic, clinical, obstetric and neonatal variables was performed (absolute and percentage values, mean, standard deviation and minimum/maximum values). Chi-square and Fisher's exact tests were applied considering a 5% significance level, as well as calculations for the prevalence ratios and their respective 95% Confidence Intervals (CIs). The multiple analysis was performed following Poisson regression with robust variance, including in the model those variables with p-values<0.20 in the bivariate analysis. Infant formula use before initiating breastfeeding was considered as the dependent variable; in turn, the other variables of interest were classified as independent variables.

The research protocol was approved by the Research Ethics Committee of Center A under Opinion No. 5,627,159 dated September 6th, 2022, and by its counterpart from Center B under Opinion No. 5,656,072 dated September 21st, 2022. Thus, the study was guided by the guidelines and rules governing research studies involving human beings set forth in Resolution No. 466/2012/CNS/MS. Steps were taken to ensure that all the study participants signed the Free and Informed Consent Form.

RESULTS

A total of 102 dyads were included in the study. Of them, 54 (52.9%) were served in a maternity hospital holding the title of Child-Friendly Hospital and 48 (47.1%) were treated in a maternity institution not certified in the Child-Friendly Hospital Initiative.

As for the primiparous women's sociodemographic profile characterization, their age varied from 18 to 43 years old, with a mean of 25.77 (±6.36). Most of the women self-declared as brown-skinned (n=61; 59.8%), lived with a partner (n=77; 75.5%) and had Complete High School as a minimum (n=89; 87.3%). The family income reported by 70 (68.6%) women was between two and three minimum wages, and most of them had some paid activity (n=60; 58.8%) to contribute to their family income.

As for the clinical variables, six (5.9%) participants smoked, 47 (46.1%) had previous health problems or with onset during their pregnancy and 33 (32.4%) used medications on a daily basis. Incidence of pregnancy-related diabetes (n=22), hypertension (n=15) and hypothyroidism (n=8) was most frequently described. It is noted that each woman could present more than one concomitant health problem. The most frequently mentioned medications were methyldopa (n=13), insulin (n=8) and levothyroxine (n=7). It is noted that none of the pathologies or medications was contraindicated for breastfeeding.

Ruiz MT, Cornélio MP, Silva JA, Resende CV, Ferreira MG, Christoffel MM, Rodrigues EC, Linares AM
Infant formula use during Rooming-in Care

DOI: https://doi.org/10.12957/reuerj.2025.91546

Related to the gestational variables, all the women underwent prenatal care and the number of consultations varied from four to 30, with a mean of 9.10 (±3.23). In addition, 97 (95.1%) attended at least six consultations, as recommended by the Ministry of Health in the national territory.

Most of the women were provided with guidelines about breastfeeding during the pre-natal period (n=62; 60.8%), with pre-natal consultations (n=45), didactic materials (n=21) and Internet searches (n=21) as the information sources most frequently mentioned. When asked about having received any guidance from professionals, nurses were the most cited (n=41), followed by physicians (n=31) and by nutritionists (n=8). The participants were allowed to give more than one answer for the sources and professionals.

There was predominance of C-sections in the sample (n=56; 54.9%) and most of the participants reported having a companion during labor, delivery and postpartum period (n=98; 96.1%). However, even with good birth conditions, 66 (64.7%) dyads had skin-to-skin contact after birth and only 22 (21.6%) mothers breastfed their newborns in the first hour of life.

The newborns' weight varied from 2,550 g to 4,155 g, with a mean of 3,208.61 (±415.64), and they were between 41.05 cm and 53 cm in length, with a mean of 47.73 (±2.28). Their gestational age varied from 37 to 41 weeks, with a mean of 38.89 (±1.27).

The scores obtained when applying the LACTH scale varied from two to ten points, with a mean of 7.33 (±2 10). In addition to that, 24 (23.5%) dyads reached scores equal to or lower than six, indicating the need for professional support in how to breastfeed their newborns.

Among the dyads researched, 43 (42.2%) of the neonates were offered formulas during their hospitalization, 18 (17.6%) were administered formulas before initiating breastfeeding, five (5.0%) were fed with them before initiating breastfeeding and had them maintained during the entire hospitalization and 20 (19.6%) were offered formulas as a complement after initiating breastfeeding.

Tables 1 and 2 present the bivariate analysis showing the association between the sociodemographic/clinical/obstetric/neonatal variables and infant formula use before initiating breastfeeding (administered before or initiated and maintained during the hospitalization period).

Table 1: Association analysis between sociodemographic variables and infant formula use before breastfeeding initiation. Uberaba, MG, and Rio de Janeiro, RJ, Brazil, 2024.

| | Infant formula use | | | | |
| | Yes | No | | | |
Sociodemographic variables	n(%)	n(%)	PR	95%CI	p-value
Age					
18-35 years old	19(18.6)	71(69.6)			
>35 years old	4(3.9)	8(7.9)	1.58	(0.65 – 3.86)	0.460
Skin color					
White	5(4.9)	14(13.8)			
Non-white	19(18.6)	64(62.7)	1.09	(0.42 – 2.83)	1.000
Partner					
Living with a partner	18(17.6)	59(57.8)			
Not living with a partner	5(4.9)	20(19.7)	0.96	(0.76 – 1.21)	1.000
Schooling level					
Incomplete High School or lower	3(2.9)	10(9.8)	0.97	(0.34 – 2.83)	1.000
Complete High School or higher	20(19.7)	69(67.6)			
Family income					
1 minimum wage	6(5.9)	26(25.5)	0.93	(0.75 – 1.15)	0.617
More than 1 minimum wage	17(16.7)	53(51.9)			
Paid activity					
Yes	14(13.7)	46(45.1)			
No	9(8.9)	33(32.3)	0.97	(0.79 – 1.20)	1.000

Notes: *p-value<0.05; PR - Prevalence Ratio; 95%CI - 95% Confidence Interval.

Table 2: Association analysis between clinical, obstetric and neonatal variables and infant formula use before breastfeeding initiation. Uberaba, MG, and Rio de Janeiro, RJ, Brazil, 2024.

Clinical, obstetric and neonatal variables	Infant formula use		PR	95%CI	p-value
	Yes n(%)	No n(%)			
Child-Friendly maternity hospital					
Yes	4(3.9)	50(49.0)			
No	19(18.6)	29(28.5)	1.53	(1.20 – 2.00)	**<0.001***
Smoking habit					
Yes	1(1.0)	5(4.9)	0.73	(0.12 – 4.52)	1.000
No	22(21.6)	74(72.5)			
Health problems					
Yes	14(13.7)	33(32.3)	1.82	(0.87 – 3.82)	0.153
No	9(8.9)	46(45.1)			
Number of prenatal consultations					
≥6	23(22.6)	74(72.5)			
<6	-	5(4.9)	0.76	(0.68 – 0.85)	0.585
Having been provided with guidelines on breastfeeding during prenatal care					
Yes	8(7.8)	54(52.9)			
No	15(14.7)	25(24.6)	1.39	(1.08 – 1.80)	**0.007***
Delivery					
Normal	5(4.9)	41(40.2)			
C-section	18(17.6)	38(37.3)	1.31	(1.07 – 1.61)	**0.016***
Presence of a companion					
Yes	21(20.7)	77(75.5)			
No	2(1.9)	2(1.9)	1.57	(0.58 – 4.21)	0.218
Skin-to-skin contact with the newborn					
Yes	9(8.9)	57(55.9)			
No	14(13.7)	22(21.5)	1.41	(1.07 – 1.87)	**0.006***
Breastfeeding in the first hour of life					
Yes	-	22(21.5)			
No	23(22.6)	57(55.9)	1.40	(1.22 – 1.61)	**0.003***
Difficulties (score<6) – LACTH scale					
Yes	8(7.9)	16(15.7)	1.21	(0.89 – 1.64)	0.168
No	15(14.6)	63(61.8)			

Notes: *p-value<0.05; PR - Prevalence Ratio; 95%CI - 95% Confidence Interval.

The following variables were significant for formula use: being served in a Child-Friendly maternity hospital (p<0.001), having been provided with guidelines about breastfeeding during the pre-natal period (p=0.007), C-section (p=0.016), skin-to-skin contact with the newborn (p=0,006) and having initiated breastfeeding in the first hour of life (p=0.003).

When analyzing the prevalence ratios, it was noticed that infant formula use before initiating breastfeeding was 1.53 times lower in the Child-Friendly maternity hospital than in the non-certified institution. Having been provided with guidelines about breastfeeding in the pre-natal period reduced formula use by 1.39 times, skin-to-skin contact reduced it by 1.41 times and initiating breastfeeding in the first hour of life reduced formula incorporation before initiating breastfeeding by 1.40 times. C-sections alone increased infant formula provision by 1.31 times even before initiating breastfeeding. Table 3 presents the variables included in the Poisson regression with robust variance model.

Table 3: Poisson regression with robust variance model between infant formula use before initiating breastfeeding and the significant variables. Uberaba, MG, and Rio de Janeiro, RJ, Brazil, 2024

Variable	PR	95%CI	p-value
Child-Friendly maternity hospital	0.17	(-0.16 – 0.52)	0.315
Maternal health problems	0.16	(-0.36 – 0.26)	0.756
Guidelines on breastfeeding during pre-natal care	0.18	(-0.31 – 0.39)	0.814
Delivery type	0.17	(-0.22 – 0.43)	0.536
Skin-to-skin contact with the newborn	0.19	(-0.32 – 0.43)	0.776
Breastfeeding in the first hour of life	0.20	(-0.32 – 0.47)	0.729
Difficulties (score <6 in the LACTH scale)	0.19	(-0.27 – 0.45)	0.638

Notes: PR - Prevalence Ratio; 95%CI - 95% Confidence Interval.

When analyzing the model, none of the variables explained infant formula use before initiating breastfeeding during the hospitalization period in the study sample.

DISCUSSION

In the study sample, two out of five neonates were offered formulas during their hospitalization and the formula were incorporated even before breastfeeding initiation in 22.5% of the cases. The regression model failed to explain the factors associated with this early and undue practice. Therefore, the Discussion was based on the bivariate analysis results.

Having been served in a Child-Friendly maternity hospital, having been provided with guidelines about breastfeeding during the pre-natal period, skin-to-skin contact and breastfeeding in the first hour of life proved to be protective factors for exclusive breastfeeding. In turn, C-sections presented a higher risk potential for exclusive breastfeeding and more propensity to early and undue formula use.

Having been treated in a Child-Friendly maternity hospital increased the exclusive breastfeeding rates during the dyads' RI hospitalizations. Similarly, the "*Nascer no Brasil*" ("Being Born in Brazil") study pointed out higher exclusive breastfeeding chances in dyads served at public institutions certified in the Child-Friendly Hospital Initiative[15]. Diverse evidence indicates that hospitals certified in that initiative had their exclusive breastfeeding rates increased[16,17] or were able to maintain them high, similarly to the scenario in which those institutions were certified[18,19]. Consequently, it is verified that, in line with the results, holding the Child-Friendly Hospital recognition exerts a protective effect in favor of not using infant formulas while the dyads are hospitalized.

Having been provided with pre-natal guidelines on breastfeeding was also a significant factor for the increase in the exclusive breastfeeding rates after delivery. A systematic review study pointed out that pre-natal breastfeeding education increases women's knowledge about breastfeeding and that postpartum women with prior knowledge regarding its advantages had a tendency to initiate breastfeeding and maintain it for extended periods of time[20]. In addition, another systematic review study pointed out that pre-natal breastfeeding education increases the odds of extending breastfeeding in time, mainly when the educational interventions included psychological components or were combined with postpartum in-person support for breastfeeding[21]. Thus, both the results and the diverse evidence found in the literature point to the protective effect exerted by previous breastfeeding knowledge on maintaining it in the exclusive modality.

C-sections increased formula use even before breastfeeding initiation by 1.31 times. This result is similar to the diverse evidence pointing to delayed breastfeeding initiation as a result of C-sections[22,23]. Similarly, a study conducted in Portugal pointed out that neonates born via C-sections presented twice the chances of having infant formulas introduced before initiating breastfeeding[24]. Performing a C-section seems to exert an influence on breastfeeding initiation, as well as it predisposes to a greater need for support for such initiation[25], impairing exclusive breastfeeding.

Early skin-to-skin contact behaved as a protective factor for exclusive breastfeeding and for not using formulas. Diverse evidence points out that skin-to-skin contact immediately after birth acts as a predictor and protective factor for early breastfeeding, as it favors it in the first hour of life[26,27].

When initiated during a neonate's first hour of life, breastfeeding was also associated with lower formula use rates during hospitalization. Neonates' first three days of life represent a major risk for their survival. Breastfeeding in the first hour of life is a powerful strategy to increase survival, as it favors neonates' neurological development, which influences the other body functions[28]. According to a meta-analysis study, neonates fed with infant formulas in the first 24 hours of life present twice the risk of maintaining them, when compared to those who initiate breastfeeding in the first hour of life[29], thus reinforcing the importance of their restricted use.

Although it is presented as a relevant initiative in the literature, only one out of two neonates is breastfed in their first hour of life[9]. The indicators behave differently in each region, varying from 34.2% in North Africa to 64.1% in South Africa, pointing to better and worse rates[9]. The data also point out that, in Latin America, 53.9% of all neonates initiate breastfeeding in the first hour of life[9]; in turn, the breastfeeding rate during the first hour of life in Brazil is 62.4%[6], a figure much higher than the results obtained in the current study. It is noted that it is not possible to assert the reason for this low prevalence. However, the results of this study were disclosed to the institutions, which have been seeking strategies for their implementation.

It is also necessary to reflect on the right moment to incorporate formulas. A study pointed out that one-third of the neonates were offered formulas after birth and during hospitalization. Of these cases, only 30% resumed exclusive breastfeeding at discharge and 70% mothers chose to use only formulas[30], indicating the impact, criticality and need for their indication solely when strictly necessary.

Study limitations

The study presents the following limitations: heterogeneity of the sample and the fact of the convenience data collection, although nested in an RCT. Consequently, a larger sample might have revealed factors warranting formula use. However, the study points to the need to better explore the theme with larger samples and different research designs.

The results presented have not been confirmed in a multiple analysis; they are only anchored in the bivariate analysis. The intentional and non-probability sampling method may have contributed to the limitation. An in-depth study on diverse factors based on sample calculation is suggested.

Having included primiparous women impairs generalization of the results. Nevertheless, the researchers' objective was to assess a homogeneous sample. This limitation can emerge as a driver to conduct new studies that include multiparous participants. In addition, infant formula use during the dyads' hospitalization emerges as a gap in the literature due to the scarcity of studies about the topic, which hinders data comparability, reinforcing the novel nature of the study.

CONCLUSION

Two out of five neonates were offered infant formulas during the dyads' RiC hospitalization, and formulas were incorporated even before breastfeeding initiation in 22.5% of the cases. However, no factors warranting their early and undue use were found.

Having been served in a Child-Friendly maternity hospital, having been provided with guidelines about breastfeeding during the pre-natal period, skin-to-skin contact and breastfeeding in the first hour of life proved to be protective factors for exclusive breastfeeding. In turn, C-sections presented a higher risk potential for exclusive breastfeeding and more propensity to early and undue formula use.

As implications for the practice and advances for the area, the study pointed to the prevalence of formula use and to its associated factors. It is expected that these results may foster a reflection about the care practices, the adoption of good practices and thoughtful formula use restricted to extremely necessary cases. It is reinforced that, as is the case of the results obtained in the current study and regarding all previous information about breastfeeding, the literature points out that nurses are the professionals most frequently mentioned by women in the breastfeeding protection and promotion actions. Thus, it is important for them to advocate good practices and question undue formula use.

The results represent progress because they emphasize the good practices and factors that may compromise exclusive breastfeeding. As formula use can interfere in breastfeeding and in its exclusive modality, it is recommended to reflect on evidence-based practices and on restricted use solely in specific cases.

REFERENCES

1. Lyons KE, Ryan CA, Dempsey EM, Ross RP, Stanton C. Breast milk, a source of beneficial microbes and associated benefits for infant health. Nutrients. 2020 [cited 2025 Apr 29]; 12(4):1039. DOI: https://doi.org/10.3390/nu12041039.
2. Victora CG, Bahl R, Barros AJ, França GVA, Horton S, Krasevec J, et al. Breastfeeding in the 21st century: epidemiology, mechanisms, and lifelong effects. Lancet. 2016 [cited 2025 Apr 29]; 387(10017):475-90. DOI: https://doi.org/10.1016/S0140-6736(15)01024-7.
3. Qiu R, Zhong Y, Hu M, Wu B. Breastfeeding and reduced risk of breast cancer: a systematic review and a meta-analysis. Comput Math Methods Med. 2022 [cited 2025 Apr 29]; 2022:8500910. DOI: https://doi.org/10.1155/2022/8500910.
4. World Health Organization. Breastfeeding. Recommendations. Geneva: World Health Organization; 2025 [cited 2025 March 03]. Available from: https://www.who.int/health-topics/breastfeeding#tab=tab_2.
5. World Health Organization. Global breastfeeding scorecard 2023. Rates of breastfeeding increase around the world through improved protection and support. Geneva: World Health Organization; 2023 [cited 2025 Mar 03]. Available from: https://iris.who.int/bitstream/handle/10665/375796/WHO-HEP-NFS-23.17eng.pdf?sequence=1.
6. Universidade Federal do Rio de Janeiro. Aleitamento materno: Aleitamento materno: prevalência e práticas entre crianças brasileiras menores de 2 anos. 4: ENANI – 2019. Rio de Janeiro; 2021 [cited 2025 Mar 03]. Available form: https://enani.nutricao.ufrj.br/wp-content/uploads/2021/11/Relatorio-4_ENANI-2019_Aleitamento-Materno.pdf.
7. Muelbert M, Giugliani ERJ. Factors associated with the maintenance of breastfeeding for 6, 12, and 24 months in adolescent mothers. BMC Public Health. 2018 [cited 2025 Apr 29]; 18:675. DOI: https://doi.org/10.1186/s12889-018-5585-4.
8. Santana GS, Giugliani ERJ, Vieira TO, Vieira GO. Factors associated with breastfeeding maintenance for 12 months or more: a systematic review. J Pediatr. 2018 [cited 2025 Apr 29]; 94(2):104-22. DOI: https://doi.org/10.1016/j.jped.2017.06.013.
9. The Lancet. Unveling the predatory tatics of the formula milk industry. Lancet. 2023 [cited 2025 Apr 29]; 401(10375):409. DOI: https://doi.org/10.1016/s0140-6736(23)00118-6.
10. Rollins N, Piwoz E, Baker P, Kingston G, Mabaso KM, McCoy D, et al. Marketing of commercial milk formula: a system to capture parents, communities, science and policy. Lancet. 2023 [cited 2025 Apr 29]; 401(10375):486-502. DOI: https://doi.org/10.1016/S0140-6736(22)01931-6.

Ruiz MT, Cornélio MP, Silva JA, Resende CV, Ferreira MG, Christoffel MM, Rodrigues EC, Linares AM
Infant formula use during Rooming-in Care

DOI: https://doi.org/10.12957/reuerj.2025.91546

Research Article
Artigo de Pesquisa
Artículo de Investigación

11. Perez-Escamilla R, Tomori C, Hernadez-Cordero S, Baker P, Barros AJD, Bégin F, et al. Breastfeeding: crucially important but increasingly challenge in a market-driven world. Lancet. 2023 [cited 2025 Apr 29]; 401(10375):472-85. DOI: https://doi.org/10.1016/S0140-6736(22)01932-8.

12. Cushiere S. The STROBE guidelines. Saudi J Anaesth. 2019 [cited 2025 Apr 29]; 13(Suppl 1):S31-4. DOI: https://doi.org/10.4103/sja.SJA_543_18.

13. Ruiz MT, Rodrigues EC, da Silva KEPO, de Resende CV, Cavalcanti MC, Santos LM, et al. Effectiveness of individualized counseling on the duration of exclusive breastfeeding: study protocol for a multicenter, randomized, parallel, and open clinical trial. Trials. 2023[cited 2025 Apr 29]; 24(1): 455. DOI: https://doi.org/10.1186/s13063-023-07490-y.

14. Griffin CM, Amorim MH, Almeida FA, Marcacine KO, Goldman RE, Coca KP. LATCH as a systematic tool for assessment of the breastfeeding technique in maternity. Acta Paul Enferm. 2022 [cited 2025 April 29]; 35:eAPE03181. DOI: https://doi.org/10.37689/acta-ape/2022AO03181.

15. von Seehausen MP, Oliveira MIC, Leal MDC, Domingues RMSM, Boccolini CS. Baby-Friendly Hospital Initiative and exclusive breastfeeding during hospital stay. Rev Saude Publica. 2023 [cited 2025 April 29]; 57:28. DOI: https://doi.org/10.11606/s1518-8787.2023057004283.

16. Patterson JA, Keuler NS, Buckingham WR. Differences in exclusive breastfeeding rates in US hospitals according to Baby-Friendly Hospital Initiative designation and area deprivation index category. Breastfeed Med. 2021 [cited 2025 Apr 29]; 16(10):799-806. DOI: https://doi.org/10.1089/bfm.2021.0050.

17. Shing JS, Lok KY, Fong DY, Fan HS, Chow CL, Tarrant M. The influence of the Baby-Friendly Hospital Initiative and maternity care practices on breastfeeding outcomes. J Hum Lact. 2022 [cited 2025 Apr 29]; 38(4):700-10. DOI: https://doi.org/10.1177/08903344221086975.

18. Mäkelä H, Axelin A, Kolari T, Niela-Vilén H. Exclusive breastfeeding, breastfeeding problems, and maternal breastfeeding attitudes before and after the baby-friendly hospital initiative: A quasi-experimental study. Sex Reprod Healthc. 2023 [cited 2025 April 29]; 35:100806. DOI: https://doi.org/10.1016/j.srhc.2022.100806.

19. Lisi C, De Freitas C, Barros H. Maternal country of birth and exclusive breastfeeding during the first in-hospital day in Portugal: The influence of the Baby-Friendly Hospital Initiative. J Hum Lact. 2021 [cited 2025 Apr 29]; 37(1):147-57. DOI: https://doi.org/10.1177/0890334420982248.

20. Kehinde J, O'Donnell C, Grealish A. The effectiveness of prenatal breastfeeding education on breastfeeding uptake postpartum: A systematic review. Midwifery. 2023 [cited 2025 Apr 29]; 118:103579. DOI: https://doi.org/10.1016/j.midw.2022.103579.

21. Oggero MK, Rozmus CL, LoBiondo-Wood G. Effects of prenatal breastfeeding education on breastfeeding duration beyond 12 weeks: a systematic review. Health Educ Behav. 2024 [cited 2025 Apr 29]; 51(5):665-76. DOI: https://doi.org/10.1177/10901981231220668.

22. Li L, Wan W, Zhu C. Breastfeeding after a cesarean section: a literature review. Midwifery. 2021 [cited 2025 Apr 29]; 103:103117. DOI: https://doi.org/10.1016/j.midw.2021.103117.

23. Fan HSL, Wong JYH, Fong DYT, Lok KYW, Tarrant M. Association between intrapartum factors and the time to breastfeeding initiation. Breastfeed Med. 2020 [cited 2025 Apr 29]; 15(6):394-400. DOI: https://doi.org/10.1089/bfm.2019.0166.

24. Branco J, Manuel AR, Completo S, Marques J, Rodrigues Antão R, Pinto Gago C, et al. Prevalence and predictive factors of exclusive breastfeeding in the first six months of life. Acta Med Port. 2023 [cited 2025 Apr 29]; 36(6):416-23. DOI: https://doi.org/10.20344/amp.18692.

25. Gomes MASM, Esteves-Pereira AP, Bittencourt SDA, Augusto LCR, Lamy-Filho F, Lamy ZC, et al. Care for healthy newborns in Brazil: are we making progress in achieving best practices? Cien Saude Colet. 2021 [cited 2025 Apr 29]; 26(3):859-74. DOI: https://doi.org/10.1590/1413-81232021263.26032020.

26. Giang HTN, Duy DTT, Vuong NL, Ngoc NTT, Pham TT, Tuan LQ, et al. Prevalence of early skin-to-skin contact and its impact on exclusive breastfeeding during the maternity hospitalization. BMC Pediatr. 2022 [cited 2025 Apr 29]; 22(1):395. DOI: https://doi.org/10.1186/s12887-022-03455-3.

27. Ballesta-Castillejos A, Rodríguez-Almagro J, Gómez-Salgado J, Martínez-Galiano JM, Romero-Blanco C, Hernández-Martínez A. Preparation and validation of a predictive model of breastfeeding initiation in the first hour of life. Midwifery. 2024 [cited 2025 Apr 29]; 134:104019. DOI: https://doi.org/10.1016/j.midw.2024.104019.

28. Fondo de las Naciones Unidas para la Infancia, Organización Mundial de la Salud. Capturar el momento: Inicio temprano de la lactancia materna: el mejor comienzo para cada recién nacido. 2018 [cited 2025 Mar 03]. Available from: https://www.unicef.org/lac/media/3031/file/PDF%20Capturar%20el%20momento.pdf.

29. Smith ER, Hurt L, Chowdhury R, Sinha B, Fawzi W, Edmond KM, et al. Delayed breastfeeding initiation and infant survival: a systematic review and meta-analysis. PLoS One. 2017 [cited 2025 Apr 29]; 12(7):e0180722. DOI: https://doi.org/10.1371/journal.pone.0180722.

30. Netting MJ, Moumin NA, Knight EJ, Golley RK, Makrides M, Green TJ. The Australian Feeding Infants and Toddler Study (OzFITS 2021): breastfeeding and early feeding practices. Nutrients. 2022 [cited 2025 Apr 29]; 14(1):206. DOI: https://doi.org/10.3390/nu14010206.

Research Article
Artigo de Pesquisa
Artículo de Investigación

Use of artificial intelligence tools

Authors declare that no artificial intelligence tools were used in the composition of the manuscript "*Infant formula use during Rooming-in Care hospitalizations of newborns: a cross-sectional study*".