





Determinants of human milk donation: data from women donors at a milk bank^a

Determinantes da doação de leite humano: dados de mulheres doadoras em um banco de leite

Determinantes de la donación de leche humana: datos de mujeres donantes en un banco de leche

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ABSTRACT

Objective: To analyze the sociodemographic variables of women registered as milk donors at a Human Milk Bank and assess their association with the volume of milk donated. **Method:** Sociodemographic data was collected from registered home donors, as well as breastfeeding characteristics between 2017 and 2020 at the Human Milk Bank of the University Hospital of the Federal University of Maranhão, São Luís. The volume of donated milk served as the outcome variable and its association with other exposure variables were analyzed. **Results:** At the end of the study, a total of 619 donors had their records analyzed. The median volume donated was 1,285 ml (IQR 300 - 3,570 ml). Maternal age, exclusive breastfeeding, and the baby's age were the characteristics that showed an association with the volume of milk donated ($p < 0.05$). **Conclusion and Practice Implications:** In the studied sample, maternal and infant age and exclusive breastfeeding practice were associated with the volume of milk donated. Knowledge of the sociodemographic factors of human milk donors and their relationship with the volume of milk donated can support the development of actions to increase the volume of milk distributed to premature newborns.

Keywords: Breastfeeding; Milk Banks; Socioeconomic factors; Donation; Human milk.

RESUMO

Objetivo: Analisar as variáveis sociodemográficas das mulheres doadoras cadastradas em um Banco de Leite Humano associadas com o volume de leite doado. **Método:** Foram coletados dados sociodemográficos de doadoras domiciliares cadastradas, bem como características de aleitamento entre 2017 e 2020 no Banco de Leite Humano do Hospital Universitário da Universidade Federal do Maranhão, São Luís. O volume de leite doado foi utilizado como variável de desfecho sendo analisada sua associação com as demais variáveis expositivas. **Resultados:** Ao final do estudo, 619 doadoras tiveram as fichas analisadas ($N = 5253$). A mediana de volume doado foi de 1.285 ml (IQ 300 - 3570ml). A idade materna, a amamentação exclusiva e a idade do bebê foram as características que demonstraram associação com o volume de leite doado ($p < 0,05$). **Conclusão e Implicações para a Prática:** Na amostra estudada, as idades materna e do bebê e a prática de aleitamento exclusivo estiveram associados com o volume de leite doado. O conhecimento dos fatores socioeconômicos das doadoras de leite humano e a sua relação com o volume de leite doado podem subsidiar o desenvolvimento de ações para o aumento de volume de leite distribuído ao recém-nascido prematuros.

Palavras-chave: Aleitamento Materno; Bancos de Leite Humano; Fatores Socioeconômicos; Doação; Leite Humano.

RESUMEN

Objetivo: Identificar las variables sociodemográficas de las mujeres inscriptas como donantes de leche en un Banco de Leche Humana y evaluar su asociación con el volumen de leche donado. **Método:** Se recopilieron datos sociodemográficos de las donantes domiciliarias inscriptas como también las características de la lactancia materna entre 2017 y 2020 en el Banco de Leche Humana del Hospital Universitario de la Universidad Federal de Maranhão, São Luís. El volumen de leche donada se utilizó como variable de resultado y se analizó su asociación con otras variables de exposición. **Resultados:** Al final del estudio, se analizaron los registros de 619 donantes. El volumen promedio donado fue de 1.285 ml (RIQ 300 - 3.570 ml). La edad materna, la lactancia materna exclusiva y la edad del bebé fueron las características que mostraron una asociación con el volumen de leche donado ($p < 0,05$). **Conclusión e Implicaciones para la Práctica:** En la muestra estudiada, las edades maternas e infantiles y la lactancia materna exclusiva se asociaron con el volumen de leche donado. El conocimiento de los factores socioeconómicos de las donantes de leche materna y su relación con el volumen de leche donado puede respaldar el desarrollo de acciones para aumentar el volumen de leche distribuido a recién nacidos prematuros.

Palabras clave: Lactancia Materna; Bancos de Leche Humana; Factores Socioeconómicos; Donaciones; Leche Humana.

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INTRODUCTION

Breastfeeding is the best and most efficient nutrition source for infants, with multiple nutrients essential for proper growth and development, promoting a series of benefits such as improving the intestinal microbiota and increasing intelligence. On the other hand, it stimulates the emotional bond between mother and baby, contributing to the prevention of infectious diseases, food intolerance and atopy, as well as helping to reduce the risk of respiratory infections. Among the benefits of this dietary practice is a reduction in malnutrition and mortality, even among those with unfavorable socio-economic conditions.¹⁻³

It is considered a key component in strategies to reduce neonatal mortality and is also associated with the prevention of some diseases in adulthood,^{3,4} such as a lower risk of overweight, obesity, the development of chronic non-communicable diseases, lymphomas and type I diabetes. The benefits for mothers are seen in the reduced risk of developing breast cancer, ovarian cancer, type 2 diabetes, depression, postpartum anxiety, sleep disorders and stress.¹

Most women are capable of breastfeeding and, in some cases, are able to produce more milk than the baby needs.⁵ However, historical, socio-economic, cultural and individual factors can interfere with milk production and breastfeeding, such as a lack of information, the use of medication and diseases that are incompatible with breastfeeding, making it necessary to resort to other methods for nutritional support.⁶

Human Milk Banks (HMBs) are specialized units linked to the intensive care unit for newborns and their main objective is to encourage the breast milk donation to feed premature or very low weight newborns hospitalized at risk, whose mothers, for various reasons, are unable to breastfeed.⁷ These units are responsible for pasteurizing and distributing human milk, with the aim of meeting the demands of the target public and also following the guidelines of the American Academy of Pediatrics and the World Health Organization (WHO), which recommend breastfeeding as the main choice of food in the first six months of life.^{8,9}

They are therefore a strategic element in helping to reduce infant morbidity and mortality, with an emphasis on the neonatal component.¹⁰ It is a service environment full of distinctive features, structured according to a series of intricate and meticulously planned procedures to guarantee the excellence of the milk provided to the children who depend on it. Ensuring the milk's quality is of the utmost importance if the HMB aims to achieve its objectives in a safe and effective manner.¹¹

This research is of fundamental value since, to date, few studies have shown the relationship between human milk donation and sociodemographic data, and the disparities between the different Brazilian regions.¹²

Therefore, knowing this information will lead to a better understanding of the donation process, broadening the scope of data that goes beyond the number of registered donors. It also leads the coordination of the HMB's services to create strategies

to better welcome these women, who play an honorable role in society.

The aim of this study was to identify the sociodemographic variables of donor women registered at the HMB of the Federal University of Maranhão's University Hospital (HUUFMA) between 2017 and 2020, and to see how these variables might determine the volume of human milk donated.

METHOD

This is a retrospective study carried out by analyzing the medical records of registered donors. The study was carried out at the Human Milk Bank (HMB) of the Federal University of Maranhão's University Hospital (Maternal and Child Unit).

The participants in the study were all home-based donors who had records on file at the HMB - HUUFMA, and had a Donor Registration Form from 2017 to 2020, with a record of at least one donation. Considering the total number of donors in the period (N = 5253), a total of 619 records met this criterion, as most of the donors were hospital interns or casual donors. Data was not collected from Donor Registration Forms which contained erasures that made it impossible to collect information that was essential for analyzing the variables. Data sheets with inaccurate, incorrect data and data marked in pencil were also excluded, as they could compromise the data's validity.

In relation to data collection, the variables included in the study were grouped as follows: number of home visits made, volume of milk donated, age and the donor's education level, household income and smoking habits. About prenatal care, the place where it was carried out, number of total deliveries, type and place of delivery. Experience and guidance on breastfeeding, the baby's use of artificial nipples, exclusive breastfeeding and the baby's age were also taken into account.

In the statistical analysis, the normality of the numerical variables was tested using the Shapiro-Wilk test. The frequencies and percentages of the descriptive statistics were computed only with the valid data (without computing the values considered missing). As the dependent numerical variables showed an abnormal distribution, they were described using the median, the 25th and 75th percentile variation. In order to analyze the association between sociodemographic variables, it was decided to transform the dependent variable into 4 percentiles and thus perform the Chi-square test. For all tests, a P value of 0.05 or less was considered significant. All tests were carried out using SPSS statistical software (IBM®, version 26).

This project was initially submitted to HUUFMA's Scientific Committee for authorization to carry out the research. The project was then submitted to the Research Ethics Committee (Comitê de Ética em Pesquisa, CEP) of HUUFMA, through the Brazil Platform (CEP/CONEP System) to obtain the respective substantiated opinion. The study was approved by the CEP/HUUFMA under number 4.688.729. Participants were asked to waive the requirement to obtain an Informed Consent Form (ICF), in accordance with section IV, item IV.8 of Resolution No. 466 of December 12, 2012.

RESULTS

Between 2017 and 2020, a total of 619 donors were registered at the HUUFMA HMB. The mean number of home visits was 8 (IQ 4-14), and the volume of milk donated was 1285ml (IQ 300 - 3570ml), as shown in Table 1.

Table 2 shows the donor's descriptive characteristics. The median maternal age was 27 IQ (23-31), with the highest concentration in the 18-30 age bracket (63.4%). The most frequent income was between 1 and 3 minimum wages. Cigarette consumption was associated with the volume of milk donated.

The majority of donors had prenatal care in public services (49.1%). Most of the donors were primiparous (66.6%) and had a cesarean delivery (65.7%), with almost the same percentage

between public and private maternity hospitals (37.8% vs. 37.3%, respectively). None of the variables related to childbirth and the puerperium showed any association with the volume of milk donated percentiles. Detailed data is available in Table 3.

Table 4 shows the information related to the baby and breastfeeding. Exclusive breastfeeding and the age of the baby showed a significant association with the percentiles of milk donation volume ($p < 0.05$). It can be seen that the younger the age of the baby at the registration stage, the higher the mean volume of milk donated. The donors reported receiving guidance on breastfeeding during prenatal and postpartum care (43%) and did not report using artificial nipples such as pacifiers or bottles (73.5%). These variables were not associated with the volume of milk donated.

Table 1. Description of the numerical variables of donors registered at the HUUFMA Human Milk Bank between 2017-2020.

	Minimum	Maximum	Median	P25-75
Number of visits made	0	83	8	4-14
Donated milk volume	0	54620	1285	300-3570
Donated milk volume (percentiles)				
1	0	300	70	0-200
2	310	1280	750	570-960
3	1290	3500	2200	1740-3250
4	3570	54620	7140	4865-11862

Source: Human Milk Donors Database 201-2020, Human Milk Bank of the University Hospital of the Federal University of Maranhão, São Luís, MA, Brazil.

Table 2. Association between the descriptive characteristics of human milk donors registered at the HUUFMA Human Milk Bank and the percentiles of milk donation, São Luís, 2017-2020.

	N	%	Median (IQ)	p-value
Age				0.002*
Under the age of 18	31	5.4	605 (300-1670)	
Over 18 to 30 years old	367	63.4	1200 (300-3350)	
31+ years old	181	31.3	2400 (600-5550)	
Education				0.213
Between 9 and 11 years of education	286	46.9	1140 (300- 9542)	
12 or more years of education	291	47.7	1580 (420-3850)	
Income				0.180
Up to 1 MWs	196	33.4	1230 (300-3350)	
From 1 to 3 MW	205	35	1125 (255-3600)	
More than 3 MWs	185	31.6	1620 (600-3950)	
Smoking donor				0.098
Yes	7	1.2	900 (140-1280)	
No	595	98.8	1330 (300-3600)	

Source: Human Milk Donors Database 201-2020, Human Milk Bank of the University Hospital of the Federal University of Maranhão, São Luís, MA, Brazil.

* Significant association (χ^2 test); MW = minimum wage. Alcohol and tobacco consumption reported by the mother at the collection time.

Table 3. Prenatal and puerperium conditions and association with percentile of human milk donation volume in donors registered at the HUUFMA Milk Bank, São Luís 2017-2020.

	N	%	Median (IQ)	p-value
Place of prenatal follow-up				0.407
At HUUFMA	45	8.7	1650 (560-6380)	
In a public service	254	49.1	1170 (335-3425)	
In private services	218	42.2	1565 (400-3750)	
Number of births				0.984
1	402	66.6	1300 (332.5-3477.5)	
2	150	24.8	1350 (285 - 3600)	
3+	52	8.6	755 (250-3667.5)	
Type of delivery				0.372
Vaginal	206	34.3	1230 (400-3390)	
Cesarean	395	65.7	1340 (300-3617.5)	
Birthplace				0.488
HUUFMA	129	20.8	1230 (300-3260)	
Other public services	234	37.8	1120 (300-3357.5)	
Private maternity hospitals	231	37.3	1620 (495-4380)	

Source: Human Milk Donors Database 2017-2020, Human Milk Bank of the University Hospital of the Federal University of Maranhão, São Luís, MA, Brazil.

Table 4. Information on breastfeeding and association with percentile of human milk donation volume in donors registered at the HUUFMA Milk Bank, São Luís 2017-2020.

	N	%	Median (IQ)	p-value
Breastfeeding experience				0.592
First child	395	67.6	1290 (405-3400)	
Breastfed a baby	169	28.9	1350 (250-3750)	
Breastfed more than one baby	20	3.4	1600 (515-5035)	
Guidance on breastfeeding				0.858
Only during prenatal care	38	6.6	860 (125-3475)	
Only after childbirth	190	33	1250 (300-3750)	
Prenatal and postpartum	247	43	1350 (345-3605)	
Never received guidance	100	17.4	1310 (500-4220)	
Baby's use of artificial nipples				0.209
Yes	150	26.5	1150 (405-4100)	
No	417	73.5	1480 (335-3715)	
Exclusive breastfeeding				0.018*
Yes	480	83.3	1440 (415-3932.50)	
No	96	16.7	820 (147.5-2457.5)	
Baby's age (at registration)				0.046*
1 month or less	168	27.9	1500 (300-3765)	
Over 1 under 6 months	371	61.6	1465 (400-3904)	
More than 6 months	63	10.5	750 (145-2100)	

Source: Human Milk Donors Database 201-2020, Human Milk Bank of the University Hospital of the Federal University of Maranhão, São Luís, MA, Brazil.

* significant association (χ^2 test).

DISCUSSION

Recognizing the sociodemographic profile of milk donors is relevant to developing appropriate dissemination measures to help attract new donations. Therefore, by knowing them, the HMB can be improved so that it can fulfill its objective of collecting and distributing HM to meet the demands of its recipients. On the other hand, the donor's collaboration is fundamental, since the existence of the HMB is associated with women willing to donate their milk, since it is a non-profit establishment, where the sale of the product is forbidden.^{9,13}

Exclusive breastfeeding was a factor associated with the volume of human milk. A study carried out in Madrid, Spain, found that breastfeeding for more than 4 months was associated with higher milk volume.¹⁴ The literature shows that women who exclusively breastfeed their children may be more likely to produce a greater quantity of human milk, generating a greater willingness to donate excess milk.¹⁵ The study also points out that environmental factors can influence the quantitative production of human milk, including maternal nutritional status, partner support, stress and the baby's ability to latch on.¹⁶

The donors' age profile in this study is consistent with a study carried out in Salvador.¹⁷ The authors say that this is a positive factor, because in adulthood, the donor woman is better prepared to take on motherhood and the changes that come with it. Another study carried out in North America also showed a similar age profile, but this was not associated with the volume of milk donated.¹⁸

In relation to the infants' age profile, two studies have shown this association, although they associated prematurity with higher volumes of donated milk.^{18,19} It is theorized that smaller babies are more likely to suck exclusively at the breast and thus contribute to lactogenesis through mechanical sensory stimulation. Although it was not a factor analyzed in this research, a study has shown that donation time is associated with volume, since the longer the donor remains linked, the greater the volume donated.¹⁹

Recent research indicates that the interruption of breastfeeding is significantly influenced by low education and family income. This is because women with a higher education level have greater access to information and a deeper understanding of the relevance and benefits of breastfeeding, which are communicated during the prenatal period. These women are less susceptible to influences from outside cultures or experiences.²⁰

Costa Santos et al.¹⁷ stated that most of the women had a high education level and that this is related to the mother's greater ability to assimilate the information given during prenatal care, which can contribute to successful breastfeeding. On the other hand, a longer education period also contributes to this woman's entry into the labor market, which can limit exclusive breastfeeding (EBF).²¹

In the analysis related to breastfeeding time and maternal education, there was no statistically significant difference in this study. This study found that most of the women in the donation process were primiparous. The research carried out by Soares et al.¹³ also showed that the majority of women reported

being mothers and breastfeeding for the first time, whereas a smaller proportion were breastfeeding their second or third child.

A condição de ser mãe pela primeira vez pode estar ligada a um aumento na procura por serviços de saúde, provavelmente devido à ausência de vivência prévia e à sensação de insegurança ao amamentar.²² Another factor is related to the fact that these nursing mothers may have more time available to dedicate to donation. This makes it possible to shorten the relationship between the mother and the HMB, favoring the breast milk donation. On the other hand, Soares et al.¹³ found that the data relating to HM donors reflected greater preparation on the part of multiparous women because they had already experienced breastfeeding. In general, being primiparous, low educational level, lack of previous experience with breastfeeding, negative attitude towards childbirth and lack of intention to breastfeed are risk factors for early weaning,²³ and, as a result, less milk being available for donation.

This study found that puerperal women between the ages of 18 and 30 were the ones who most often sought care to donate milk to the HMB at home. Some research has shown that young mothers and teenagers are the ones who breastfeed for the shortest period of time; higher maternal age is related to the intention to breastfeed, since lived experience brings with it notions about breastfeeding.^{1,24}

This study found that cesarean deliveries were more common than vaginal deliveries. Soares et al.¹³ report that cesarean delivery can make it difficult for women to start breastfeeding. This is due to the effects of anesthesia, postpartum pain and limited movement as a result of the surgery. Therefore, the highest EBF prevalence is related to vaginal delivery. It should be noted that normal childbirth is a predisposing factor in promoting breastfeeding.²⁵

In relation to health habits, this study found that the majority of nursing mothers denied smoking or drinking alcohol. Smoking in moderate amounts and some medications are not an impediment to donating HM.^{9,26} Costa Santos et al.¹⁷ argue that health education, taking into account the whole process of preparing for lactation during prenatal and puerperal care, can guarantee good results for the growth of donations to the HMB.

The use of artificial nipples such as pacifiers and bottles has been identified as one of the main factors that can lead to weaning or low milk production.^{27,28} In this study, this factor was not associated with milk donation. The amount of use of artificial nipples is commonly reported by Silva et al.²⁹ who stated that the use of artificial nipples at an early age is a practice that can have a number of negative effects on the child's breastfeeding process and, consequently, can also hinder donation.

At the health service where this study was carried out, the visit to the donors made it possible to advise them on the correct way to milk and any doubts that still existed regarding donation. As diretrizes acerca da doação, as etapas para a extração, coleta e preservação do leite humano têm o potencial de fortalecer as mães que amamentam, infundindo nelas confiança e habilidade para enfrentar os principais desafios ligados à amamentação.

In addition, these guidelines make them aware of the importance of breast milk and the act of donating.^{30,31}

FINAL CONSIDERATIONS AND IMPLICATIONS FOR THE PRACTICE

From this study, it was possible to identify the sociodemographic variables of the HM donors, and the majority of the sample were adult, primiparous women who had had a cesarean delivery. Houve associação das variáveis, amamentação exclusiva e a idade do bebê e materna com os percentis de volume de doação de leite. These women's profiles can serve as a useful tool for developing strategies, especially by intensifying the guidance provided on breast milk donation.

This study has limitations inherent to its observational design, which means that it is not possible to establish a conclusive case-by-case relationship between the variables studied. In addition, filling out the form manually brought with it problems regarding the precise identification of some data that ended up being overlooked in the final analysis. We also believe that the lack of prenatal appointments can have a direct influence on women's preparation for breastfeeding and also on the possibility of pregnant women understanding the importance of donating human milk. However, we believe that the data from this study should serve as a basis for the Human Milk Bank to employ effective strategies to attract new donors. Therefore, it is clear that breastfeeding should always be supported and promoted, right from prenatal care, as exclusive breastfeeding can be a good predictor of a greater number of HM donors.

Further research is needed to establish how the donor's profile can influence her ability to donate milk and thus allow for a refined strategy of active search and targeting of efforts to strengthen the Brazilian milk bank stocks.

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Data collection. Thayne Alexandre de Carvalho.

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Interpretation of the results. Thayne Alexandre de Carvalho. Christyann Lima Campos Batista.

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REFERENCES

1. Passos LSD, Kroll C, Borges L, Rocha EDDM, Schultz LF. Acompanhamento dos atendimentos de puérperas e recém-nascidos em um Banco de Leite Humano. *Esc Anna Nery*. 2020;24(2):e20190086. <http://doi.org/10.1590/2177-9465-ean-2019-0086>.
2. Marinho TF, Alves VH, Branco MBLR, Rodrigues DP, Pereira RM, Marchiori GRS. Percepções valorativas de práticas em banco de leite humano. *Cogitare Enferm*. 2017;22(1). <http://doi.org/10.5380/ce.v22i1.48679>.
3. Prentice AM. Breastfeeding in the Modern World. *Ann Nutr Metab*. 2022;78(Suppl. 2):29-38. <http://doi.org/10.1159/000524354>. PMID:35679837.
4. Moubareck CA. Human milk microbiota and oligosaccharides: a glimpse into benefits, diversity, and correlations. *Nutrients*. 2021;13(4):1123. <http://doi.org/10.3390/nu13041123>. PMID:33805503.
5. Wambach K, Bateson T, Matheny P, Easter-Brown K. A descriptive study of the attitudes, perceptions, and experiences of human milk donation. *Adv Neonatal Care*. 2019;19(6):441-51. <http://doi.org/10.1097/ANC.0000000000000659>. PMID:31764132.
6. Silva CM, Pellegrielli ALR, Pereira SCL, Passos IR, Santos LCD. Práticas educativas segundo os "Dez passos para o sucesso do aleitamento materno" em um Banco de Leite Humano. *Cien Saude Colet*. 2017;22(5):1661-71. <http://doi.org/10.1590/1413-81232017225.14442015>.
7. Fonseca RMS, Milagres LC, Franceschini SDCC, Henriques BD. O papel do banco de leite humano na promoção da saúde materno infantil: uma revisão sistemática. *Cien Saude Colet*. 2021;26(1):309-18. <http://doi.org/10.1590/1413-81232020261.24362018>.
8. RDC-ANVISA No. 171, de 04 de Setembro de 2006. (BR). Agência Nacional de Vigilância Sanitária. 2006.
9. Brasil. Agência Nacional de Vigilância Sanitária. Banco de Leite Humano: funcionamento, prevenção e controle de riscos. Brasília: Agência Nacional de Vigilância Sanitária; 2008.
10. Currier RW, Widness JA. A brief history of milk hygiene and its impact on infant mortality from 1875 to 1925 and implications for today: a review. *J Food Prot*. 2018;81(10):1713-22. <http://doi.org/10.4315/0362-028X.JFP-18-186>. PMID:30234385.
11. Pereira JAC, Alves VH, Marchiori GRS, Rodrigues DP, Gabriel AD, Santos MVD. Atuação do enfermeiro nos bancos de leite humano. *Rev Enferm UFPE*. 2017;11(7):2691-6.
12. Gutierrez dos Santos B, Perrin MT. What is known about human milk bank donors around the world: a systematic scoping review. *Public Health Nutr*. 2021. <http://doi.org/10.1017/S1368980021003979>. PMID:34509177.
13. Soares LG, Dolinski D, Wagner LPB, Santos LDSFD, Soares LG, Mazza VDA. Captação e Aproveitamento de Leite Humano em um Banco de Leite de um Município do Estado do Paraná. *Rev. Pesqui. Cuid. Fundam*. 2018;10(3):656-62. <http://doi.org/10.9789/2175-5361.2018.v10i3.656-662>.
14. Sierra-Colomina G, García-Lara NR, Escuder-Vieco D, Alonso-Díaz C, Esteban EM, Pallás-Alonso CR. Donor milk volume and characteristics of donors and their children. *Early Hum Dev*. 2014;90(5):209-12. <http://doi.org/10.1016/j.earlhumdev.2014.01.016>. PMID:24581867.
15. Doshmangir L, Naghshi M, Khabiri R. Factors influencing donations to human milk bank: a systematic review of facilitators and barriers. *Breastfeed*

- Med. 2019;14(5):298-306. <http://doi.org/10.1089/bfm.2019.0002>. PMID:30896254.
16. Golan Y, Assaraf YG. Genetic and physiological factors affecting human milk production and composition. *Nutrients*. 2020;12(5):1500. <http://doi.org/10.3390/nu12051500>. PMID:32455695.
 17. Costa Santos Y, Dourado Gaspar J, Brito Duarte G, Pimentel Miranda F. Caracterização do perfil de doadoras do banco de leite humano da maternidade escola de Salvador/BA. *Enfermagem Brasil*. 2018;17(6):5676-584. <http://doi.org/10.33233/eb.v17i6.1250>.
 18. Jarmoc G, Bar-Yam N, Hagadorn JI, Tosi L, Brownell EA. Demographics and geographic distribution of mothers donating to a nonprofit milk bank. *Breastfeed Med*. 2021;16(1):54-8. <http://doi.org/10.1089/bfm.2020.0197>. PMID:33090004.
 19. Bocci G, Kundisova L, Pacini V, Nante N, Alaimo L. Generous breastfeeding: an observational retrospective study of milk donor's characteristics in the province of Siena, Italy. *Ann Ig*. 2019;31(4):316-25.
 20. Feitosa RMC, Santana CM, Bezerra YCP, Quental OB. Breastfeeding and early weaning-associated factors: integrative review. *Braz J Prod Eng*. 2020;6(6):90-106.
 21. Monteiro FR, Buccini GS, Venâncio SI, da Costa THM. Influence of maternity leave on exclusive breastfeeding: analysis from two surveys conducted in the Federal District of Brazil. *J Hum Lact*. 2019;35(2):362-70. <http://doi.org/10.1177/0890334418783715>. PMID:30207819.
 22. Feenstra MM, Jørgine Kirkeby M, Thygesen M, Danbjørg DB, Kronborg H. Early breastfeeding problems: a mixed method study of mothers' experiences. *Sex Reprod Healthc*. 2018;16:167-74. <http://doi.org/10.1016/j.srhc.2018.04.003>. PMID:29804762.
 23. Gabay ZP, Gondwe KW, Topaz M. Predicting risk for early breastfeeding cessation in Israel. *Matern Child Health J*. 2022;26(6):1261-72. <http://doi.org/10.1007/s10995-021-03292-3>. PMID:34855056.
 24. Whipps MDM. Education attainment and parity explain the relationship between maternal age and breastfeeding duration in U.S. Mothers. *J Hum Lact*. 2017;33(1):220-4. <http://doi.org/10.1177/0890334416679385>. PMID:28135484.
 25. Rabiepoor S, Hamidiazar P, Sadeghi E. The relationship between type of delivery and successful breastfeeding. *Int J Pediatr*. 2017;5(41):4899-907. <http://doi.org/10.22038/IJP.2017.22299.1865>.
 26. Dos Santos e Silva RK, Sany de Moura MS, Carvalho MDL, Braz ZR, Moura NDS, Mendes AN et al. Desejo de doar leite: relação com características maternas. *Av Enferm*. 2020;38(2):216-25. <http://doi.org/10.15446/av.enferm.v38n2.82838>.
 27. Pinheiro JMF, Flor TBM, Araújo MGGD, Xavier AMSF, Mata AMBD, Pires VCDC et al. Feeding practices and early weaning in the neonatal period: a cohort study. *Rev Saude Publica*. 2021;55:63. <http://doi.org/10.11606/s1518-8787.2021055003248>.
 28. Cavalcante VO, de Sousa ML, Pereira CS, da Silva NO, Rodrigues de Albuquerque T, Callou Cruz RSBL. Consequences of using artificial nipples in exclusive breastfeeding: an integrative review. *Aquichan*. 2021;21(3):1-13. <http://doi.org/10.5294/aqui.2021.21.3.2>.
 29. Silva TF, Cavalcanti SH, Lima BRFS, Rodrigues TMM, Cavalcanti LMA, Bezerra CT et al. Influência dos bicos artificiais na amamentação em lactentes atendidos em um banco de leite humano. *Acervo Saúde*. 2020;12(12):e4607. <http://doi.org/10.25248/reas.e4607.2020>.
 30. Rocha FNPDS, Patrício FDB, Passos MNSD, Lima SWOD, Nunes MGS. Caracterização do conhecimento das puérperas acerca do aleitamento materno. *Rev. Enferm. UFPE*. 2018;20(38):122-30.
 31. Buges NM, Pereira RJ. Fatores que influenciam o processo de doação de leite humano: uma revisão sistemática da literatura. *Rev Cont Saúde*. 2020;20(38):122-30. <http://doi.org/10.21527/2176-7114.2020.38.122-130>.

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