



REVIEW ARTICLE

Factors associated with breastfeeding maintenance for 12 months or more: a systematic review[☆]



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KEYWORDS

Review;
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Abstract

Objective: Synthesize the information about the factors associated with maintenance of breastfeeding for 12 months or more.

Data source: A systematic review was conducted in the Pubmed/Medline, Scielo, and Lilacs databases, including articles published in Portuguese or English since 2004 on the factors associated with breastfeeding maintenance for at least 12 months; review articles and those with qualitative design were excluded. The factors were organized into four levels, according to the chronological proximity to the outcome: distal, distal intermediate, proximal intermediate, and proximal; nationality and place/area of residence were considered contextual factors.

Summary of data: 1174 articles were identified, of which 19 were included in this review, comprising seven cohort studies and 12 cross-sectional studies. A total of 39 of the 75 assessed factors were associated with the outcome at least once. The factors with the highest percentages of associations with maintenance of breastfeeding for 12 months or more, considering the number of times they were tested were: children whose parents are the caregivers (100%), none type of maternal exposure to smoke (54%), children and/or parents are immigrants/foreigners (50%), live in urban areas (42.9%), older maternal age (40%), married women (37.5%), higher level of maternal education (31.3%), greater parity (30.8%), and lower income (30%).

Conclusions: The maintenance of breastfeeding for 12 months or more is associated with multiple factors, emphasizing the contextual factors and those related to some maternal sociodemographic characteristics. Associations differ in effect and magnitude between the different populations studied.

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PALAVRAS-CHAVE

Revisão;
Aleitamento
materno;
Fatores
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Fatores associados à manutenção da amamentação por 12 meses ou mais: revisão sistemática**Resumo**

Objetivo: Sintetizar as informações sobre os fatores associados à manutenção da amamentação por 12 meses ou mais.

Fontes de dados: Foi conduzida revisão sistemática nas bases de dados Pubmed/Medline, Scielo e Lilacs, incluindo artigos publicados em língua portuguesa ou inglesa desde 2004 versando sobre fatores associados à amamentação por, no mínimo, 12 meses. Excluíram-se artigos de revisão e com delineamento qualitativo. Os fatores foram organizados em quatro níveis de acordo com a proximidade cronológica com o desfecho: distal, intermediário distal, intermediário proximal e proximal; nacionalidade e local/área de residência foram considerados fatores contextuais.

Síntese dos dados: Identificaram-se 1.174 artigos, dos quais 19 foram selecionados para revisão, sendo sete estudos de coorte e 12 transversais. Dos 75 fatores explorados, 39 mostraram-se associados ao desfecho ao menos uma vez. Os fatores com os maiores percentuais de associações com a manutenção da amamentação por 12 meses ou mais, considerando o número de vezes que foram testados, foram: filhos terem os pais como cuidadores (100%), nenhum tipo de exposição materna ao fumo (54%), crianças e/ou pais serem imigrantes/estrangeiros (50%), morar em zona urbana (42,9%), maior idade materna (40%), mãe ser casada (37,5%), maior escolaridade materna (31,3%), maior número de filhos (30,8%) e menor renda familiar (30%).

Conclusões: A manutenção da amamentação por 12 meses ou mais está associada a múltiplos fatores, com destaque para os fatores contextuais e os relacionados a algumas características sociodemográficas das mães. As associações diferem em efeito e magnitude entre as diferentes populações estudadas.

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Introduction

The World Health Organization (WHO) recommends the maintenance of breastfeeding (BF) for 2 years or more,¹ based on the positive impact of breastfeeding on the health of the child and the breastfeeding mother, as well as the economic impact.^{2,3} Scientific evidence demonstrates the dose-response effect of breastfeeding, especially against morbidity and mortality due to infectious diseases^{4,5} and overweight/obesity,⁶⁻⁹ favoring orofacial development^{10,11} and the intelligence quotient.^{3,12-14}

Despite the WHO recommendation, the maintenance of breastfeeding after the first year of the child's life is practiced by few women, being more common in low-income countries, where the prevalence of BF at 12 months and 24 months is higher than 90% and 60%, respectively.⁴ In most high-income populations, this prevalence is below 20%, with important differences between countries, such as Norway (38%), the United States (27%), Sweden (16%), and the United Kingdom (<1%).⁴ In Brazil, despite the significant advances in BF indicators, since the 1980s, less than half of the children aged between 12 and 14 months and approximately one-third of those aged 21-23 months are breastfed.^{15,16}

Early weaning determinants have been widely assessed.¹⁷⁻¹⁹ However, little is known about factors associated with continued breastfeeding after 12 months. A Brazilian study found that, unlike what is reported for early weaning that the presence of the child's father in the home

was a protective factor for BF,^{20,21} the cohabitation with the husband/partner was a risk factor for the maintenance of BF for 2 years or more.²² This discrepancy raises the suspicion that some factors involved in the maintenance of breastfeeding for a longer period differ from those associated with early weaning.

The present review aimed to collect the available evidences to increase the knowledge about factors involved in breastfeeding maintenance for 12 months or more, organizing the factors hierarchically, according to their proximity to the outcome. The results shown here may guide future research on continuous BF, in addition to helping in the establishment of measures that promote longer breastfeeding duration.

Methods

This is a systematic review using a pre-established protocol for searching, selecting, and collecting data, adapted to the recommendations of the Preferred Reporting Items for Systemic Reviews (PRISMA) guidelines for meta-analysis and systematic review studies.²³ As few studies that addressed the maintenance of breastfeeding for 2 years or more were retrieved, the authors chose to study this practice for 12 months or more.

A search was carried out in the Pubmed/Medline, Scielo and Lilacs databases, using the following search terms, based on the Descriptors in Science and Health and Medical Subject Headings (MeSH): aleitamento materno,

amamentação, breast feeding, breastfeeding, breast milk, human milk, duração, duration, 12 meses, 12 months, 24 meses, 24 months, primeiro ano, first year, segundo ano, second year, prolong*/\$, sustain*/\$, exten*/\$, continu*/\$, long-t*/\$, factor*/\$, determ*/\$ and predict*/\$. The terms were combined through the Boolean operators AND, NOT, and AND NOT; the symbols (*) and (\$) were used to complement the searched words according to their radical, varying with the used database. The terms "revisão, review, gestantes, pregnant woman, pregnancy, gestation, desnutrição, malnutrition" were incorporated into the search terms to facilitate the exclusion of publications that did not meet the criteria for this review. Articles addressing factors associated with breastfeeding, having as an outcome the maintenance of BF for at least 12 months, published between January 2004 and March 2016 and written in Portuguese or English, were selected. There were no restrictions regarding the study site, type of population, study design, and quality. Review articles (systematic or not) and qualitative studies were excluded.

Two independent reviewers carried out the searches and evaluated the articles based on their titles, abstracts, and full text when it was considered potentially eligible. Article inclusion and data extraction were also performed independently; the results were compared and the disagreements resolved by consensus between the two reviewers. In case of non-agreement between the researchers, a third reviewer was consulted.

The quality of evidence was evaluated according to criteria adapted from Parry et al. and Taylor et al.^{24,25} These criteria take into account: type of study (internal validity), structured summary, introduction with scientific basis and logical explanation, population recruitment method, selection of predefined sampling, information on data collection tools, nonresponse rate information, interviewers' training, clearly defined method of outcome measurement, statistical analysis, result interpretation, study hypothesis and possible biases considered, result interpretation in the context of current evidence, and generalization. The maximum possible score, according to this criterion, is 30 points.

Once the factors that were tested for association with maintenance of breastfeeding for 12 months or more were identified, they were organized according to the hierarchical theoretical model proposed by Boccolini et al.,²⁶ arranged in four levels according to the chronological proximity of the variables with the outcome. Level 1 (or distal level) grouped the characteristics prior to pregnancy: maternal socioeconomic and demographic characteristics, familial and/or domiciliary. Level 2 (or distal intermediate level) included prenatal care and events occurred during pregnancy. Level 3 (or proximal intermediate level) comprised the characteristics of delivery, immediate postpartum, and newborn care, in addition to events that occurred between childbirth and hospital discharge. Finally, level 4 (or proximal level) included the characteristics of the women and the infants related to the variables that occurred after hospital discharge, including the infant's feeding.

The variables related to nationality, place of residence (region, municipality, district, neighborhood), and area of residence (urban/rural, slum/not slum, countryside/capital) were classified as contextual factors, that is, characteristics related to the social, economic, and

demographic context shared by the nursing mothers that can influence the duration of BF.²⁶

Results

A total of 1174 potentially relevant articles for the review were retrieved (Medline $n=833$, Lilacs $n=161$, Scielo $n=177$, and three were manually searched, that is, identified through the list of article citations in publications retrieved by searching the databases), of which 272 were selected for abstract reading. After reading these, 95 articles were selected for full-text reading; among these, 19 met the inclusion criteria and were selected to be part of the review. Fig. 1 shows the inclusion and exclusion flowchart of the articles and Table 1 summarizes the main characteristics and outcomes of the 19 studies.

Four studies were carried out in Brazil,^{22,27-29} three in the United States,^{21,30,31} two in Norway,^{32,33} two in Italy,^{34,35} and one in each of the following countries: Sri Lanka,³⁶ Sweden,³⁷ Qatar,³⁸ Haiti,³⁹ Australia,⁴⁰ Iran,⁴¹ Turkey,⁴² and East Timor.⁴³ Of the 19 selected articles, seven were cohort^{22,27,29,32,34,35,40} and 12 were cross-sectional studies.^{21,28,30,31,33,36-39,41-43} The publication quality ranged from 13²⁸ to 26 points.³²

Seventy-five factors were tested for the association with maintenance of breastfeeding for 12 months or more (Fig. 2). The number of associations of the same variable with the outcome may be higher than the number of studies investigating it, since some authors have categorized the same variable into more than two categories or evaluated it under different aspects. Yalçın et al.,⁴² for instance, investigated active maternal exposure to tobacco, as well as exposure to passive smoke.

The distal level was the hierarchical level submitted to the most evaluations (20 variables and 93 evaluations), followed by the proximal (23 variables and 73 evaluations), proximal intermediate (20 variables and 52 evaluations), and distal intermediate (nine variables and 16 evaluations). Contextual factors, although encompassing only three variables, were evaluated 22 times.

The factors most frequently assessed were: level of schooling^{21,22,27,29,31-36,38-43} and maternal age^{21,22,27-29,31-33,35,36,38-43}; parity,^{22,28,30-32,34-36,38-43} maternal occupation^{21,27,29,32,34-36,38,39,41-43} and region of residence^{27,30-33,36,39-43}; child's gender^{21,22,27,30,31,33,36,38,41-43}; maternal exposure to tobacco^{22,30,32-34,37,42}; family income^{28-31,36-39,42,43}; type of delivery^{22,27,28,34-38,42}; and maternal marital status.^{28,29,31,32,35,36,40} The number of evaluations of the assessed factors is shown in Fig. 2. Thirty-nine variables were associated with the outcome at least once; the most frequent were maternal age^{28,29,31-33,42} and some type of maternal exposure to tobacco^{30,32,33,37,42} (six associations), level of maternal schooling^{31-33,40,41} (five associations), and number of children^{28,32,40,41} (four associations). Fig. 2 shows the number of times each variable was associated with the outcome.

The factors with the highest percentages of associations with breastfeeding maintenance for 12 months or more, considering the number of times they were tested, were children having parents as caregivers (100%), none maternal exposure to tobacco (54.5%), children and/or parents

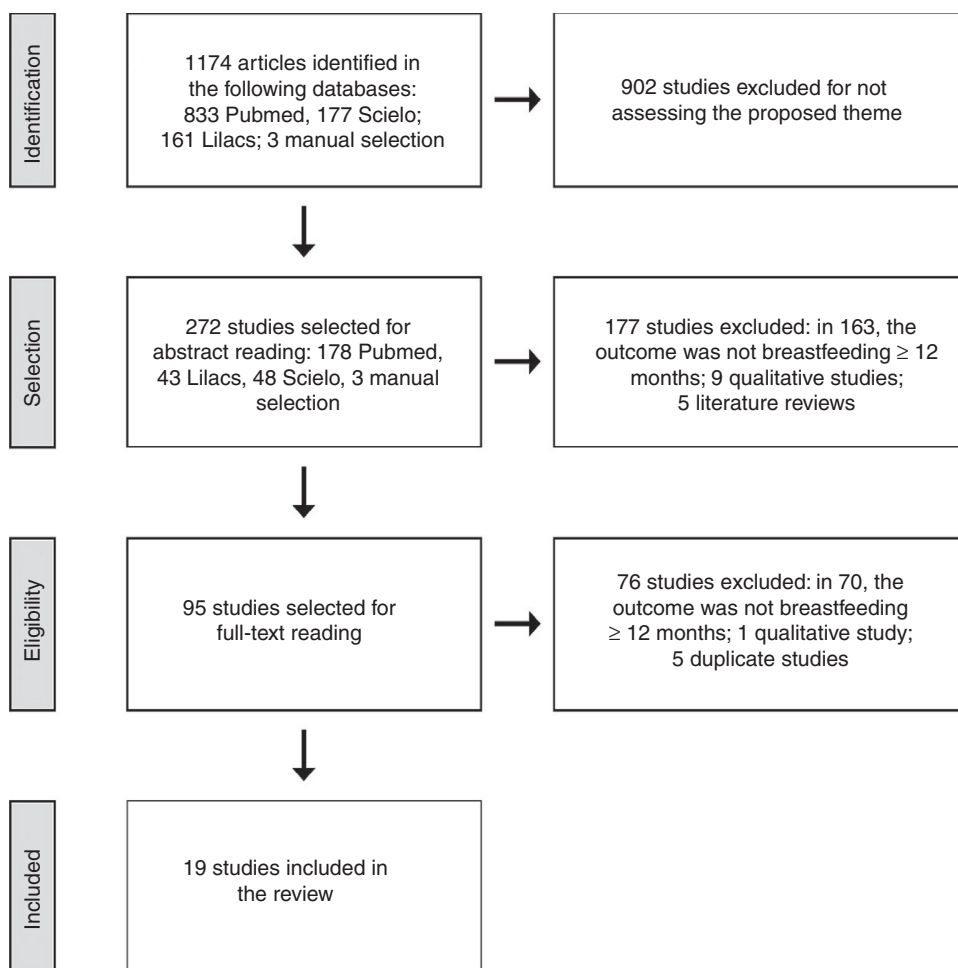


Figure 1 Study inclusion and exclusion flowchart for the systematic review of factors associated with maintenance of breastfeeding for ≥ 12 months.¹²

being immigrants/foreigners (50%), living in the urban area (42.9%), older mothers (40%), married mothers (37.5%), higher maternal level of schooling (31.3%), higher number of children (30.8%), and lower family income (30%).

Discussion

The knowledge of factors associated with the maintenance of breastfeeding for at least 12 months may help in the planning of health actions aimed at increasing the proportion of women who breastfeed according to the international recommendation of 2 years or more. The present systematic review identified 39 variables associated with maintaining breastfeeding for 12 months or more in at least one study.

Several factors grouped at the distal level, such as maternal older age and higher level of schooling, married mother, higher number of children, and lower family income, showed a high percentage of associations with the maintenance of breastfeeding for 12 months or more, considering the number of times they were tested. This finding demonstrates that the prolongation of breastfeeding suffers significant influence of socioeconomic and demographic characteristics. In turn, when exclusive breastfeeding is assessed in

the first 6 months of life, factors closer to the outcome are those most frequently associated with this practice, such as maternal occupation, pre- and postpartum counseling, maternal knowledge about breastfeeding, and type of delivery.^{26,44,45}

Six associations were found between older maternal age and breastfeeding maintenance for 12 months or more. This result can be attributed to the greater emotional stability and experience acquired with previous children, which allow the mother to deal with eventual complications during pregnancy, delivery, and the postpartum period.^{46,47} A higher number of children favored the maintenance of BF.^{32,40,41} As with maternal age, parity may be related to greater experience of women regarding several aspects that may positively influence BF.²⁸

The association between maternal level of schooling and breastfeeding duration for 12 months or more was observed in six of the 16 studies that analyzed this association.^{31-33,40,41,43} These studies, mostly from high-income countries, found that higher levels of maternal schooling^{31-33,40,41} were positively associated with longer BF duration, except for a study carried out in East Timor, which found an association between lower level of schooling and breastfeeding maintenance.⁴³ This finding corroborates

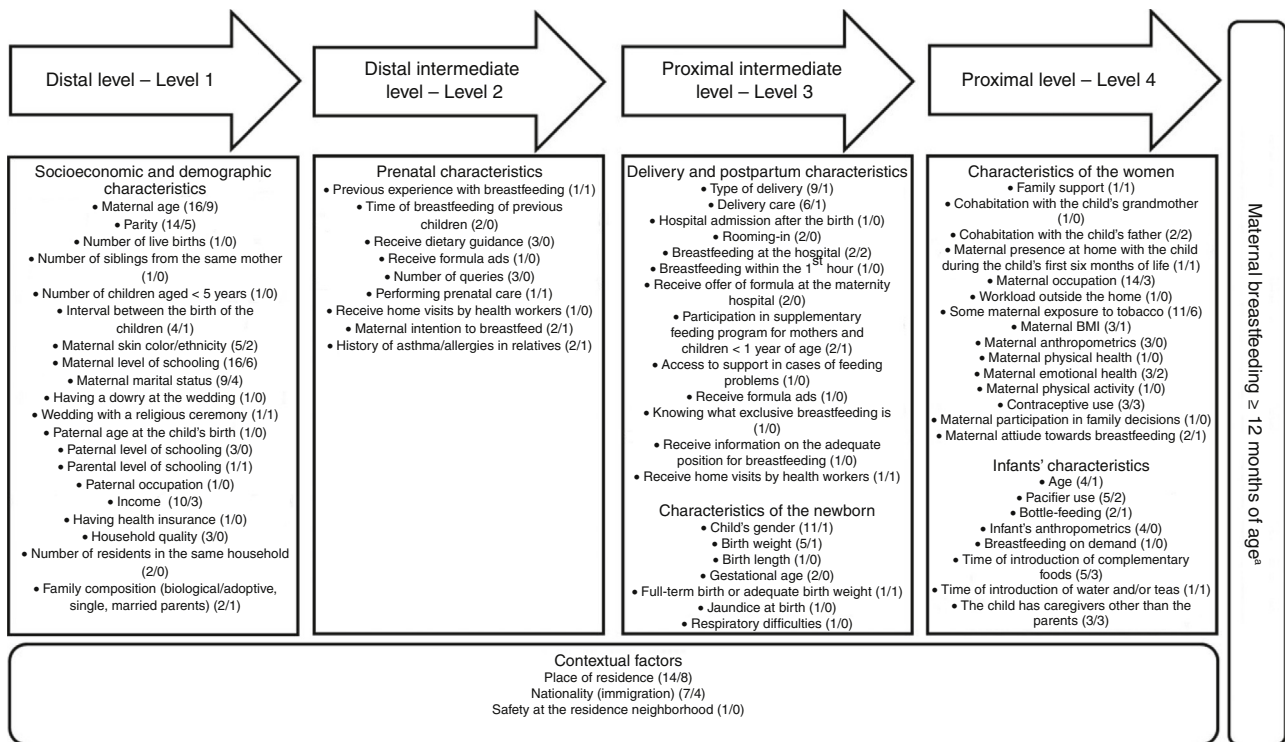


Figure 2 Hierarchical theoretical model of the variables evaluated for possible association with maintenance of breastfeeding for ≥ 12 months of age. ^aVariable (number of evaluations of the association with outcome/number of associations with outcome).

recent data published by Victora et al.,⁴ indicating that, in high-income countries, breastfeeding is more common in women with a better socioeconomic level. In Brazil, a middle-income country, a systematic review found an association between a higher level of maternal schooling and the practice of exclusive breastfeeding in almost half of the reviewed studies.²⁶

The association between lower family income and maintenance of breastfeeding for 12 months or more was detected in three^{28,37,43} of the ten^{28–31,36–39,42,43} studies in which this variable was assessed. It is noteworthy that one of these three studies was carried out in Brazil,²⁸ and the others in a high-income³⁷ (Sweden) and in a low-income (East Timor) country.⁴³ It is worth remembering that, in the Swedish study, this finding may be associated with the fact that the women who breastfed longer were immigrants.³⁷ In low- and middle-income countries, breastfeeding is one of the few health-related positive behaviors that is most prevalent among the poorest population.⁴ It is possible that this finding is related to the economic benefit of breastfeeding.²

Maternal marital status presented a different behavior regarding the association direction. Being a single mother was a protective factor for BF at 12 months or more and a risk factor at 2 years or more.⁴⁰ Further studies are required to better understand a possible ambivalent influence of the child's father/mother's partner on BF duration.

Previous experience with breastfeeding,²⁸ presence of allergy/asthma in the children's parents and relatives,³³ attendance at prenatal consultations,²⁷ and the mother's intention to breastfeed during pregnancy²¹ were the distal intermediate level variables reported to be associated with the outcome. It is expected that prenatal consultations

with information on breastfeeding, intention to breastfeed during pregnancy, and having previous experience with breastfeeding are factors that help women to face possible BF difficulties and, thus, promote the prolongation of breastfeeding.^{46,48,49} The association between the presence of allergy/asthma in parents and family members may have its origin in the concern for children's health, since among the long-term benefits of breastfeeding is protection against asthma and eczema, especially in low-income countries.⁵⁰

Among the delivery and birth characteristics, although type of delivery was evaluated in nine^{22,27,28,34–38,42} of the 19 selected studies, only one study demonstrated that vaginal delivery was a protection factor for maintenance of BF for 12 months or more.³⁶ In turn, several studies documented the association between cesarean-section delivery and early weaning.^{51–53} This apparent discrepancy is not surprising, since it appears reasonable that cesarean sections negatively interfere with BF at the beginning of the process and not with its maintenance for a prolonged period of time.

Among the factors classified as proximal, the absence of maternal exposure to smoking was the individual variable with the second highest number of evaluations (11)^{22,30,32–34,37,42} and associations (six).^{30,32,33,37,42} Such association may be due to the negative interference of nicotine in breast milk production,⁵⁴ as well as the profile of smoking women, less favorable to the maintenance of BF for a longer period of time.³⁷

Three^{21,41,43} of 14 evaluations^{21,27,29,32,34–36,38,39,41–43} that assessed maternal work showed an association between this variable and duration of breastfeeding. Studies carried out in the United States²¹ and Iran⁴¹ found that mothers working outside the home were less likely to maintain breastfeeding

Table 1 Main characteristics of the selected studies for a systematic review of factors associated with maintenance of breastfeeding for ≥ 12 months in descending order of year of publication.

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Lattera A, 2014, Haiti ³⁹	Cross-sectional	Mothers aged ≥ 18 years and children aged ≤ 2 years from four Haitian departments/administrative divisions/310	Yes	BF 20–24 months	None	Area of residence (urban or rural) Region of residence Maternal age Parity Maternal level of schooling Annual family income Place of last childbirth Birth attended by health professional Maternal work Maternal workload outside the home Age of the youngest child	19

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Yalçın SS, 2014, Turkey ⁴²	Population-based Cross-sectional	Children 12–35 months of age living with their mothers/1666	Yes	BF \geq 12 months	Maternal age 30–34 years at the child's birth (aOR = 1.94; 95%CI 1.13–3.32) when compared to mothers <19 years Higher order of birth (\geq 5th) of the child associated with a longer interval between deliveries (\geq 24 months) (aOR = 2.20, 95% CI: 1.30–3.72) Wedding with religious ceremony (aOR = 2.54, 95% CI: 1.06–6.07) Passive maternal exposure to tobacco (aOR = 0.73, 95% CI: 0.56–0.95) when compared to non-smoking mothers Mother who smoked (aOR = 0.61, 95% CI: 0.45–0.83) when compared to non-smoking mothers Overweight mother (BMI 25–29.9 kg/m ²) (aOR = 1.31, 95% CI: 1.02–1.68) Not using any contraceptive method (aOR = 0.52, 95% CI: 0.37–0.71) when compared to traditional methods Using modern non-hormonal contraceptive methods (aOR = 0.59, 95% CI: 0.45–0.77) when compared to traditional methods Using hormonal contraceptives (aOR = 0.47, 95% CI: 0.30–0.75) when compared to traditional methods Bottle-fed child (aOR = 0.36, 95% CI: 0.29–0.45) Exclusively breastfed infant in the first 3 days of life (aOR = 1.45, 95% CI: 1.16–1.82)	Place of residence Region of residence Birth order Birth interval Family with 6 or more members Maternal education Having a dowry at the wedding Family constitution Paternal age Paternal education Family income Having health insurance Number of prenatal visits Type of birth Place of birth Beginning of breastfeeding within the first hour of life Weight at birth Child's gender Maternal work Age of child (12–23 months versus 24–36 months) Weight/age of child Height/age of child Weight/height of the child BMI/age of child	20

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Hure AJ, 2013, Australia ⁴⁰	Population-based cohort	Mothers aged 30–36 years/9773	No	BF ≥ 12 months and ≥24 months	<p>Outcome ≥ 12 months: Older maternal age at delivery (<i>p</i> < 0.01) Higher order of birth of the child (<i>p</i> < 0.01) Higher maternal level of schooling (<i>p</i> < 0.01) Mother is married (<i>p</i> < 0.01) Full-term child and/or with adequate birth weight (<i>p</i> < 0.01) Lower level of maternal concern related to money (<i>p</i> < 0.01)</p> <p>Outcome ≥ 24 months: Older maternal age at delivery (<i>p</i> < 0.01) Higher order of birth of the child (<i>p</i> < 0.01) Higher maternal level of schooling (<i>p</i> < 0.01) Mother is single (<i>p</i> < 0.01)</p>	Place of residence	23
dos S Neto ET, 2013, Brazil ²⁹	Cohort	Children and mothers residing in two areas covered by the Family Health Strategy of the Unified Health System in the municipality of Vitória, ES/67	Yes	BF ≥ 12 months	<p>Older maternal age (>35 years; <i>p</i> = 0.002) Did not start pacifier suction in the 1st month of life (<i>p</i> = 0.005) Did not start artificial feeding in the 1st month of life (<i>p</i> = 0.01)</p>	<p>Number of children born alive Number of siblings from the same mother Number of children under 5 in the house Interbirth interval Number of individuals living in the same house Maternal level of schooling Maternal marital status Marital stability Paternal occupation Monthly family income House finishing Number of rooms in the house Maternal occupation Child started using pacifier before the third month of life Child started using pacifier before the sixth month of life Child was bottle-fed Child received formula before the sixth month of life</p>	17

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Al-Kohji S, 2012, Qatar ³⁸	Cross-sectional	Arab mothers and children under 24 months attending a Primary Health Care Center/770	No	BF \geq 12 months	None	Nationality Maternal age Parity Maternal level of schooling Monthly family income Receiving guidance about infant feeding during prenatal care Mother received formula ads during prenatal care Type of birth Place of delivery (type of hospital) Rooming-in Easy access to get support for feeding problems after childbirth Mother received formula ads before discharge Meaning of exclusive breastfeeding for mothers Maternal opinion on the appropriate position for breastfeeding Child's gender Maternal occupation Planned feeding method for the child Breastfeeding on demand	20
Bertino E, 2012, Italy ³⁴	Cohort	Children born in a hospital in Turin, and their mothers/562	Yes	BF \geq 12 months	High score of the maternal attitude toward breastfeeding (mothers favorable to breastfeeding compared with those favorable to using formula to feed their children; <i>p</i> =0.003)	Maternal nationality Parity Maternal level of schooling Type of birth Rooming-in practice Maternal employment situation Maternal smoking before pregnancy Maternal smoking during pregnancy Paternal smoking during pregnancy Maternal BMI Child uses pacifier	16

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Langellier BA, 2012, United States ²¹	Cross-sectional	Mothers and children participating in Special Supplemental Nutrition Program for Woman, Infants and Children (WIC)/4725	Yes	BF \geq 12 or \geq 24 months	<p>Outcome \geq 12 months: Foreign mother (aOR = 1.86, 95% CI: 1.41–2.43) Interview carried out in Spanish (aOR = 1.50, 95% CI: 1.14–1.47) Mother intends to breastfeed (aOR = 2.80, 95% CI: 2.05–3.8) Non-exclusive breastfeeding at the maternity hospital (aOR = 3.52, 95% CI: 2.75–4.51) when compared with non-breastfeeding Exclusive breastfeeding in the maternity hospital (aOR = 8.04, 95% CI: 6.17–10.49) when compared to non-breastfeeding Mother resides with the child's father (aOR = 1.31; 95% CI: 1.06–1.61) Maternal return to work up to three months postpartum (aOR = 0.63, 95% CI: 0.45–0.8)</p> <p>Outcome \geq 24 months: Interview carried out in Spanish (aOR = 1.89, 95% CI: 1.10–3.25) Mother intends to breastfeed (aOR = 2.07, 95% CI: 1.15–3.75) Non-exclusive breastfeeding at the maternity hospital (aOR = 2.72, 95% CI: 1.64–4.50) when compared to non-breastfeeding Exclusive breastfeeding at the maternity hospital (aOR = 5.72, 95% CI: 3.44–9.52) when compared to non-breastfeeding Maternal return to work up to three months postpartum (aOR = 0.49, 95% CI: 0.28–0.88)</p>	Maternal age Maternal level of schooling Maternal ethnicity Child receiving formula at the hospital Participation in the WIC Child's gender Age of child	17

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Martins EJ, 2012, Brazil ²²	Cohort	Children born in a hospital in Porto Alegre, RS and their mothers/151	Yes	BF \geq 24 months	Mother living with the child's father (aOR = 0.61, 95% CI: 0.37–0.99) Mother staying at home with the child in the first 6 months of life (aOR = 2.13, 95% CI: 1.12–4.05) Child not using a pacifier (aOR = 2.45, 95% CI: 1.58–3.81) Delay the introduction of water and/or teas to the child's diet (aOR = 1.005, 95% CI: 1.001–1.009) Delay the introduction of other types of milk to the child's diet (aOR = 1.001, 95% CI: 1.001–1.002)	Maternal age Parity Maternal level of schooling Mother's skin color/ethnicity Time of breastfeeding of previous children Receive guidance about BF in prenatal care Number of prenatal visits Type of birth Child received formula at the maternity hospital Child's gender Mother lives with her mother-in-law. Maternal smoking during pregnancy Age at which child started receiving solid/semi-solid foods	16
Senarath U, 2012, Sri Lanka ³⁶	Cross-sectional	Mothers aged 15–49 with children up to 24 months of age/2735	Yes	BF \geq 12 months	Living in rural areas compared to tea-producing properties (<i>p</i> < 0.01) Not residing in the Central Province compared to the West Province (<i>p</i> = 0.01) Vaginal delivery (<i>p</i> < 0.01) Receiving at least one home visit by postpartum health workers (<i>p</i> = 0.01)	Maternal age Child's birth order Birth interval between the two last births Maternal level of schooling Maternal marital status Paternal level of schooling Family income Number of prenatal visits in clinics Receiving home visits by health workers during pregnancy Place of delivery Birth weight Child's gender Maternal occupation Maternal BMI Maternal participation in family decisions	16

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Demétrio F, 2012, Brazil ²⁷	Cohort	Children born in public maternity hospitals in the municipalities of Laje and Mutuípe, BA/531	Yes	BF \geq 24 months	Residing in the rural area (<i>p</i> < 0.05) Mother received prenatal care (<i>p</i> < 0.05)	Maternal age Maternal level of schooling Skin color Housing status index Type of birth Birth weight Child's gender Gestation time Maternal work outside the home after childbirth Maximum height of the mother Pre-gestational maternal anthropometric status Post-gestational maternal anthropometric status	17
Carletti C, 2011, Italy ³⁵	Cohort	Children born in a hospital in Trieste and their mothers/93	Yes	BF \geq 12 months	Maternal age 30–34 years compared with mothers aged >34 years (<i>p</i> = 0.026)	Maternal nationality Parity Maternal level of schooling Maternal marital status Duration of previous breastfeeding Type of delivery Child admitted at the hospital after birth Child's birth weight Child's birth length Gestational age Child had jaundice at birth Child had respiratory difficulty at birth Maternal occupation Maternal return to work	16

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/p-value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Kristiansen AL, 2010, Norway ³²	Population-based cohort	All children born in Norway from April 17 to May 8, 2006/1490	Yes	BF \geq 12 months	Older maternal age (25–34 years old: aOR = 1.99, 95% CI: 1.13–3.50/ \geq 35 years old: aOR = 2.40, 95% CI: 1.30–4.44) compared with mothers \leq 24 years Mother of a second child (aOR = 0.75, 95% CI: 0.57–0.97) Higher maternal schooling (higher education \leq 4 years: aOR = 2.33; 95% CI: 1.17–4.65/higher education >4 years: aOR = 2.81; 95%CI: 1.39–5.66) when compared to mothers with primary and secondary education Lower child's birth weight (aOR = 0.39, 95% CI: 0.21–0.72) Mother smoked during pregnancy (aOR = 0.49, 95% CI: 0.34–0.71) Child has a caregiver other than the parents (aOR = 0.64, 95% CI: 0.50–0.82)	Geographical region of residence Maternal marital status Paternal level of schooling Family history of asthma/allergy Maternal occupation at the child's birth Maternal occupation at 12 months of the child's life Mother smoking at 6 months of the child's life	24
Wallby T, 2009, Sweden ³⁷	Cross-sectional	Children born between 1997 and 2001 living in the city of Uppsala/12.197	Yes	BF \geq 12 months	Non-Swedish mother (from Eastern Europe and Balkan countries: aHR = 1.63; 95% CI: 1.29–2.06/from Africa: aHR = 2.14; 95% CI: 1.73–2.64/from the Middle East: aHR = 1.73, 95% CI: 1.49–2.01/from South and East Asia: aHR = 1.72, 95% CI: 1.38–2.15) Lower family income (Quartile 1: aHR = 1.24, 95% CI: 1.10–1.39) Smoking mother (aHR = 0.70, 95% CI: 0.61–0.80)	Type of delivery	20

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Senarath U, 2007, East Timor ⁴³	Cross-sectional	Children aged 0–23 months living in urban and rural areas of the study country, selected from a population sample of a study carried out in 2003/2162	Yes, but only for the outcome BF \geq 12	BF \geq 12 months or \geq 24 months	<p>Outcome \geq 12 months: Home delivery ($p=0.01$) Mothers who worked in the 12 months prior to the interview ($p=0.01$) Younger age of the child ($p=0.01$)</p> <p>Outcome \geq 24 months: Not residing in the eastern rural area ($p=0.001$) Living in the mountains ($p=0.001$) Mother aged <35 years old ($p < 0.01$) Number of children <4 ($p < 0.05$) Being illiterate or having attended only elementary school ($p < 0.01$) Not belonging to the wealthiest social stratum ($p < 0.05$)</p>	Child's gender	20
Singh GK, 2007, United States ³⁰	Population-based cross-sectional	Children younger than 6 years/33,121	Yes	BF \geq 12 months	<p>Residing in a metropolitan region ($p=0.05$) Children born in the United States, to immigrant parents, compared to US children born to American parents ($p=0.05$) White, non-Hispanic mothers compared with non-Hispanic Black mothers ($p=0.05$) Family composition: not being the child of a single mother and not being the child of adoptive parents when compared to the children of biological parents ($p=0.05$) Parents' level of schooling \geq 13 years ($p=0.05$) Female child ($p=0.05$) High level of family or social support ($p=0.05$) Not having a smoker at home ($p=0.05$)</p>	<p>Safety in the home district Child's birth order Level of family poverty Maternal physical health status Maternal emotional health status Maternal physical activity</p>	25

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Carrascoza KC, 2005, Brazil ²⁸	Cross-sectional	Children from a dental care center for special patients and their mothers/80	No	BF \geq 12 months	Older maternal age ($p=0.0331$) Higher number of children ($p=0.0175$) Mother is married ($p=0.0078$) Lower socioeconomic class ($p < 0.05$) Mother had previous experience with breastfeeding ($p=0.0058$)	Mother received guidance on breastfeeding during pregnancy Mother's intention to breastfeed during pregnancy Type of delivery	13
Hajian-Tilaki KO, 2005, Iran ⁴¹	Cross-sectional	Mothers of children aged 12–24 months/600	Yes	BF \geq 24 months	Living in rural areas ($p < 0.05$) Greater parity ($p < 0.05$) Higher maternal schooling ($p < 0.05$) Mother did not work outside the home ($p < 0.05$) Lower maternal stress level ($p < 0.05$)	Maternal age Child's gender	17
Li R, 2005, United States ³¹	Cross-sectional	Children aged 19–35 months who participated in the National Immunization Survey of 2002/3507	No	BF \geq 12 months	Residing in the Pacific region ($p < 0.05$) Older maternal age ($p < 0.05$) Higher maternal schooling ($p < 0.05$) Mother is married ($p < 0.05$) White non-Hispanic mother ($p < 0.05$) Mother/child not participating in the WIC program ($p < 0.05$) for mothers and children in the first year of life Child did not have a nanny at 6 months ($p < 0.05$)	Child's birth order Poverty level Child's Gender	21

Table 1 (Continued)

First author, year of publication, study country	Design	Population/sample (No. of assessed mother-baby pairs)	Multivariate analysis	Outcome	Factors associated to outcome (association measure/95% CI/ <i>p</i> -value) ^a	Factors not associated with the outcome	Evidence quality score ^b
Lande B, 2004, Norway ³³	Cross-sectional	12-month-old children born to Norwegian mothers or mothers from another Scandinavian country/1932	Yes	BF at 12 months	Residing in a place with a higher degree of urbanization (aOR = 1.34, 95% CI: 1.04–1.72) Older maternal age (25–34 years old: aOR = 1.45, 95% CI: 1.03–2.05/ \geq 35 years old: aOR = 2.36, 95% CI: 1.58–3.51) when compared with mothers aged <25 years Higher maternal level of schooling (\geq 13 years) (aOR = 2.48, 95% CI: 1.63–3.77) Presence of allergy/asthma among family members (aOR = 1.40, 95% CI: 1.14–1.71) Mother smoking at six months of child's life (aOR = 0.57, 95% CI: 0.44–0.74) Child does not have a baby-sitter (aOR = 1.43, 95% CI: 1.15–1.77)	Child's gender	24

BF, maternal breastfeeding; OR, odds ratio; aOR, adjusted odds ratio; 95% CI, 95% confidence interval; aHR, adjusted hazard ratio; *p*, *p* value; BMI, body mass index.

^a Variables with significant values of OR or HR greater than 1.00 indicate a greater chance of breastfeeding maintenance, and OR or HR < 1.00 indicate a lower chance.

^b Adapted from Parry et al.²⁴ and Taylor et al.²⁵

for 12 months or more. A study carried out in East Timor⁴³ showed the opposite, that is, working mothers were more likely to breastfeed their children aged 12 months. This is an association that deserves to be investigated, since maternal work outside the home can be expected to negatively interfere in breastfeeding maintenance due to the supposed physical separation between mother and child. It is possible that maternal work is more informal in East Timor, allowing women to take their children to work, thus favoring the maintenance of breastfeeding.

Two^{22,29} of the three studies that explored the association between pacifier use and maintenance of breastfeeding described longer BF duration among children who did not use this object. It has been well documented that pacifier use is strongly associated with early weaning and interruption of exclusive breastfeeding.^{26,55} This review showed that pacifier use also negatively interferes with BF maintenance for at least 12 months.

Two studies investigated the interference of the mother's cohabitation with the child's father on the duration of BF.^{21,22} It has been previously reported that cohabitation with the child's father is a protective factor against early weaning.²⁰ However, in the study conducted in Brazil, the mother's cohabitation with her partner/child's father was a risk factor for the maintenance of breastfeeding for 2 years or more. This discrepancy raises the hypothesis that fathers initially encourage breastfeeding, but that, after some time, due to lack of knowledge about the recommendation of breastfeeding duration for 2 years or more or for another reason, they discourage the practice.²² It has been reported that some fathers feel that breastfeeding is harmful to breasts; interferes with the relationship between the father and the child; interferes with the couple's relationship, including sexual intercourse; and causes feelings of exclusion, abandonment, and jealousy, among others.⁵⁶ Additionally, cohabitation with the husband/partner may result in more workload for the woman, especially if he does not share household chores with her.

Among the factors classified as contextual, the association between region of residence and breastfeeding for 12 months or more was investigated in 14 studies,^{27,30–33,36,39–43} and nine associations were found.^{27,30,31,33,36,41,43} In three studies,^{30,33,43} two of them carried out in high-income countries,^{30,43} living in an urban/metropolitan area was a protection factor for BF maintenance for 12 months or more. However, in three other studies carried out in Brazil,²⁷ Iran,⁴¹ and Sri Lanka,³⁶ middle-income countries, living in urban areas was characterized as a risk factor for long-term BF. This discrepancy between the results can be explained by cultural differences. The fact that three studies^{21,30,37} observed that being an immigrant favored the increased duration of breastfeeding corroborates this hypothesis.

The present review has the merit of being a comprehensive study, including studies from different countries with different methodological approaches, in addition to having organized the factors described in the literature as associated with longer BF duration in hierarchical levels, facilitating the understanding of the characteristics involved in the maintenance of breastfeeding for at least 12 months.

Conversely, the geographical heterogeneity of the studies included in the review may be a limitation to the applicability of the present results, as the risk factors and protection

factors may vary according to the individual and environmental characteristics of the different population groups. The methodological limitations of some studies, including not using multivariate models for data analysis,^{28,31,38,40} may also have impaired some results. Moreover, several factors associated with BF maintenance were tested in only one study.

In conclusion, the maintenance of breastfeeding for 12 months or more is strongly influenced by contextual factors and some maternal sociodemographic characteristics. Factors related to prenatal care, delivery, and the postpartum period also influence the assessed outcome, but to a lesser degree. It is evident that the determinants of breastfeeding maintenance for 12 months or longer may differ between populations, as well as the magnitude of associations. Therefore, it is necessary to know the several factors associated with continued breastfeeding in different socio-cultural contexts, so that interventions can be performed in the modifiable variables.

Nonetheless, some factors were associated with maintenance of breastfeeding in almost all the assessed places, such as the mother's older age, greater number of children, higher level of education, and non use of pacifiers by the child. Thus, the hierarchical theoretical model constructed with the results of this review, which describes the previously explored factors and those associated with BF maintenance, may guide future studies aimed at exploring the facilitators and obstacles to continued breastfeeding in different contexts.

Conflicts of interest

The authors declare no conflicts of interest.

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