Determinants of early breastfeeding initiation and exclusive breastfeeding in Colombia

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Abstract

Objective: To identify modifiable risk factors associated with early initiation of breastfeeding (EIBF) and exclusive breastfeeding (EBF) in Colombia.

Design: Cross-sectional study from the 2010 Colombia nationally representative Demographic Health Survey (DHS). Studied exposures were categorized into five hierarchical blocks of increasing proximity to the outcomes: household, maternal, health systems, child, and early feeding characteristics. The two outcomes examined were delayed breastfeeding initiation among infants <24 months and interruption of EBF among infants <6 months. Prevalence ratios were computed using Poisson regression analysis with robust error variance, adjusted for sampling weights, following a hierarchical modelling approach.

Setting: Nationally representative cross-sectional survey from Colombia.

Participants: The EIBF analytical sample included 6592 and the EBF sample 1512 women with young children.

Results: EIBF prevalence was 65·6 % in children under 24 months and EBF was 43 % in infants under 6 months. Modifiable risk factors associated with delayed breastfeeding initiation were: C-section (PR = 2·08, CI 95 % = 1·92, 2·25), maternal overweight/obesity (PR = 1·09, CI 95 % = 1·01, 1·17), lack of skilled attendant at birth (PR = 1·09, CI 95 % = 1·01, 1·18). Modifiable risk factors for EBF interruption were C-section (PR = 1·12, CI 95 % = 1·02, 1·23) and prelacteal feeding (PR = 1·51, CI 95 % = 1·37, 1·68). Non-pregnancy intention was a protective factor for EBF interruption (PR = 0·82, CI 95 % = 0·72, 0·93).

Conclusions: C-section, lack of skilled attendant at birth, prelacteal feeding, maternal nutritional status, and pregnancy intention were modifiable factors associated with suboptimal breastfeeding practices in Colombia.

Investing in breastfeeding protection, promotion, and support programmes is important to promote optimal child health and child development throughout the lifespan, including maternal health, and foster economic growth[1,2].

Since the early 1990s, Colombia has identified breastfeeding and child welfare programmes as key strategies to reduce infant mortality and morbidity as well as to improve child developmental potential[3]. The enabling of a breastfeeding friendly environment began in 1992 with the development of the Breastfeeding Support National Plan and three central policies that endorsed the WHO International Code of Marketing of Breastmilk Substitutes (WHO's Code), the Baby Friendly Hospital Initiative (BFHI) and the formation of a National Breastfeeding Committee; however, oversight and regulatory responsibility for these policies were not granted to a

specified entity[4,5]. Since then, the National Breastfeeding Committee has disbanded and BFHI implementation remains limited. Of the 51 430 private and public health institutions licensed to provide maternal and child care in 2009, only 330 (0·64 %) were accredited as BFHI[3,6,7]. This is not surprising given that that the country lacks a centralized coordinating entity empowered to recommend and implement needed breastfeeding policies and programmes[8–10].

Primary indicators for assessing in-country breastfeeding practices include early initiation of breastfeeding (EIBF) and exclusive breastfeeding (EBF). EIBF has been shown to be associated with positive infant morbidity and mortality outcomes, associated with colostrum feeding and overall duration of breastfeeding[1,6]. In Colombia, breastfeeding practices have not improved over the years.

Indeed, early breastfeeding initiation rates decreased from 61 % in 2000 to 48·9 % in 2005 and then partially rebounded to 57 % in 2010. Furthermore, EBF decreased from 47 % in 2005 to 43 % in 2010[11–13]. To our knowledge, the reasons for this trend have not been studied. In our study we hypothesize that this may be influenced by healthcare system-adjacent modifiable risk factors[3,14] combined with population level factors such as household and maternal characteristics[7,8]. There is a dearth of studies investigating the determinants of EIBF and EBF in Colombia. Thus, it is important to identify relevant modifiable risk factors for improving breastfeeding that can be integrated into and delivered through a package of interventions to improve optimal breastfeeding practices more rapidly in Colombia[15]. Examples of modifiable risk factors to improve breastfeeding practices through healthcare system interventions are maternal nutrition status, pregnancy intention, type and place of delivery, prenatal and prelacteal feedings. Hence, the primary aim of this study is to identify modifiable risk factors for improving EIBF and EBF among infants under 24 months and 6 months of age, respectively.

Methods

Study setting

The study used data from the Colombian Demographic and Health Survey (DHS) conducted from November 2009 through November 2010. Colombia is an upper middle-income country with the fourth highest rate of maternal mortality in South America (92 per 100 000 live births) and relatively high rates of infant mortality (15 per 1000 live births)[16]. Data on maternal and child health and nutrition outcomes were collected in the DHS for children born in the 36 months preceding data collection, and then our analyses subsets were restricted to the relevant age ranges (i.e. born during the previous 24 months for EIBF and during the previous 6 months for EBF analyses). The survey's sampling framework was based on a stratified, multiple-stage cluster sampling design, drawing from national level census data, and regional/household level registries across geographical areas[12].

Outcome variables

This study has two primary outcomes operationalized based on the following definitions from the WHO Infant and Young Child Feeding (IYCF) guidelines[17].

Early initiation of breastfeeding was defined as the 'proportion of children born in the last 24 months who were put to breast within 1 h of birth'[18]. The outcome variable was delayed breastfeeding initiation, i.e. not being breastfed within the 1 h of birth.

Exclusive breastfeeding was defined as the 'proportion of infants 0–5 months of age who were fed exclusively with breastmilk' and was based on maternal current status recall in reference to the previous day[18]. EBF was categorized based on nineteen questions querying the mother if her child consumed 29 specific food or liquid items other than breastmilk in the previous day. Infants were considered to be exclusively breastfed if breastmilk was the only source of nutrition and hydration, without any additional solid or liquid supplement including water[18]. The outcome variable 'EBF interruption' was defined as not being exclusively breastfed in the last 24 h before the interview.

Independent variables

The explanatory variables were grouped into four (EIBF model) and five (EBF model) distal to proximal blocks. Both models included household, maternal, health systems, and child characteristics, and the EBF analysis also included the early feeding environment (see conceptual model in Fig. 1). Breastfeeding initiation and exclusivity are influenced by a range of interrelated and temporally distinct factors at different levels of proximity. Conceptual hierarchical frameworks are an appropriate technique to evaluate the individual determinants of health outcomes as outlined by Victora et al.[19]. Specifically, hierarchical models have been recommended and applied to study breastfeeding outcomes globally[20–22].

The DHS composite wealth index was used to describe household wealth and is based on a standard list of household assets classified into five wealth quintiles (income quintile variable). The number of adults in the household was estimated by subtracting the number of children living in the residence from the total number of usual household residents plus the number of visitors who slept in the house the previous night. A skilled attendant at birth was affirmed if delivery was performed by a doctor or nurse (yes); and not performed by a skilled attendant if it involved others, including auxiliary nurse and traditional birth attendant (no). DHS anthropometric measurements (height and weight) were assessed directly at the time of the survey using a measuring board and properly calibrated scale. Maternal overweight/obesity was estimated using the standard BMI cut-off points; i.e. ≥25 for overweight and ≥30 for obesity. Newborns were considered to have received prenatal feeds when any one of nineteen questions querying regarding any liquids given to the infant in the first 3 d post birth, including infant formula and water with or without sugar, were affirmed. Prelacteal feeding was considered to have not occurred only when all nineteen items were not affirmed[23]. The number of prenatal visits were considered to be adequate if they were at least four based on Colombia's guidelines[24]. Prenatal visits numbering ten or more was considered potentially indicative of a higher risk pregnancy[25].

Analytical sample

In the EIBF analysis the initial sample included 6694 children under 24 months of age born to women aged
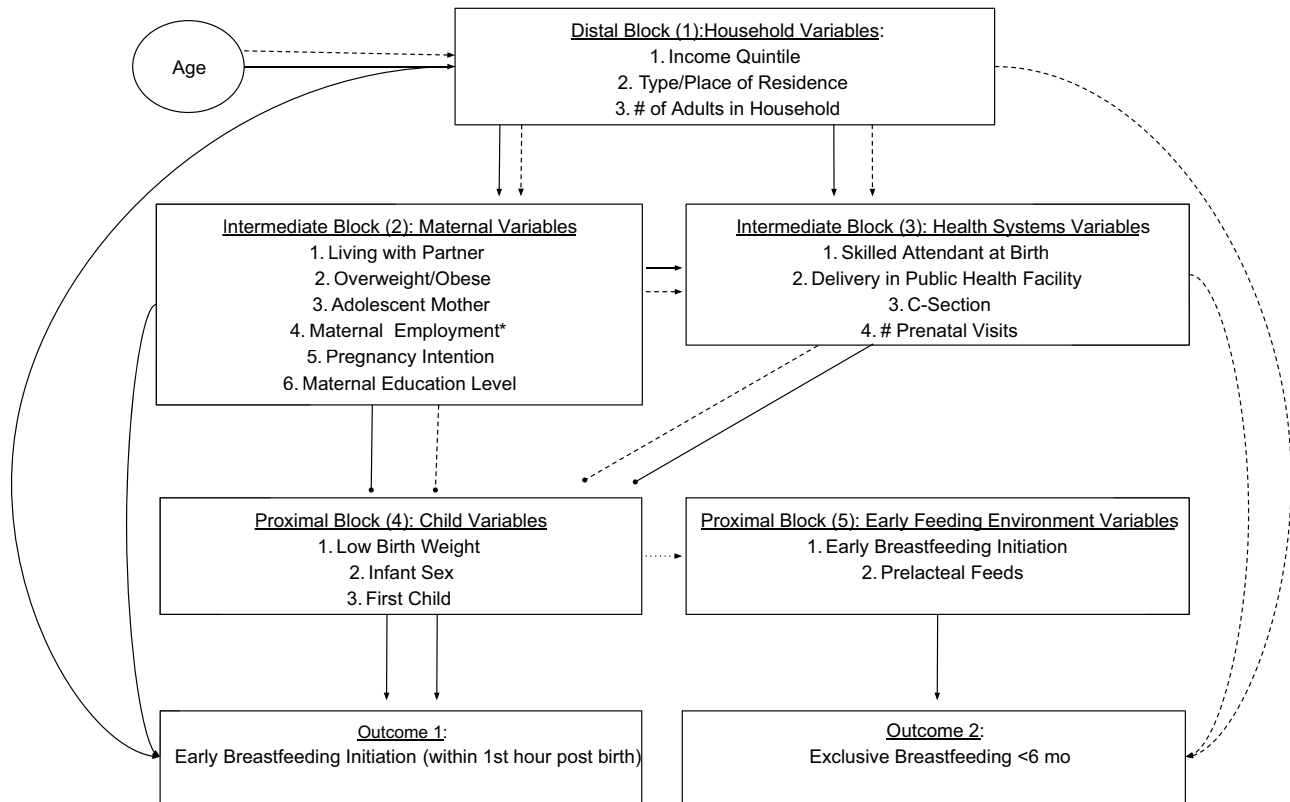
Fig. 1 Conceptual model: description of hierarchical interrelationship between explanatory and outcome variables. *Maternal Employment variable only considered in outcome 2, exclusive breastfeeding model
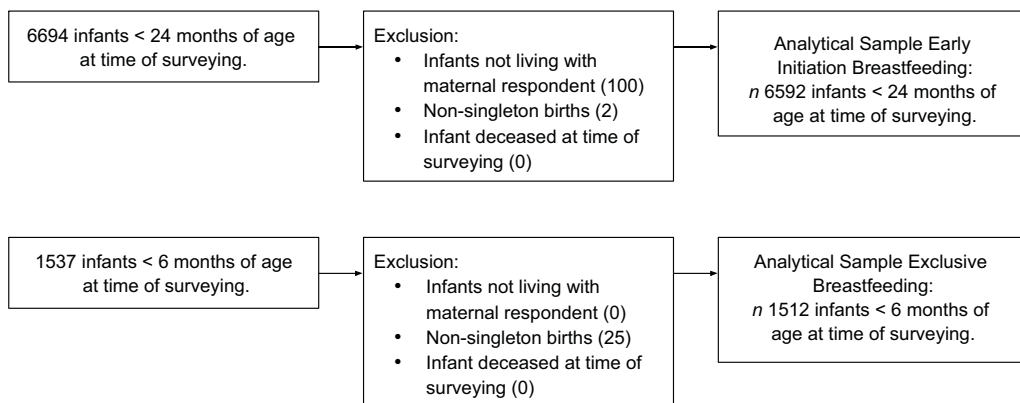

Fig. 2 Flow chart depicting analytical sample selection criteria.

13–49 years old. After excluding multiple births, children who did not live in the maternal household, and non-living children, the analytical sample included 6592 children born within the 24 months preceding data collection. In the EBF analysis, the initial sample included 1537 infants under 6 months of age. After excluding multiple births, children who did not live in the maternal household, and non-living children the analytical sample included 1512 infants under 6 months of age. Figure 2 presents detailed information regarding analytical sample selection.

Data analyses

Statistical analyses were performed using STATA version 15.1 (Stata Corp.). Separate modified Poisson logistic regressions with robust error variance weighted by the DHS weight statistic (iweight = wgt) for nationally representative proportions were conducted to identify explanatory factors for each outcome. We used the statistical command meglm with (iweight = wgt) option as it is the preferred command to fit mixed-effects generalized linear models to hierarchical datasets with normally distributed effects, such as described in our DHS dataset[26,27]. The study was

Table 1 Descriptive characteristics of analytical sample (n 13 567), and bivariate analyses of delayed breastfeeding initiation among children aged under 24 months and unadjusted prevalence ratios (Demographic Health Surveys, Colombia 2010)

		Analytical sample		Delayed breastfeeding initiation		
		%*	n†	%‡	Non-adjusted PR	95 % CI
Early breastfeeding initiation (within 1 h)	Yes	65·6	4305	–	–	–
	No	34·4	2056	–	–	–
Distal block (1): household variables						
Place residence	Urban	72·3	4195	35·3	1·00	
	Rural	27·7	2397	32·1	0·86	0·80, 0·94
	Poorest	25·2	2448	32·2	1·00	
	Poorer	23·6	1765	35	1·15	1·04, 1·27
Income quintile	Middle	22·2	1209	36·1	1·20	1·08, 1·34
	Richer	17·3	740	34·5	1·22	1·08, 1·38
	Richest	11·6	430	34·9	1·28	1·11, 1·48
	1–2	28·3	1797	33·2	1·00	
Number adults in household	3+	71·8	4795	34·9	0·99	0·91, 1·07
Intermediate block (2): maternal variables						
Living with partner currently	Yes	73·1	4931	35·2	1·00	
	No	26·9	1661	32·3	0·91	0·84, 0·99
Education level	Higher education	75·5	4587	36·1	1·00	
	Lower education	24·5	2005	29·2	0·77	0·71, 0·84
Maternal overweight/obese	No	59·1	3547	32·7	1·00	
	Yes	40·9	2515	34·4	1·09	1·01, 1·17
Adolescent mother (<19)	No	81·9	5357	34·7	1·00	
	Yes	18·1	1235	33·0	0·97	0·88, 1·06
Pregnancy intention	Then	47·6	3000	35·1	1·00	
	Later	30·2	1959	35·8	1·00	0·92, 1·08
	No More	22·2	1633	31·2	0·85	0·78, 0·94
Intermediate block (3): health systems variables						
Skilled attendant at birth	Yes	41·7	2600	32·3	1·00	
	No	58·3	3992	36	1·03	0·96, 1·11
Delivery in public health facility	Yes	95·2	5860	34·7	1·00	
	No	4·8	631	29·4	0·68	0·58, 0·80
C-Section	No	62·9	4399	24·6	1·00	
	Yes	37·1	2193	51·4	2·10	1·96, 2·25
Number prenatal visits	4–9	80·7	4928	34·0	1·00	
	0–3	11·3	1126	34·0	0·82	0·74, 0·91
	10+	8·0	371	40·5	1·25	1·10, 1·42
Proximal block (4): child variables						
Low birth weight	No	91·8	4705	33·3	1·00	
	Yes	8·2	353	48·7	1·48	1·31, 1·68
Infant sex	Male	52·0	3411	36·0	1·00	
	Female	48·0	3181	32·7	0·93	0·86, 1·00
First child	Not 1st	58·0	4022	31·5	1·00	
	1st	42·0	2570	38·5	1·29	1·20, 1·38

*Percentages are nationally representative with DHS weighted variable.
†This analysis included alive, singleton birth, infants under 24 months of age at time of survey.
‡Percentages are nationally representative with DHS weighted variable.

exempt from IRB review as no primary data were available from a deidentified data asset in the public domain.

Initially, descriptive statistics expressed as counts and frequencies were tabulated for all explanatory variables (Step 1). Next, unadjusted bivariate analyses examined the associations between the independent variable and each of the outcomes (Step 2). Variables associated with a $P < 0.20$ were then entered into multivariable analyses examining each block of the hierarchical conceptual model (Step 3). Finally, variables associated with a $P < 0.20$ in the within block analyses were entered as control variables in Step 4, i.e. multivariate hierarchical modelling. Blocks of variables were entered as following in the hierarchical modelling: (i) 'Household Variables'; (ii) 'Maternal Variables'; (iii) 'Health Systems Variables';

(iv) 'Child Variables'; (v) 'Early Feeding Environment Variables' (EBF model only) (Fig. 1). The associations between independent variables and outcomes were determined to be significant at the 5 % P-level. For both outcomes, within the healthcare system block we tested the interaction between C-section and number of prenatal visits (block 3) to find out if the simultaneous presence of both increased the risk of poor breastfeeding outcomes in a multiplicative ($v.$ additive) way.

Results

Early breastfeeding initiation

Table 1 shows the analytical sample characteristics and the prevalence of delayed breastfeeding initiation across

Table 2 Final multiple hierarchical model to identify the factors associated with delayed breastfeeding initiation in children aged under 24 months (*n* 6592) (Colombia, DHS 2010)

Variable	PR$_{adjusted}$	95 % CI	*P*
Model 1†			
Income quintile			
Poorest	1·00	–	–
Poorer	1·15	1·04, 1·27	0·005*
Middle	1·20	1·08, 1·34	0·001**
Richer	1·22	1·08, 1·38	0·001**
Richest	1·28	1·11, 1·48	0·001**
Model 2‡			
Living with partner currently			
Yes	1·00	–	–
No	0·91	0·83, 1·00	0·050*
Maternal education			
Higher education	1·00	–	–
Lower education	0·81	0·74, 0·89	<0·001**
Maternal overweight/obese			
No	1·00	–	–
Yes	1·09	1·01, 1·17	0·031*
Pregnancy intention			
Then	1·00	–	–
Later	1·03	0·94, 1·12	0·562
No More	0·92	0·83, 1·02	0·115
Model 3§			
Skilled attendant at birth			
Yes	1·00	–	–
No	1·09	1·01, 1·18	0·025*
C-Section			
No	1·00	–	–
Yes	2·08	1·92, 2·25	<0·001**
Number prenatal visits			
4–9	1·00	–	–
0–3	0·98	0·88, 1·11	0·789
10+	1·15	1·00, 1·32	0·056
Model 4‖			
Low birth weight			
No	1·00	–	–
Yes	1·37	1·20, 1·56	<0·001**
Infant sex			
Male	1·00	–	–
Female	0·97	0·89, 1·06	0·498
First child			
Not 1st	1·00	–	–
1st	1·23	1·12, 1·35	<0·001**

*Significant at *P* < 0·05 **Significant at *P* < 0·001– reference category; no prevalence ratios or CI calculated.
†Model 1: Income quintile and infant age.
‡Model 2: Model 1 + mother living with partner, maternal education, maternal overweight/obese and pregnancy intention.
§Model 3: Model 2 + skilled attendant at birth, C-section and number of prenatal visits.
‖Model 4: Model 3 + low infant birth weight, infant sex, and maternal primiparity.

outcome variables. The prevalence of EIBF within the first hour after birth was 66 %. The majority of respondents delivered in public health facilities (95·2 %) had at least a primary-level education (75·5 %), and 18·1 % were adolescent mothers. The prevalence of C-section was 37·1 % and 8·2 % of infants had low birth weight. Proportionally more mothers who delivered via C-section (51·4 %) did not practice EIBF relative to those who had a vaginal birth (24·6 %). There was a statistically significant interaction between C-section and number of prenatal

visits, the risk of delayed breastfeeding initiation was higher among those who had a C-section and had fewer than four visits (OR = 1·44 CI 95 % = 1·20, 1·72) or had ten visits or more (OR = 1·50, CI 95 % = 1·27, 1·78) compared with those who had four to nine visits (data not shown).

Table 2 describes the results from the multivariate hierarchical modelling analysis by block. The modifiable risk factors associated with delayed breastfeeding initiation identified were: C-section delivery (PR = 2·08, CI 95 % = 1·92, 2·25), no skilled attendant at birth (PR = 1·09, CI 95 % = 1·01, 1·18), and maternal overweight/obesity (PR = 1·09, CI 95 % = 1·01, 1·17). Non-modifiable risk factors associated with delayed breastfeeding initiation identified were: maternal primiparity (PR = 1·23, CI 95 % = 1·12, 1·35), infant low birth weight (PR = 1·37, CI 95 % = 1·20, 1·56), and higher household income quintile (PR = 1·20, CI 95 % = 1·08, 1·34). Mother not living with partner (PR = 0·91, CI 95 % = 0·83, 1·00) and lower maternal education (PR = 0·81, CI 95 % = 0·74, 0·89) were protective factors for EIBF. Supplementary material provides detailed information regarding the hierarchical EIBF models.

Exclusive breastfeeding

Table 3 shows the analytical sample characteristics (*n* 1512) and the prevalence of non-EBF across variables. A total of 688 infants (43 %) were exclusively breastfed through the first 6 months after birth. The majority of respondents were delivered in public health facilities (95·2 %), had at least a primary-level education (77·3 %) and were non-adolescent mothers between 20 to 49 years of age (76·6 %). The prevalence of C-section was 36·5 % and 8·3 % of infants had low birth weight. Around 60 % had initiated breastfeeding within the first hour after birth and prelacteal feeds were used very frequent (62·4 %). There was a statistically significant interaction between C-section and number of prenatal visits, the risk of interrupting EBF was increased among those who had a C-section and had ten visits or more (OR = 1·24, CI 95 % = 1·03, 1·51) compared with those who had four to nine visits (data not shown).

Table 4 describes the results from the multivariate hierarchical modelling analysis by block. The independent modifiable risk factors identified for EBF interruption were: C-section delivery (PR = 1·12, CI 95 % = 1·02, 1·23) and prelacteal feeding (PR = 1·51, CI 95 % = 1·37, 1·68). Non-pregnancy intention was a protective factor against EBF interruption (PR = 0·82, CI 95 % = 0·72, 0·93). The non-modifiable risk factor associated with EBF interruption was higher household income quintile (PR = 1·23, CI 95 % = 1·08, 1·40). Supplementary material provides detailed information regarding the EBF hierarchical models.

Table 3 Descriptive characteristics of analytical sample (n 1512) and bivariate analyses of EBF interruption among children aged under 6 months and unadjusted prevalence ratios (Demographic Health Surveys, Colombia 2010)

		Analytical sample		Exclusive breastfeeding interruption		
		%*	n†	%‡	Non-adjusted PR	95 % CI
Exclusive breastfeeding <6 months	Yes	43·0	688	–	–	–
	No	57·0	824	–	–	–
Distal block (1): household variables						
Place residence	Urban	72·8	951	56	1·00	
	Rural	27·2	561	59·5	0·90	0·81, 1·00
Income quintile	Poorest	25·3	563	59	1·00	
	Poorer	23·0	416	57·1	1·21	1·07, 1·37
	Middle	23·5	281	59·3	1·20	1·04, 1·37
	Richer	18·4	170	51·8	1·14	0·97, 1·35
	Richest	9·9	82	55·3	1·26	1·03, 1·53
Number adults in household	1–2	27·7	407	49·6	1·00	
	3+	72·3	1105	59·8	1·10	0·98, 1·22
Intermediate block (2): maternal variables						
Living with partner currently	Yes	73·9	1161	55·4	1·00	
	No	26·1	351	61·4	1·12	1·01, 1·25
Education level	Higher education	77·3	1071	56·2	1·00	
	Lower education	22·7	441	59·5	0·91	0·82,1·02
Maternal overweight/obese	No	54·9	664	60·3	1·00	
	Yes	45·2	560	63·1	1·06	0·96, 1·17
Adolescent mother (≤19)	No	76·6	1158	55·5	1·00	
	Yes	23·5	354	61·6	1·05	0·94, 1·17
Pregnancy intention	Then	48·1	704	56·3	1·00	
	Later	31·1	451	59·8	1·01	0·91, 1·12
	No more	20·8	357	54·2	0·85	0·75, 0·97
Working mother	No	71·6	1058	55·2	1·00	
	Yes	28·4	454	61·4	1·01	0·92, 1·12
Intermediate block (3): health systems variables						
Skilled attendant at birth	Yes	39·9	583	60·7	1·00	
	No	60·1	929	54·5	0·91	0·83, 1·00
Delivery in public health facility	Yes	95·2	1353	57·2	1·00	
	No	4·8	159	53·0	0·69	0·56, 0·86
C-Section	No	63·5	1029	55·8	1·00	
	Yes	36·5	483	58·9	1·16	1·05, 1·27
Number prenatal visits	4–9	78·4	1106	58·1	1·00	
	0–3	12·9	295	51·9	0·77	0·66, 0·88
	10+	8·7	100	54·7	1·03	0·87, 1·23
Proximal block (4): child variables						
Low birth weight	No	91·7	1147	56·8	1·00	
	Yes	8·3	81	40·6	0·77	0·60, 1·01
Infant sex	Male	53·1	799	59·5	1·00	
	Female	47·0	713	54	0·92	0·84, 1·01
First child	Not 1st	57·6	923	55·3	1·00	
	1st	42·4	589	59·2	1·10	1·00, 1·21
Proximal block (5): early feeding environment variables (only for EBF)						
Prelacteal feeds	No	62·4	968	49·1	1·00	
	Yes	37·6	528	69·1	1·57	1·44, 1·72
Early breastfeeding initiation (within 1 h)	Yes	60·5	972	56·2	1·00	
	No	39·5	524	57·3	1·08	0·98, 1·19

*Percentages are nationally representative with DHS weighted variable.
†This analysis included alive, singleton birth, infants under 6 months of age at time of survey.
‡Percentages are nationally representative with DHS weighted variable.

Discussion

To our knowledge, this is the first study to investigate determinants of breastfeeding practices in Colombia looking at modifiable risk factors from a healthcare system perspective. C-section, lack of skilled attendant at birth, prelacteal feeding, and maternal overweight/obesity were the identified modifiable risk factors that can be integrated and addressed through a package of health system interventions to improve breastfeeding outcomes in Colombia. Evidence has shown that designing tailored interventions focusing on multiple relevant risk factors increases breastfeeding rates, particularly in non-high income countries such as Colombia[1,28]. Strategies that promote breastfeeding and engage individuals, facilities, and communities in interventions that integrate education and support for optimal

Table 4 Final multiple hierarchical model to identify the factors associated with interrupting EBF in children aged under 6 months (*n* 1512) (Colombia, DHS 2010)

Variable	PR$_{adjusted}$	95 % CI	*P*
Model 1†			
Income quintile			
Poorest	1·00	–	–
Poorer	1·21	1·07, 1·35	0·002*
Middle	1·23	1·08, 1·40	0·002*
Richer	1·17	1·00, 1·36	0·049*
Richest	1·26	1·04, 1·52	0·019*
Number adults in household			
1–2	1·00	–	–
3+	1·11	1·00, 1·23	0·054
Model 2‡			
Living with partner currently			
Yes	1·00	–	–
No	1·10	0·99, 1·23	0·079
Maternal overweight/obese			
No	1·00	–	–
Yes	1·05	0·96, 1·15	0·294
Pregnancy intention			
Then	1·00	–	–
Later	0·99	0·89, 1·10	0·812
No More	0·82	0·72, 0·93	0·003*
Model 3§			
Delivery in public health facility			
Yes	1·00	–	–
No	0·87	0·70, 1·08	0·213
C-Section			
No	1·00	–	–
Yes	1·12	1·02, 1·23	0·019*
Number prenatal visits			
4–9	1·00	–	–
0–3	0·87	0·75, 1·02	0·086
10+	1·04	0·88, 1·25	0·625
Model 4‖			
Low birth weight			
No	1·00	–	–
Yes	0·79	0·60, 1·04	0·089
Infant sex			
Male	1·00	–	–
Female	0·93	0·83, 1·04	0·192
First child			
Not 1st	1·00	–	–
1st	1·01	0·90, 1·14	0·876
Model 5¶			
Prelacteal feeds			
No	1·00	–	–
Yes	1·51	1·37, 1·68	<0·001**

*Significant at *P* < 0·05 **Significant at *P* < 0·001– reference category; no prevalence ratios or CI calculated.
†Model 1: income quintile, number of adults in household, and infant age.
‡Model 2: Model 1 + mother living with partner, maternal overweight/obese, and pregnancy intention.
§Model 3: Model 2 + delivery in public health facility, C-section, and number of prenatal visits.
‖Model 4: Model 3 + low infant birth weight, infant sex, and maternal primiparity.
¶Model 5: Model 3 + prelacteal feeds.

breastfeeding practices at multiple levels have been successful in improving breastfeeding indicators and achieving country-level goals[1,28,29].

In our study, C-section was a risk factor for both delayed breastfeeding initiation and interruption of EBF. C-section is often associated with obstetric complications that may lead to mother–newborn separation, which in turn can reduce the likelihood of EIBF and the duration of any breastfeeding or EBF[30–32]. The prevalence of C-section is higher in Latin America relative to other low-and-middle income (LMIC) regions, accounting for 24–45 % of births in public and private sector facilities[33,34]. This high prevalence combined with the dearth of skilled birth attendants found in our study points to a key barrier for EIBF. Skilled attendants at birth, particularly those who are properly trained in supporting optimal breastfeeding practices, are shown to improve maternal EIBF as well as longer-term feeding practices[35]. Therefore, it is important to acknowledge that addressing barriers for timely breastfeeding initiation is a crucial first step for achieving longer term EBF and any breastfeeding success[32,36,37]. Additionally, consistent evidence from countries across world regions has identified C-section as a risk factor for influencing pre-lacteal feeding[38]. Indeed, Boccolini *et al.* analysed data from Latin America and the Caribbean, including Colombia and found important inequities between C-section delivery and risk of prelacteal feeds. Specifically, women of lower socio-economic status experienced a heightened risk of milk-based prelacteal feeding associated with C-section delivery[38]. Pre-lacteal feeding is of serious concern as it has consistently been identified as a risk factor for EBF in cohort and cross-sectional studies globally[39]. These findings combined with the high rates of hospital or clinic births (95·6 %) in Colombia indicate an opportunity for improving healthcare system support and protection of breastfeeding mothers in the perinatal and postnatal period in Colombia.

Maternal pregnancy intention is generally described in the literature as associated with positive breastfeeding behaviour as compared with lack of intention at the time of conception[40]. However, in our study, non-pregnancy intention was associated with longer EBF perhaps because, in the Colombian context, women with unplanned pregnancies may have received more attention and support with regards to their breastfeeding plans. More than 50 % of pregnancies are not planned[41], thus, providing breastfeeding education during the antenatal care is key to encouraging non-intentional pregnant women to breastfeed. A patient-centred approach to such promotion activities, such as incorporating pregnancy intention into counselling, is key to achieving optimally targeted and effective interventions[42,43]. Maternal overweight/obesity is a recognized risk factor for delayed breastfeeding initiation and is also implicated in shorter overall breastfeeding duration[44,45] owing to biological, mechanical, behavioural and/or psychological factors. This characteristic is of particular relevance in the global context as prevalence of obesity is increasing worldwide and in LMIC such as Colombia[46]. Providing timely support and counselling for obese and overweight women is crucial to improving both EIBF and EBF[47].

Several non-modifiable factors associated with suboptimal breastfeeding were found in our study. The finding of increased EBF interruption with higher income quintiles is consistent with findings from other LMIC[1]. Indeed, in these countries poorer women are more likely to initiate and continue breastfeeding for longer periods of time as compared with their richer counterparts[1]. Consistent with our findings, infant low birth weight and primiparity have been previously found to be associated with suboptimal breastfeeding practices[31,48]. Lower maternal education and mother not living with partner were protective factors to delayed breastfeeding initiation in Colombia, which is somewhat consistent with some but not all studies previously conducted[49,50].

It is important to acknowledge that Colombia has been working for several years towards building an enabling breastfeeding environment. In 2010, a 'Ten Year Plan' (2010–2020) was formulated to strengthen breastfeeding programmes[7,51]. Universal maternity leave up to 18-weeks and maternal workplace protection strategies were recently legislated[52,53]. However, our findings clearly indicate that there are key modifiable risk factors that can be addressed through healthcare systems interventions. Indeed, the modifiable factors identified in this study can inform the development of a package of interventions to strengthen the coordination of efforts on breastfeeding counselling and support, including enhancing BFHI implementation[5,6] and breastfeeding counselling within the Colombian health systems[1,22]. Evidence has shown that these identified factors are amenable to change and improvement through clear and specific recommendations and interventions to better support breastfeeding practices, underscoring the strong focus needed on the healthcare systems[54–56].

Our findings must be carefully interpreted due to the cross-sectional survey design, precluding the establishment of the temporality of associations. The retrospective nature of the surveying method also introduces potential recall bias. The external validity of the study was tested and both analytical samples were similar for most household and maternal variables analysed, differing only slightly in place of residence, marital status, and maternal age. However, these characteristics were not associated with both outcomes; therefore, we believe that this limitation did not significantly affect the external validity of the study. It is also important to note that the study data were from 2010; nevertheless, our literature review indicates that the findings are still very applicable to the current breastfeeding context in Colombia and can be used to generate hypotheses to be tested through future quasi-experimental and experimental studies[19].

In conclusion, women in Colombia need additional breastfeeding support at multiple levels to engage in optimal infant feeding practices. The identification of modifiable risk factors for EIBF and EBF can help inform the development of a tailored package of interventions to improve the coverage and quality of breastfeeding counselling through the healthcare system in Colombia.

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Supplementary material

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