Impact of Caesarean Delivery on Early Initiation of Breastfeeding in Health Facilities in India: A Secondary Data Analysis Using NFHS-5 Data

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Abstract:

Introduction: Early initiation of breastfeeding (EIBF) is crucial for neonatal survival and wellbeing. Caesarean section (C-section) is known to delay EIBF due to reduced opportunity for mother-infant contact. **Objective:** To assess the association between C-section and Early initiation of breastfeeding (EIBF) in institutional deliveries in India. **Methods:** Secondary data analysis of NFHS-5 data (2019–21) was conducted. Statistical analysis was performed using R programming version 4.5.2. The exposure variable studied was type of delivery (Caesarean or Vaginal), main outcome was Early Initiation of Breastfeeding. **Results:** Early Initiation of Breastfeeding (EIBF) was observed in 47% of 127,969 institutional births and was found to be lower following C-section (aOR 0.51, 95% CI: 0.48–0.54). Maternal education, birth weight, ANC visits, and urban residence positively correlated with EIBF. **Conclusion:** C-section was significantly associated with delay in Early Initiation of Breastfeeding. Active support and targeted intervention for mother-baby dyad could potentially increase EIBF rates.

Keywords: Breastfeeding, Caesarean, Initiation, Maternal, NFHS.

Introduction:

Breastfeeding has many health benefits for both the mother and infant. Breast milk contains all the nutrients that infants need in the first six months of life. Breastfeeding protects against diarrhoea and common childhood illnesses such as pneumonia and may also have longer-term health benefits.[1] It is recommended that breastfeeding should be initiated within first one hour after delivery.[1]

Caesarean or C-section rates in India have been rising, with reported overall prevalence of 21% at national level, which is higher than the World Health Organization recommended level of 15%.[2] As per evidence from 58 low-to-middle income countries, Women who had caesarean deliveries were more likely to have delayed initiation of breastfeeding.[3]

Caesarean births are known to delay Early Initiation of Breastfeeding (EIBF) due to various reasons which include, anaesthesia, pain, separation, hormonal disturbance etc.[3–5] Primary studies in India have reported lower Early initiation of breastfeeding rates after Caesarean delivery.[3–5] NFHS-5 (2019-21) provides nationally representative data to assess early initiation of breastfeeding and its determinants across the country. This study explores the NFHS-5 dataset to assess rates of early initiation of breastfeeding at All-India level and its association with mode of delivery, in particular, Caesarean delivery.

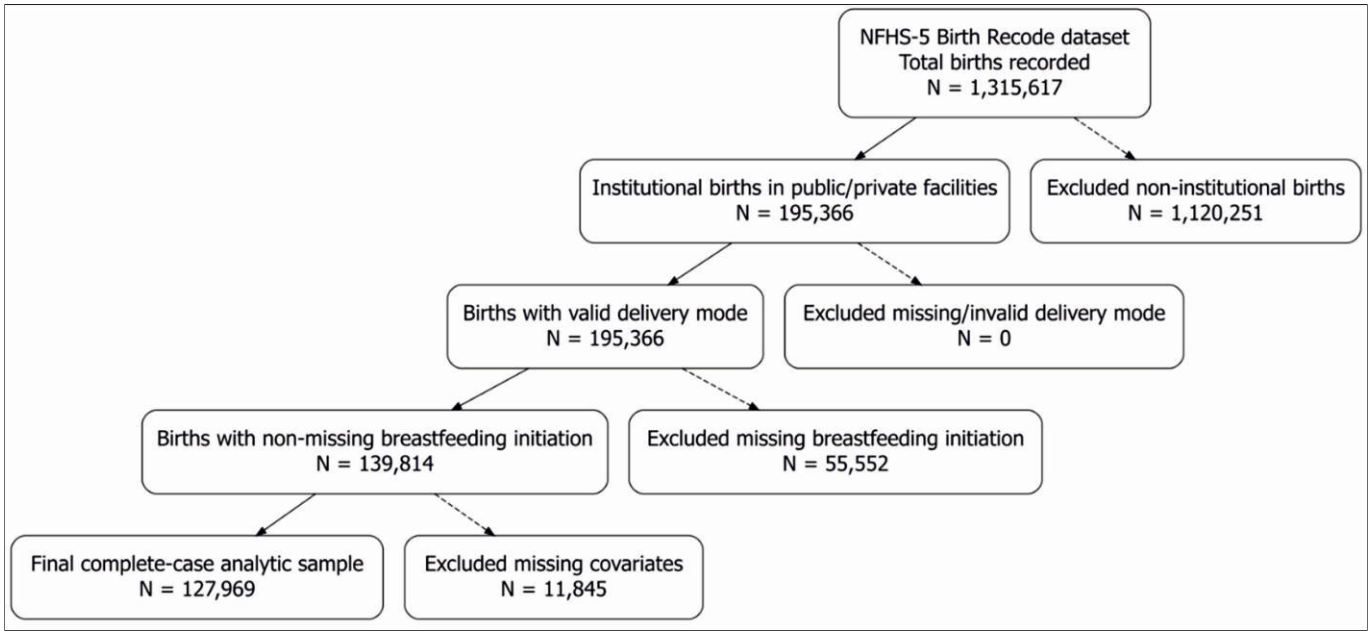
Methods:

A secondary data analysis was conducted using the NFHS-5 (2019–21) birth recode dataset. Women aged 15–49 years with institutional births in the preceding two

Quick Response Code	Access this article online	How to cite this article :
	Website : www.healthlinejournal.org	Vaz FS, Khan MG, Singh P. Impact of Caesarean Delivery on Early Initiation of Breastfeeding in Health Facilities in India: A Secondary Data Analysis Using NFHS-5 Data. Healthline. 2026;17(1): 82-86
	DOI : 10.51957/Healthline_823_2026	

Received : 17-02-2026 **Accepted** : 16-03-2026 **Published :** 31-03-2026

Figure 1: Flow diagram for the final sample selection for the analysis



years were included in the analysis. The outcome measure studied was early initiation of breastfeeding (EIBF) within the first hour post-delivery.

The primary exposure studied was mode of delivery (Caesarean or Vaginal). The other covariates studied were Maternal age, education, parity, ANC visits, birthweight, wealth index, residence and facility type. The dataset was obtained from International Institute of Population Sciences, Mumbai.

Observations with values missing in either the outcome variable, exposure variable and covariates which were included in the regression analysis were excluded using a complete-case approach. Special codes used in the NFHS dataset to denote missing or implausible values were then recoded as missing prior to analysis. The final sample consisted of 127,969 institutional births with complete information on all variables included in the study. (Figure 1)

Statistical analysis was performed in using R programming version 4.5.2.[6] All analyses were conducted using appropriate sampling weights to account for the complex survey design of NFHS-5, including clustering, stratification, and unequal probability of selection. Rao-Scott corrected chi-square, design-based Kruskal–Wallis test, and survey-weighted multivariable logistic regression analysis were conducted. A survey-weighted multivariable logistic regression in the form: General Linear Model (early initiation of breastfeeding ~ c-section + facility type + c-section*facility type + covariates, family = binomial) was used to adjust for confounders and calculate adjusted Odds Ratios. Adjusted Odds Ratios (aORs) with 95% confidence intervals were calculated. Effect modification was assessed by including an interaction term between mode of delivery and facility type in the survey-weighted multivariable logistic regression model. As NFHS is an anonymized and publicly available dataset, the study was exempted from review by Institutional Ethics Committee (GMCIEC/2025/360).

Results:

Data for a total of 1,27,969 women aged 15-49 years who had a live birth in the preceding two years and had complete data for all the variables under study was analysed. Out of the 1,27,969 live births, 101529 (79.3%) were vaginal births, while 26440 (20.6%) delivered through C-section. Women who delivered through C-section had higher education, were in the higher wealth index quintile, had higher Antenatal (ANC) visits, and were more likely to be from urban areas. (Table 1)

Table 1: Characteristics of Institutional Births by Mode of Delivery (NFHS-5)

Characteristic	Vaginal N = 101,529*	C-Section N = 26,440*	p-value#
Early initiation of breastfeeding	49,213 (50%)	11,479 (36%)	<0.001
Mother's age (years)	26.4 (4.9)	27.0 (4.8)	<0.001
Education level			<0.001
No education	22,547 (23%)	2,985 (9.3%)	
Primary	13,176 (13%)	2,784 (8.7%)	
Secondary	51,260 (52%)	18,228 (57%)	
Higher	11,449 (12%)	8,151 (25%)	
Wealth index			<0.001
Poorest	19,210 (20%)	1,842 (5.7%)	
Poorer	21,743 (22%)	3,798 (12%)	
Middle	21,252 (22%)	6,903 (21%)	
Richer	19,777 (20%)	9,191 (29%)	
Richest	16,449 (17%)	10,414 (32%)	
Place of residence			<0.001
Urban	29,276 (30%)	15,103 (47%)	
Rural	69,156 (70%)	17,045 (53%)	
ANC visits	5.1 (4.9)	6.9 (5.3)	<0.001
Parity	2.16 (1.27)	1.69 (0.84)	<0.001
Facility type			<0.001
Private	25,687 (26%)	20,552 (64%)	
Public	72,745 (74%)	11,595 (36%)	

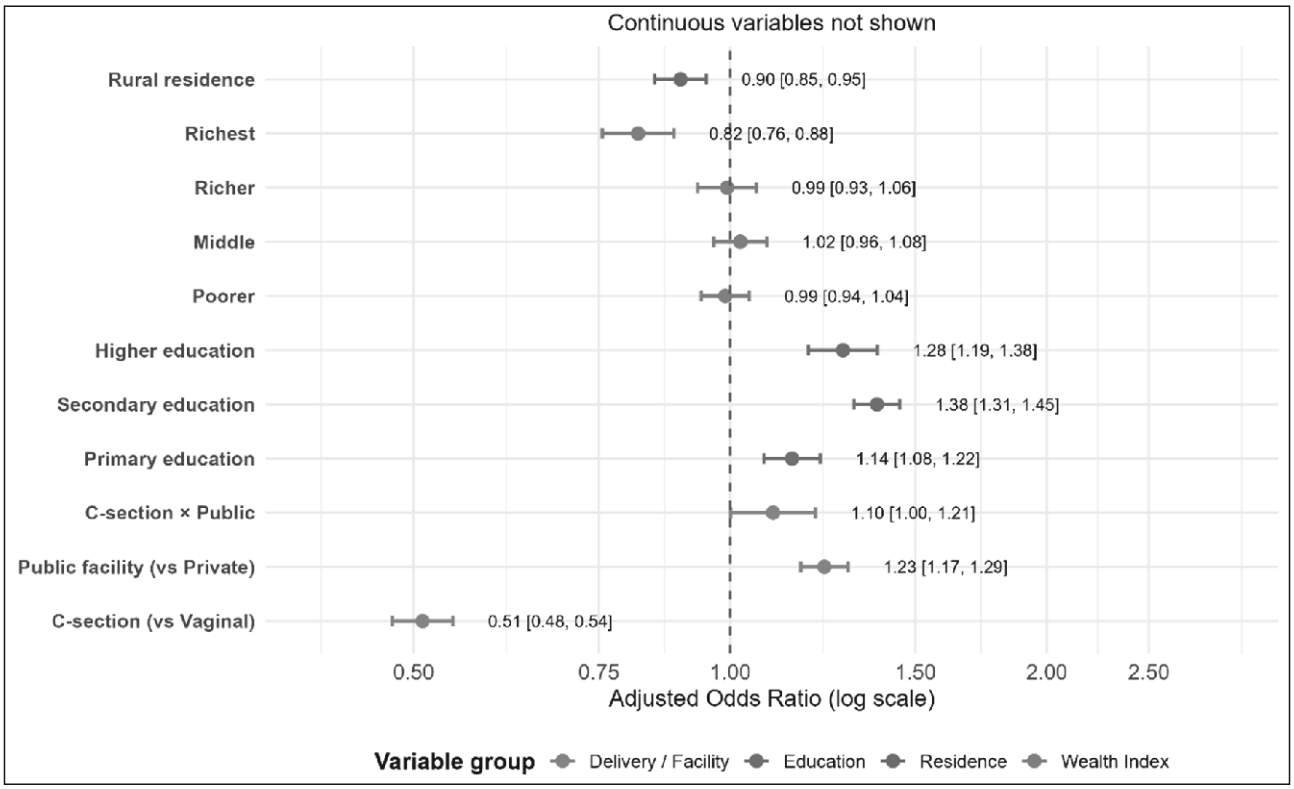
*n (%); Mean (SD), #Pearson's x^2: Rao & Scott adjustment; Design-based Kruskal Wallis test

Table 2: Adjusted Odds Ratios for Early Initiation of Breastfeeding

Characteristic	aOR	95% CI	p-value
Mode of delivery			
Vaginal	—	—	
C-Section	0.51	0.48, 0.54	<0.001
Facility type			
Private	—	—	
Public	1.23	1.17, 1.29	<0.001
Education level			
No education	—	—	
Primary	1.14	1.08, 1.22	<0.001
Secondary	1.38	1.31, 1.45	<0.001
Higher	1.28	1.19, 1.38	<0.001
Wealth index			
Poorest	—	—	
Poorer	0.99	0.94, 1.04	0.7
Middle	1.02	0.96, 1.08	0.5
Richer	0.99	0.93, 1.06	0.8
Richest	0.82	0.76, 0.88	<0.001
Place of residence			
Urban	—	—	
Rural	0.90	0.85, 0.95	<0.001
Mode of delivery * Facility type (interaction)			
C-Section * Public Facility	1.10	1.00, 1.21	0.048

Abbreviations: CI = Confidence Interval, aOR = Adjusted Odds Ratio

Figure 2: Forest plot depicting adjusted Odds Ratios for Early initiation of Breastfeeding



Early Initiation of Breastfeeding (EIBF) was observed in 47% of 127,969 institutional births. The proportion of Early Initiation of Breastfeeding (EIBF) was lower in the Caesarean group (36%) compared to the Vaginal delivery group (50%). This difference was statistically significant ($p<0.001$). Other factors which were significantly associated with early initiation of breastfeeding were, mothers age, mothers' education, wealth index, place of residence, number of Antenatal visits, parity and facility type. (Table 1)

Table 2 describes the adjusted Odds Ratios (aORs) obtained through multivariable logistic regression. Although we included the continuous variables like age, parity, birth weight and ANC visits in the model, we have not depicted them in the table as their interpretation is difficult. Women who had a C-section delivery were 0.51 times less likely to initiate early breastfeeding compared to vaginal delivery. Early Initiation of Breastfeeding was 1.23 times more likely in public health facility, 0.82 times less likely in richest wealth index quintile. Statistically significant interaction was observed between mode of delivery and facility type (aOR 1.10; 95% CI 1.00–1.21; $p = 0.048$), this indicates that the negative association between caesarean delivery and early initiation of breastfeeding was slightly weaker in public facilities than in private facilities.

The effect of the primary exposure (C-section delivery) and other covariates on early initiation of breastfeeding is depicted in a forest plot (figure 2). C-section, richest wealth index quintile, and rural residence appear to the left of the null value line (OR=1) indicating that these factors are negatively associated with early initiation of breastfeeding.

Discussion:

The present secondary data analysis of a nationally representative large NFHS dataset confirms the negative association of C-section with early initiation of breastfeeding in India. This is consistent with several primary studies in recent literature.[3–5,7] Reasons for delayed EIBF have been described in literature to include, anaesthesia, pain, separation, hormonal disturbance etc.[3–5] Public facility births showed higher rates of early breastfeeding. This probably indicates that national programme guidelines which promote early breastfeeding initiation are probably being followed more meticulously in public sector than in private sector.

Promotion of breast milk substitutes etc. is more likely to occur in private facility than in a public facility.

Maternal education, and higher number of ANC visits were strong positive predictors of EIBF this has been corroborated by contemporary studies from Gujarat and Odisha, which show similar trends.[4,5] This association is plausible. Both higher maternal education and more ANC visits should naturally translate to higher awareness of importance of EIBF. Higher socioeconomic status was linked to both higher C-section rates as well as delayed EIBF and is documented by other studies in India.[4,5] Generally higher education which leads to higher health awareness should have led to higher rate of EIBF, however in our study and other studies in India higher socioeconomic status was associated with lower rate of EIBF. This finding may be related to higher number of Caesarean births in private facilities, where guidelines for EIBF may not be followed meticulously. Higher socioeconomic status may also increase access to breast milk substitutes which may promote delayed EIBF. The study of effect moderation indicated that effect of C-section in delaying EIBF was weaker in public than in private facility. This again can be possibly attributed to better adherence to guidelines in public sector and possible promotion of milk substitutes etc. in private facilities.

Alternatively, some studies have reported a dramatic improvement in EIBF rates through quality improvement interventions post C-section delivery.[8,9] This indicates that focused and targeted intervention post C-section could lead to better EIBF rates.

Limitation:

This study is based on secondary data analysis and is thus limited by quality, completeness and consistency of data.

Conclusions:

Caesarean section deliveries appear to significantly reduce the odds of early breastfeeding initiation in Indian institutional setting. Underlying factors like decreased mother-baby contact, pain, post-operative complications etc. could possibly be playing an underlying role. The underlying or indirect factors for this association need to be further studied and addressed to develop interventions to increase early initiation of breastfeeding rates.

Recommendation:

Active support and targeted intervention for mother-baby dyad, post C-section could potentially increase EIBF rates. Key maternal factors identified in the study should be considered for developing these targeted interventions.

Declaration

Funding: Nil

Conflict of Interest: Nil

Use of AI: Quillbot software was used for grammar check only. Github copilot is integrated with R studio and R programming which assisted in code writing and debugging.

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