

The Association between Cesarean Delivery and Breast-Feeding Outcomes among Mexican Women

ABSTRACT

Objectives. This study examined the impact of cesarean section delivery on the initiation and duration of breast-feeding in the 1987 Mexican Demographic and Health Survey.

Methods. The subsample ($n = 2517$) was restricted to women whose delivery of their last-born children (aged 5 years and younger) was attended by a physician. Multivariate logistic regression was used to examine the association between cesarean section and the likelihood of either not initiating breast-feeding or doing so for less than 1 month. Among women who breast-fed for 1 month or more, multivariate survival analysis was used to examine the relationship between cesarean section and breast-feeding duration.

Results. Cesarean section was a risk factor for not initiating breast-feeding (odds ratio [OR] = 0.64, 95% confidence interval [CI] = 0.50, 0.82) and for breast-feeding for less than 1 month (OR = 0.58, 95% CI = 0.37, 0.91) but was unrelated to breast-feeding duration among women who breast-fed for 1 month or more (OR = 0.97, 95% CI = 0.86, 1.11).

Conclusions. It is desirable to provide additional breast-feeding support during the early postpartum period to women who deliver via cesarean sections. (*Am J Public Health*. 1996;86:832-836)

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Introduction

Hospital cesarean delivery rates in the 1980s ranged from 7% in Czechoslovakia to 32% in Brazil.¹ Excessive cesarean section rates can expose mothers and their infants to unnecessary health risks. It has been estimated that, in Mexico City, one of every five hospital deliveries involves a cesarean section,² and (as shown later) this situation is similar in the rest of the country.

The impact of cesarean section on breast-feeding has been studied in industrialized³⁻¹⁵ and in developing^{16,17} countries. Six studies^{9,12,14-17} have reported an inverse association between these two variables, but nine^{3-8,10,11,13} have reported no association. Most studies, however, have not distinguished between brief and longer term breast-feeding. It is likely that cesarean section affects breast-feeding primarily by jeopardizing the establishment of lactation during the first 2 to 4 weeks postpartum.

The breast-feeding performance of Mexican women is considered poor.^{18,19} Information about factors affecting breast-feeding success could help improve this performance. Although several socioeconomic and demographic risk factors have been identified in the Mexican population, the impact of cesarean section on breast-feeding has not been studied.

The objectives of this paper are to examine, in a Mexican sample, the association between cesarean section and (1) not initiating breast-feeding, (2) breast-feeding for less than 1 month among women who elect to breast-feed, and (3) breast-feeding duration among women who breast-feed for at least 1 month.

Methods

Data Set

This paper is based on data collected from women of reproductive age in the Mexican Demographic and Health Survey conducted in 1987.²⁰ This survey followed a multistage cluster design based on a nationally representative sampling framework developed by the National Institute of Statistics, Geography and Information. Of the original 8763 households targeted by the survey, information was obtained on 7786 households in which there were 9709 women of reproductive age. Of these women, 96% responded to the survey administered in their household. The final sample included 9310 women 15 to 49 years of age and 6030 children 5 years of age or less.

The pretested structured survey questionnaires were administered by 62 trained interviewers who were supervised by 15 coordinators and 12 field supervisors. Data obtained through the precoded questionnaire were entered via the Integrated System of Survey Analysis software package, which includes data entry quality control procedures such as detection of out-of-range values and verification of consistency among similar questions. The socioeconomic and demographic results

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were highly consistent with census data and findings of other large-scale surveys.²⁰

Statistical Analyses

All analyses were conducted with SPSS for Windows.²¹ A subset of the master file was created by applying the following inclusion criteria: (1) last-born child 5 years of age or less when the survey was conducted and (2) delivery attended by a physician. Deliveries attended by individuals other than a physician (e.g., nurse, midwife) were excluded because the probability of a cesarean section in such instances was practically null (i.e., 99.3% of cesarean sections were attended by a physician).

Weighted chi-square and multivariate logistic regression analyses²² were used to examine the association between cesarean section and the decision to breast-feed (ever vs never breast-fed) ($n = 2487$). The same statistical models were used to examine the hypothesis that cesarean section is a risk factor for short breast-feeding duration (i.e., breast-feeding less than 1 month vs 1 month or more) among women who elect to breast-feed ($n = 2005$).

Bivariate and multivariate survival analyses (Cox regression)²³ were used to study the relationship between cesarean section and breast-feeding duration ($n = 1898$). These analyses included only subjects who breast-fed for at least 1 month, because we wanted to determine whether there was any impact of cesarean section beyond the period when lactation is usually established. For subjects who were still breast-feeding when they were interviewed, the duration of breast-feeding was based on the age of the infant at the time of the survey. In such cases (24%), breast-feeding duration was identified as a censored value in the survival model.

The main independent variable was cesarean section (yes vs no). The remaining independent variables were selected on the basis of our previous work in Mexico²⁴ and two literature reviews on the subject.^{25,26} The following potential confounders were included in the multivariate models: population size of place of residence (<2500 vs 2500 through 19 999 vs $\geq 20\ 000$ vs metropolitan), electricity at home (yes vs no), marital status (currently vs formerly/never married), maternal employment (yes vs no), maternal education (none vs elementary vs high school or more), maternal age (less than 21 years vs 21 years or more), child gender, child age (in months) at time of survey, maternal current contraceptive use at time of survey (none vs traditional [periodic abstinence, withdrawal] vs mod-

TABLE 1—Characteristics of Sample Included from 1987 Mexican Demographic and Health Survey: Weighted Estimates ($n = 2487$)

	No. ^a	%
Population size of place of residence		
<2 500	478	19.2
2 500–19 999	385	15.5
$\geq 20\ 000$	727	29.2
Metropolitan	898	36.1
Electricity at home	2282	91.7
Maternal education		
None	131	5.3
Elementary	1376	55.3
High school or more	980	39.4
Currently employed	680	27.6
Currently married	2308	92.8
Maternal parity: primiparae	648	26.1
Maternal age less than 21 years	542	21.8
Contraceptive method none/traditional	1125	45.2
Child's age at time of survey, y		
0–1	728	29.3
1–2	623	25.0
2–3	494	19.9
3–4	336	13.5
4–5	307	12.3
Child gender, male	1219	49.0
Prenatal care	2237	90.0
Cesarean delivery	514	20.7
Ever breast-fed	2013	80.9

Note. Eighteen women had missing data on maternal employment status. There were no missing data on any of the remaining variables.

^aWeighted number of cases.

ern [intrauterine device, hormonal, surgical, barrier]), and prenatal care (yes vs no). A dummy variable with four categories combining parity (one child vs more than one child) and previous infant feeding experience (breast-fed previous child 1 month or more vs less than 1 month) was also included. The four categories of this variable were (1) primiparae, (2) multiparae with unknown previous infant feeding experience (because of missing data or because the next child was more than 5 years of age), (3) multiparae who breast-fed their previous child less than 1 month, and (4) multiparae who breast-fed their previous child 1 month or more.

Results

Sample Characteristics

Nineteen percent of the population lived in rural communities (i.e., less than 2500 inhabitants), 15% lived in small urban centers, and about two thirds lived in larger urban areas or metropolitan areas (Table 1). The vast majority of the

households had electricity, and most women had some degree of formal schooling, although only 39% had finished high school. About 28% of the women were employed, and most of them reported being married. Twenty-six percent of the women were primiparous, and 22% were less than 21 years of age. Fifty-five percent of the women reported using a modern method of contraception. The majority of children (74%) were 3 years of age or less; boys and girls were equally represented. Twenty-one percent of the deliveries occurred via cesarean section.

Breast-Feeding Patterns

Nineteen percent of the children were never breast-fed. Among those who were breast-fed, 6% were breast-fed for less than 1 month. The average breast-feeding duration was 10.6 months.

Association of Cesarean Delivery with Initiation of Breast-Feeding

Cesarean section was a risk factor for the initiation of breast-feeding in the

TABLE 2—Bivariate Associations of Independent Variables with Short- and Long-Term Breast-Feeding Outcomes

	Ever Breast-Fed ^a			Breast-Fed More than 1 Month ^b			Breast-Fed at 6 Months ^c		
	No. ^d	%	P	No. ^d	%	P	No.	%	P
Cesarean delivery			.0000			.0006			.03
Yes	514	73		374	91		408	46	
No	1973	83		1631	96		1490	51	
Population size of place of residence			.0000			.04			.0000
< 2 500	478	90		426	96		366	62	
2 500–19 999	385	80		307	96		290	54	
≥ 20 000	727	79		575	92		697	47	
Metropolitan	898	78		698	95		545	41	
Maternal education			.08			.76			.0000
None	131	88		115	94		98	68	
Elementary	1376	80		1093	95		1011	55	
High school or more	980	82		797	94		789	39	
Electricity at home			.002			.61			.0000
Yes	2282	80		1822	94		1738	48	
No	206	89		183	94		160	65	
Marital status			.002			.72			.16
Formerly/never married	180	72		129	94		151	45	
Currently married	2308	82		1876	95		1747	50	
Currently employed			.0005			.92			.0003
Yes	680	77		520	95		532	45	
No	1787	83		1474	95		1354	52	
Maternal age, y			.64			.54			.88
≥ 21	1945	81		1570	95		1507	50	
< 21	542	80		435	94		391	49	
Child gender			.80			.60			.69
Female	1268	81		1023	94		973	49	
Male	1219	81		982	95		925	50	
Child age at time of survey, y			.40			.44			.05
0–1	728	81		580	93		535	55	
1–2	623	81		501	95		480	49	
2–3	494	80		396	95		367	48	
3–4	336	85		285	96		273	47	
4–5	307	79		243	95		243	46	
Contraceptive method			.02			.0002			.0001
Modern	1363	79		1079	93		1053	46	
None/traditional	1125	83		926	97		845	54	
Prenatal care			.54			.27			.0000
Yes	2237	81		1806	95		1726	48	
No	250	80		199	98		172	63	
Parity and breast-feeding experience			.0000			.0000			.01
Primiparous	648	79		510	93		486	44	
Multiparous and unknown breast-feeding experience with previous child	1028	79		815	96		748	48	
Multiparous and breast-fed previous child < 1 month	197	61		121	85		103	44	
Multiparous and breast-fed previous child ≥ 1 month	615	92		559	97		561	57	

^aOutcome variable: ever vs never breast-fed (weighted chi-square analyses).

^bOutcome variable: breast-fed for less than vs at least 1 month (excludes women who never breast-fed; weighted chi-square analyses).

^cOutcome variable: breast-feeding duration among women who breast-fed for at least 1 month (Cox bivariate regression was used to predict prevalence of breast-feeding at 6 months).

^dWeighted number of cases.

bivariate (Table 2) and multivariate (Table 3) analyses (odds ratio [OR] = 0.64 [95% confidence interval [CI] = 0.50, 0.82). Other risk factors associated with not

initiating breast-feeding were living in a metropolitan (vs rural) area, maternal employment, and modern (vs none/traditional) method of contraception.

There was a U-shaped relationship between maternal education and breast-feeding initiation: women with an elementary school education were less likely to

initiate breast-feeding than women who either had no formal schooling or had completed high school. Women who breast-fed their previous child for a longer duration were more likely to initiate breast-feeding with the index child (Table 3).

Association of Cesarean Delivery with Breast-Feeding Duration

Cesarean section was associated with breast-feeding for less than 1 month among women who elected to breast-feed (Table 2), even after confounders had been controlled (OR = 0.58, 95% CI = 0.37, 0.91) (Table 3). Use of a modern (vs none/traditional) method of contraception was associated ($P < .05$) with short breast-feeding duration. Breast-feeding durations of the previous and index child were positively associated (Table 3).

Cesarean section was associated in the bivariate analysis with shortened breast-feeding duration among women who breast-fed for at least 1 month (Table 2). This association, however, could no longer be detected in the multivariate analysis (OR = 0.97, 95% CI = 0.85, 1.09) (Table 3). The following were risk factors for shorter breast-feeding duration: living in a metropolitan (vs rural or smaller urban) area, maternal education (high school or more vs none or elementary), availability of electricity at home, maternal employment, use of modern (vs none/traditional) method of contraception, and receiving prenatal care.

Discussion

The present analyses provide evidence from a developing country that cesarean section is a risk factor for failure to initiate breast-feeding and for short breast-feeding duration but is unrelated to the duration of breast-feeding once lactation has been established. In a similar analysis of data from a nationally representative child health survey conducted in the United States, Ford and Lobbok¹⁵ also found that cesarean section was a risk factor for the initiation but not the duration of breast-feeding. In a nationally representative sample used to evaluate the Women, Infants, and Children supplemental food program, Rush et al.¹⁴ identified cesarean section as a significant risk factor for not breast-feeding at hospital discharge. Other studies have found no association between cesarean section and breast-feeding duration.^{3-8,10,11,13} However, as mentioned earlier, many of these studies have failed to

TABLE 3—Determinants of Short- and Long-Term Breast-Feeding Outcomes: Multivariate Regression Analyses

	Ever Breast-Fed ^a (n = 2467)		Breast-Fed More than 1 Month ^b (n = 1994)		Breast-Feeding Duration ^c (n = 1886)	
	OR	95% CI	OR	95% CI	OR	95% CI
Cesarean delivery (yes vs no)	0.64	0.50, 0.82	0.58	0.37, 0.91	0.97	0.86, 1.11
Population size of place of residence ^d						
< 2 500	0.52	0.36, 0.76	0.97	0.49, 1.93	0.72	0.60, 0.86
2 500–19 999	0.92	0.67, 1.27	0.91	0.45, 1.84	0.75	0.64, 0.89
≥ 20 000	0.89	0.69, 1.16	1.42	0.86, 2.32	0.88	0.78, 1.00
Maternal education ^g	1.13	0.62, 2.08	1.43	0.54, 3.78	0.56	0.42, 0.73
None						
Elementary	1.49	1.17, 1.90	1.12	0.71, 1.79	0.74	0.66, 0.84
Electricity at home (yes vs no)	0.75	0.45, 1.24	1.46	0.69, 3.10	0.81	0.65, 1.01
Marital status (formerly/never vs currently married)	0.76	0.50, 1.14	0.71	0.31, 1.67	0.96	0.78, 1.17
Currently employed (yes vs no)	0.73	0.57, 0.93	0.96	0.58, 1.59	0.90	0.80, 1.01
Maternal age, y (≥ 21 vs < 21)	1.10	0.67, 1.22	0.98	0.56, 1.70	0.97	0.83, 1.12
Child gender (female vs male)	1.00	0.81, 1.24	0.94	0.63, 1.42	0.94	0.85, 1.05
Child age at time of survey, y ^e						
0–1	1.16	0.79, 1.69	1.24	0.59, 2.63	0.80	0.64, 0.98
1–2	1.12	0.77, 1.64	0.87	0.41, 1.88	0.97	0.81, 1.16
2–3	1.11	0.76, 1.61	1.07	0.50, 2.30	0.97	0.81, 1.15
3–4	0.76	0.50, 1.16	0.81	0.34, 1.92	0.95	0.80, 1.14
Contraceptive method (modern vs none/traditional)	0.78	0.62, 0.98	0.44	0.28, 0.71	0.86	0.77, 0.96
Prenatal care (yes vs no)	1.10	0.76, 1.60	0.75	0.33, 1.71	0.79	0.64, 0.96
Parity and breast-feeding experience ^f						
Primiparous	2.72	1.84, 4.03	2.87	1.43, 5.72	1.27	1.07, 1.49
Multiparous and unknown breast-feeding experience with previous child	2.65	1.85, 3.80	1.62	0.81, 3.20	1.12	0.96, 1.29
Multiparous and breast-fed previous child < 1 month	6.00	3.90, 9.10	5.56	2.64, 11.73	1.43	1.11, 1.83

Note. OR = odds ratio; CI = confidence interval.

^aMultivariate weighted logistic regression (outcome variable: ever vs never breast-fed).

^bMultivariate weighted logistic regression (outcome variable: breast-fed for less than vs at least 1 month; excludes women who never breast-fed).

^cCox multivariate regression (outcome variable: breast-feeding duration among women who breast-fed for at least 1 month).

^dOR numerator = breast-feeding odds in metropolitan areas.

^eOR numerator = breast-feeding odds among 4- to 5-year-olds.

^fOR numerator = breast-feeding odds among multiparous women who breast-fed previous child ≥ 1 mo.

^gOR numerator = breast-feeding odds among women with at least a high school education.

distinguish between brief and longer term breast-feeding durations.

Women who undergo a cesarean section usually stay longer in the hospital than women who experience vaginal deliveries. Therefore, the negative impact of this surgical procedure on short-term breast-feeding success might be explained by prolonged maternal-infant separation and lack of qualified breast-feeding counseling and support while in the hospital.

These two factors, in addition to maternal endocrinological changes induced by surgery, could lead to greater breast-feeding problems during the first few days after delivery. In 1987, Mexican maternity wards were generally characterized by an environment that was not supportive of breast-feeding,^{27,28} and it is likely that women who delivered via cesarean section faced even more serious obstacles than women who delivered vaginally, even

if they desired a prompt and successful initiation of breast-feeding.

As expected,¹⁸ urban place of residence was inversely associated with the choice to breast-feed. However, unexpectedly, a U-shaped relationship was detected between maternal education and breast-feeding initiation. Women with the highest or the lowest level of formal education were more likely to choose to breast-feed than women with an intermediate level of schooling. Maternal employment was negatively associated with the choice to breast-feed. It is possible that mothers who are usually employed are more likely to choose not to breast-feed, knowing that they will have to return to work a few weeks after delivery.

As shown previously,^{18,26} urban residence, maternal education, and exposure to prenatal care were inversely associated with breast-feeding duration. Use of a modern method of contraception was negatively associated with breast-feeding outcomes. It is possible that some of the methods used (e.g., combined estrogen/progesterone pills) had a negative impact on breast milk production or that mothers and/or health workers believed that some of these methods are incompatible with breast-feeding.²⁹ These results should be interpreted with caution, however, since contraceptive use patterns at the time of the survey do not necessarily reflect contraceptive practices at the time when infant feeding decisions were made. As expected, among multiparae, previous infant feeding experience was positively associated with the breast-feeding outcomes of the index child.

Women who deliver via cesarean section should receive special breast-feeding counseling and support during the first month after delivery. Experiences in several hospitals throughout the world indicate that women with cesarean sections can successfully initiate breast-feeding soon after delivery and can room-in with their infants.^{7,30-32} Not surprisingly, when this approach is taken, cesarean section is no longer a risk factor for early failure of breast-feeding.³⁰⁻³² Mexico recently launched an intensive national breast-feeding promotion program.³³ However, the current situation regarding breast-feeding support for women who deliver via cesarean section is unknown. We anticipate that the data presented herein will serve as a baseline against which the impact of ongoing breast-feeding promotion efforts can be assessed. □

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