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Birth Order and Breastfeeding Initiation: Results of a National Survey

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ABSTRACT

Background: **Because of numerous health benefits for both mothers and babies, breastfeeding is the recommended method of infant feeding. We sought to determine the association between birth order and breastfeeding practices in families with multiple children.**

Methods: **The 2002 National Survey of Family Growth was used to analyze the demographic characteristics of a national probability sample of 2,115 U.S. mothers aged 15 to 44 with two, three, four, and five or more children younger than age 19. In-person, computer-assisted interviews were conducted by trained female interviewers. The main variable of interest was birth order; the main outcome measure was breastfeeding initiation for each mother-child pair. We used multiple logistic regression models to determine the demographic predictors of breastfeeding the second child in families with two children.**

Results: **Mothers with two, three, four, and five or more children breastfed all of their children 52.6%, 48.4%, 44.7%, and 57.1% of the time, respectively ($p = 0.46$). In families with multiple children, more than 70% of women made the same feeding choice for each of their children, whether it was breastfeeding or bottlefeeding. After controlling for demographic factors, Hispanic women and women with more than a high school education were significantly more likely to breastfeed their second child if they had breastfed the first child.**

Conclusion: **U.S. mothers are likely to choose the same feeding method for each of their children, independent of the number of children they have. Breastfeeding promotion must take into consideration previous infant feeding experiences, if any.**

INTRODUCTION

BREASTFEEDING IS RECOMMENDED by multiple health agencies as the preferred method of infant feeding for at least 1 year because of its numerous benefits, both immediate and long-term, for both mothers and babies.[1–4] In 2002, 71% of mothers in the United States initiated breastfeeding, close to the Healthy People 2010 goal of 75%.[5,6] To maintain or even increase this proportion, it is necessary to determine the multiple factors that influence a woman's decision to breastfeed. Given that many women have more than one child, understanding the infant feeding experiences of individual mothers with multiple children provides an impor-

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tant public health perspective on infant nutrition.

Several studies have considered the impact of maternal demographics, employment, the health care system, maternal-child health medical issues, and cultural beliefs on breastfeeding initiation.[7–10] However, very few articles have focused on the relationship between birth order and breastfeeding. Two older studies, one small and the other limited to a single region of the United States, have shown that women tend to repeat the feeding decision they made with their first child with subsequent children.[11,12] However, a more recent analysis of birth certificates in New Jersey found considerable fluctuations in breastfeeding status at hospital discharge for births to the same mother.[13] In that study, mothers who breastfed their first child exclusively had higher rates of subsequent breastfeeding than those who supplemented breastfeeding with formula. In addition, it has also been suggested that the duration a woman breastfeeds her first born is an important predictor of whether or not she will breastfeed a later-born child.[11,14] Further research is needed to clarify these preliminary results.

In this study, we used the National Survey of Family Growth (NSFG), a large national survey that focuses on maternal and child health in the United States, to examine maternal demographic factors and breastfeeding initiation patterns among women with multiple children. We then determined breastfeeding patterns by birth order in families with two or three children. Finally, among women with two children, we sought to identify which maternal demographic factors have a significant impact on breastfeeding behavior with regards to the second child, both for women who breastfed their first child and for those who did not.

MATERIALS AND METHODS

Data set and subjects

The NSFG is a large, periodic, population-based survey that focuses on factors affecting birth and pregnancy rates and women's reproductive health. The NSFG has been conducted by the National Center for Health Statistics six times since 1973, most recently in 2002, with the participation and funding support of several other programs of the U.S. Department of Health and Human Services. The area probability sample used for Cycle 6 provides data that are representative of the national population. All households with black and Hispanic men and women and some households with white people and people of "other" race/ethnicity were selected for the 2002 NSFG sample. In other words, blacks and Hispanics were deliberately oversampled to be as representative as possible of those populations.

The sample of 12,571 total respondents included 7,643 women and 4,928 men aged 15 to 44 in the household population of the United States. Voluntary and confidential in-person interviews were conducted between March 2002 and March 2003. Trained female interviewers used computer-assisted personal interviewing devices for prompts during encounters lasting, on average, 80 minutes each. The response rate was 79% overall and 80% for women. The data were then adjusted and weighted so that findings would reflect the U.S. population as a whole. Therefore, the 7,643 women in the NSFG are representative of the 60.2 million civilian, non-institutionalized women in the United States in 2002. Full details of the NSFG survey methods are described elsewhere.[15]

Study design

The most recent NSFG data set contains information on the 13,593 pregnancies and 9,148 births of 5,033 women. Women who had miscarriages, therapeutic abortions, neonatal adoptions, neonatal deaths, or multiple gestations were excluded from our study sample. Women with children older than age 18 were not asked about breastfeeding during the interview so they were also excluded. We then limited the sample to mothers with more than one child. Therefore, the 2002 NSFG data set includes information on 2,115 mothers with two or more living children younger than age 19 from singleton births. Ultimately, we divided these 2,115 mothers into four groups depending on the number of children they had: two, three, four, or five or more.

For each child, breastfeeding was self-reported as either "yes" or "no" in response to the question "Did you breastfeed your child at all?" Maternal age was determined both at the time of a woman's first pregnancy and at the time of the interview. All other demographic factors were measured at the time of the interview. Women were asked two separate questions about race and ethnicity. They were first asked about race as either black, white, or other and then second asked about Hispanic origin, yes or no. For analyses presented here, a third data set variable produced by the NSFG that combines the answers to these two questions was used. Therefore, race/ethnicity was either non-Hispanic white, non-Hispanic black, Hispanic, or non-Hispanic other. Marital status was considered as married or not married at the time of the interview. Poverty level, an indicator of socioeconomic status, was measured continuously up to 500%, at which point it was topcoded, using the 2001 U.S. Census Bureau numbers (family size/poverty level: two, $11,569; three, $14,128; four, $18,104; etc.). Education was defined as completed years of school. As missing data have been imputed in the data set, information on maternal demographics was entirely complete. In families with two and three children, breastfeeding information on at least one of the children was missing for six and three mothers, respectively.

For multivariate analyses, five demographic variables were considered categorically: age (teen vs. 20 years old or older), race/ethnicity (non-Hispanic white vs. non-Hispanic black vs. Hispanic), marital status (married or not), education (less than a high school education vs. high school education vs. more than a high school education), and poverty level (<100% of the poverty level vs. between 100% and 199% of the poverty level vs. ≥200% of the poverty level).

Analysis

The NSFG employed a complex survey design such that sampling weights and design effects need to be considered when evaluating specific hypotheses (NSFG Cycle 6 2002 CD-ROM, Series 23, No. 4A public use date file). Initially, sample characteristics were analyzed in unweighted form. Next, bivariate analyses were conducted using two-sample t tests and chi-square tests to examine the association between the independent variable of interest, birth order, and the dichotomous, dependent variable, breastfeeding. For these and all further analyses, sampling weights and design effects provided in the data set were applied. Finally, multiple logistic regression models that included age, race/ethnicity, marital status, education, and income level were constructed. Reference groups were deliberately chosen from among women known to have lower breastfeeding rates: younger women (age <20), black women, unmarried women, and those with less education and lower income levels. Initially, all significant ($p < 0.05$) variables were entered into the model.

Adjusted odds ratios (OR) for the effect of each predictor and 95% confidence intervals (CI) are reported. All analyses were performed with SAS version 8.2 (SAS Institute, Cary, NC) and SUDAAN version 8.0.0 (Research Triangle Institute, Research Triangle Park, NC).

RESULTS

Our final sample included 2,115 U.S. mothers with two or more living children under age 19: 1,360 with two children, 556 with three children, 150 with four children, and 49 with five or more children (Table 1).

Table 2 illustrates the maternal demographics and breastfeeding patterns of women with different numbers of children. Women in all four groups were of similar ages at the time of the interview ($p = 0.11$). However, women with more children were significantly younger at the time of their first pregnancy than women with fewer children ($p < 0.0001$). There were significant differences in the racial and ethnic makeup of families of varying sizes, with a higher proportion of black women as mothers in larger families. Marital status was not significantly different among women in different-sized families. However, mothers with fewer children had significantly higher education and income levels.

With respect to breastfeeding behaviors, between 44.7% and 57.1% of the mothers breastfed all of their children, regardless of the number of children they had ($p = 0.46$). Similarly,

TABLE 1. STUDY SAMPLE FROM THE 2002 NSFG

Women		*Inclusions*		*Exclusions*
n = 5,033	→	Pregnancies (n = 13,593)	→	Miscarriages and therapeutic abortions (n = 4,445 pregnancy events and (n = 620 women)
↓				
n = 4,413	→	Births (n = 9,148)	→	Neonatal adoptions/deaths (n = 703 children and n = 119 mothers)
↓				
n = 4,294	→	Live births (n = 8,445)	→	Multiple births (n = 308 children and n = 126 mothers)
↓				
n = 4,168	→	Singleton births (n = 8,137)	→	Mothers with children >18 years old (n = 1,420 children and n = 590 mothers)
↓				
n = 3,578	→	Children ≤18 years old (n = 6,717)	→	Mothers with only one child (n = 1,463 mother-child dyads)
Final sample: Mothers with 2 or more living children ≤18 years old from singleton births (n = 2,115)				
↓		↓	↓	↓
Mothers with 2 children (n = 1,360)		Mothers with 3 children (n = 556)	Mothers with 4 children (n = 150)	Mothers with 5 or more children (n = 49)

between 18.3% and 28.3% of mothers did not breastfeed any of their children, also independent of family size (p = 0.21). In families with two, three, four, or five or more children, 80.9%, 72.2%, 72.9%, and 75.4% of women, respectively, behaved consistently with all of their children with regard to infant nutrition. Among mothers with two children, 20% breastfed one of the two children but not both. Furthermore, among mothers with high parity, 82% breastfed at least one of their children, but only 57.1% breastfed all of their children.

Next, we examined breastfeeding patterns by birth order in families with two or three children (Table 3). Among the 817 women with two children who breastfed their firstborn, 85% (n = 696) of them breastfed their next child as well. Among the 537 women with two children who did not breastfeed their first child, 78% (n = 417) did not breastfeed their second child either. In families with three children, 78.1% of the 338 women who breastfed their first child then breastfed both their second and third children as well, and 91% went on to breastfeed at

TABLE 2. DEMOGRAPHIC FACTORS FOR MOTHERS WITH TWO OR MORE CHILDREN (N = 2,115 FAMILIES)

	Mothers with				
Maternal demographic factor[a]	*2 children* (n = *1,360)*	*3 children* (n = *556)*	*4 children* (n = *150)*	*5+ children* (n = *49)*	p *value*[b]
Age (mean years)					0.11
At interview	33.5	34.2	33.3	35.9	
At first pregnancy	24.4	23.2	21.2	22.1	<0.0001
Race/ethnicity (%)					<0.0001[b]
White (n = 1,024)	66.7%	62.0%	53.5%	61.8%	
Hispanic (n = 575)	17.3%	20.3%	21.7%	13.2%	
Black (n = 425)	11.2%	13.4%	20.3%	24.9%	
Other (n = 91)	4.8%	4.2%	4.5%	0	
Married (%)	76.6%	74.4%	66.9%	74.8%	0.19
Education (mean years)	13.3	12.9	12.4	12.8	0.008
Percentage of the 2002 poverty level (mean)	257.7	207.0	155.1	134.4	<0.0001
Breastfeeding patterns					
Mother breastfed all of her children (%)	52.6%	48.4%	44.7%	57.1%	0.46
Mother breastfed none of her children (%)	28.3%	23.8%	28.2%	18.3%	0.21

Estimates were based on sample weights and design effects.
[a]Unless otherwise specified, all demographic factors were measured at the time of interview.
[b]p value computed using weights but no design effects given cell with a zero count.

Table 3. Breastfeeding Patterns by Birth Order (First Child/Second Child/Third Child) in Families with Two or Three Children

Feeding by birth order	*Percentage of mothers (*n*)*
Families with 2 children (n = 1,360)[a]	
Breast/breast	52.8% (696)
Breast/formula	9.8% (121)
Formula/breast	8.9% (120)
Formula/formula	28.5% (417)
Families with 3 children (n = 556)[a]	
Breast/breast/breast	48.7% (264)
Breast/breast/formula	3.5% (24)
Breast/formula/breast	3.1% (21)
Breast/formula/formula	5.2% (29)
Formula/breast/breast	9.4% (26)
Formula/breast/formula	2.0% (9)
Formula/formula/breast	4.2% (34)
Formula/formula/formula	23.9% (146)

Estimates were based on sample weights and design effects. Breast designates any breastfeeding (including both exclusive breastfeeding and breastfeeding supplemented with formula); formula designates no breastfeeding at all.

[a]Missing data for families with two and three children, n = 6 and n = 3, respectively.

least one of their two other children. Among the 215 women with three children who did not breastfeed their first child, 67.9% of them did not breastfeed either of their subsequent children. Of women with three children, 32% who did not breastfeed their first child went on to breastfeed any of their other children. In families with two children, it was equally as likely for mothers to convert from breastfeeding to formula as from formula to breastfeeding.

Finally we analyzed, in families with two children, the association of specific demographic factors with a woman's decision to breastfeed her second child depending on how the first infant was fed (Table 4). After adjusting for mother's age at first pregnancy,

Table 4. Demographic Predictors of Breastfeeding a Second Child in Families with Two Children (N = 1,360)

	Adjusted OR (95% CI)[a]	
Maternal demographic factor	*Mothers who breastfed their first child (*n = *817)*	*Mothers who did not breastfeed their first child (*n = *537)*
Mother's age at first pregnancy		
Non-teen vs. teen	1.47 (0.75, 2.89)	0.86 (0.40, 1.84)
Race/ethnicity		
White	0.96 (0.49, 1.90)	1.38 (0.63, 3.07)
Hispanic	3.23 (1.20, 8.71)	2.19 (0.96, 5.00)
Black	Reference	Reference
Marital status		
Married vs. not married	1.42 (0.64, 3.12)	1.02 (0.50, 2.09)
Education		
>High school	3.23 (1.39, 7.50)	1.59 (0.79, 3.18)
High school	1.67 (0.77, 3.61)	1.06 (0.52, 2.19)
<High school	Reference	Reference
Percentage of the 2002 poverty level		
≥200	1.13 (0.53, 2.41)	0.78 (0.42, 1.44)
100–199	0.66 (0.31, 1.37)	0.72 (0.38, 1.36)
<100	Reference	Reference

Estimates were based on sample weights and design effects. Unless otherwise specified, all demographic factors were measured at the time of interview.

[a]ORs were adjusted for age, race/ethnicity, marital status, education, and poverty level.

race/ethnicity, marital status, education, and income level, Hispanic women and women with more than a high school education were significantly more likely than black women and those with less than a high school education, respectively, to breastfeed their second child if they had breastfed the first child (Hispanic: adjusted OR 3.23, 95% CI 1.20–8.71; more than high school education: adjusted OR 3.23, 95% CI 1.39–7.50). Among mothers who did not breastfeed their first child, no demographic factor was found to be significantly associated with breastfeeding the second child.

DISCUSSION

This study shows that, if a woman breastfeeds her first child, she is likely to also breastfeed her subsequent children, regardless of how many children she has. Conversely, if a woman does not breastfeed her first child, she is less likely to breastfeed in the future. More than 70% of the time, women repeated their initial infant feeding decision with subsequent children. Among mothers with two children who breastfed their first child, Hispanic women and those with more than a high school education were significantly more likely to breastfeed their second child than black women and those with less than a high school education, respectively. No other demographic factors predicted breastfeeding for second children, in spite of adequate power given this national sample.

We had originally hypothesized that with an increase in family size, the demands for caring for a family with older children would make it more difficult to breastfeed a younger child, but we did not find an inverse linear relationship between the number of children in a family and a mother's breastfeeding practices. In fact, our results suggest that having three children presents the greatest challenge for breastfeeding every child. The positive impact of previous experience with caring for an infant, including breastfeeding and increased confidence in maternal tasks, may help to explain consistency in infant feeding choices for mothers of multiple children.[16]

Previous research has documented the positive association between breastfeeding and educational level,[1] which is confirmed here. Given the heterogeneity within the Hispanic racial/ethnic group in the United States, it is interesting to speculate on the explanation for increased breastfeeding rates for second children among Hispanic women who breastfed their first child as compared to black women. One must consider the influence of foreign-born Hispanic mothers versus native-born Hispanic mothers. In the case of the latter, the first child may represent an initial deflection of breastfeeding norms, followed by a return to cultural norms and breastfeeding patterns with the next child. Our results may highlight either an increased acceptance of breastfeeding among Hispanic women in the United States or, conversely, the poor likelihood of black women to breastfeed, even having already breastfed one child.

Our analysis of this national population-based sample confirms the results of two previous studies. In 1990, a study of 157 women identified the breastfeeding decision that women make with their first child as the best predictor of later breastfeeding behavior.[11] A larger more recent written survey of mothers with live births over a 3-month period in Hawaii also showed that most multiparous women chose the same feeding method that they had chosen previously.[12] Ours is the first study to document this phenomenon on a national level.

This population-based study has several strengths. The data set provides a large national sample with excellent representation of minority women; statistical weighting allows these data to reflect the entire U.S. population. Adjustment of data for non-response lessens the risk of selection bias. The data set is robust, and these results should be generalizable to all U.S. mothers.

A potential weakness of this study is that, with the exception of the mother's age, which was reported both at the time of her first pregnancy and at the time of the interview, the other demographic variables were measured only at the time of the survey and therefore may be different from the characteristics of these women at the times when they made their infant feeding decisions. However, the mothers' ages were all similar at the time of the interview, thus mitigating the impact of temporal changes in so-

cietal views about breastfeeding on the women in this study. Also, there is the potential for recall bias given that the women in this study had children ranging in age from infancy to age 18. However, given that they were asked simply to remember if they had breastfed each child or not, this information should be fairly accurate. In addition, this study is unable to control for sociocultural factors known to affect breastfeeding initiation as those data were not gathered. However, it is not clear that these factors would be differentially distributed based on family size. Finally, we do not report here on exclusive versus non-exclusive breastfeeding, which has been shown to have an impact on future infant feeding decisions.

This paper focuses on breastfeeding initiation and not duration among women with multiple children. It is interesting to consider yet difficult to clearly delineate the association between birth order and duration of breastfeeding. Breastfeeding itself can directly impact fertility, thereby indirectly affecting child spacing. In addition, often women stop breastfeeding when they have another pregnancy. For these reasons, we chose to focus on breastfeeding initiation in this study, but future work may consider the multifactorial relationship between birth order and breastfeeding duration.

The overall breastfeeding rate in this study comprises women who breastfed all of their children as well as those who breastfed only some of their children. Therefore to maintain or even increase breastfeeding rates, promotion efforts should target all mothers who have never breastfed, both first-time mothers as well as mothers who did not breastfeed their previous children.

CONCLUSION

This study demonstrates that a woman's decision for feeding her first child is likely to be the same for all subsequent children, suggesting that public health efforts to promote breastfeeding that target first-time mothers are likely to have the greatest impact. However, there are also smaller but significant numbers of women who switch from breastfeeding to bottlefeeding, and vice versa, with subsequent children. Breastfeeding promotion for experienced mothers must take into consideration previous infant feeding decisions and experiences.

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