Selection of Infant Feeding Method: A Population-Based Study in a Rural Area

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The selection of infant feeding method was studied in a rural area. At discharge from the hospital, 70 percent of women were breast feeding, with 47 percent still breast feeding at three months. The decision regarding feeding method was made early, with the majority of women deciding before the pregnancy. Multiparous women almost always used the method that was favored by their experience feeding previous children. For primiparous women, the husband and mother were the most important sources of information. Educational efforts designed to increase the use of breast feeding should reach future parents prior to pregnancy, and every effort should be made to ensure that the first experience with breast feeding is successful and rewarding.

In the past 15 years there has been a tremendous resurgence of interest in breast feeding.[1–3] Breast feeding is widely felt to be the optimal method of infant feeding, and its use has increased dramatically. The upward trend in the incidence of breast feeding may be leveling off,[1] however, and a substantial proportion of infants who are breast fed are weaned at an early age.[1,4–8] If efforts to maintain the upward trend in the use of breast feeding, as well as efforts to promote a reasonable duration of breast feeding, are to be successful, then it is important to continue to explore factors influencing the decision regarding infant feeding method and factors associated with a successful nursing experience.

Regional and ethnic differences in the use of breast feeding have been reported.[9,10] The urban poor, for example, have a low incidence of breast feeding. The only study that specifically examined a rural area was done in Manitoba, Canada, where those in the rural setting were less likely to breast feed than those in the city of Winnipeg.[6] The purpose of this study was to determine the incidence of breast feeding in a rural area and to investigate factors influencing the likelihood of both choosing to breast feed and persisting for at least three months.

METHODS

This study was part of a larger project that examined patterns of utilization and satisfaction with prenatal care, and described health-related beliefs and behaviors during pregnancy.

The population studied included all married women residing in Callaway County, Missouri, who had a live birth during a one-year period ending July 15, 1983. Callaway is a rural county in central Missouri with a population of 32,252, similar in most respects to all other US counties outside a standard metropolitan statistical area (Table 1).

Information used in the study was obtained from birth certificate data as well as a questionnaire mailed three to 12 months after delivery. The following information was elicited by questionnaire: (1) method of feeding at discharge from the hospital and at three months postpartum (Women who were both breast and bottle feeding were grouped with those who were exclusively breast feeding.), (2) timing of the decision regarding feeding method (Women indicated whether the decision was made before pregnancy, during the first or second half of pregnancy, or in the hospital after delivery.), (3) sources of information regarding feeding method (A list of potential sources was given, and participants were asked to indicate

Submitted, revised, February 10, 1987.

A portion of this paper was presented at the Thirteenth Annual Meeting of the North American Primary Care Research Group, Seattle, Washington, April 14, 1985. *From the Department of Family and Community Medicine, University of Missouri–Columbia, Columbia, Missouri, and the Department of Family Practice, Southern Illinois University, Quincy Family Practice Residency Program, Quincy, Illinois. At the time this study was performed, Drs. LeFevre, Kruse, and Zweig were Robert Wood Johnson Foundation Fellows in Academic Family Practice at the University of Missouri School of Medicine. Requests for reprints should be addressed to Dr. Michael LeFevre, Department of Family and Community Medicine, University of Missouri–Columbia, School of Medicine, Columbia, MO 65212.*

TABLE 1. COMPARISON OF CALLAWAY COUNTY TO OTHER COUNTIES NOT A PART OF A STANDARD METROPOLITAN STATISTICAL AREA (SMSA)*

Demographics	Callaway County	Counties Outside SMSAs (US)
Sex (percent female)	50.9	51.0
Race (percent white)	94.0	88.1
(percent black)	5.2	8.8
Median age (years)	28.8	30.1
More than 65 years old (percent)	12.1	13.0
Median annual household income (dollars)	15,593	16,043
Education		
(percent high school graduates)	59.5	63.7
(percent college graduates)	9.6	11.0

* *1980 United States Census Data*

whether each potential source favored breast or bottle feeding, had no preference, or was not a source for them.), (4) attitudes regarding issues related to breast feeding (Participants were asked to indicate on a Likert scale the extent to which they agreed or disagreed with six statements.), and (4) household income (Intervals of $6,000 were listed up to $30,000, with incomes greater than $30,000 being grouped together; respondents were instructed to check the category that included the total family income before taxes.). Smoking and alcohol consumption during pregnancy were also elicited, as was participation in childbirth classes.

Birth certificate information used included demographic information as well as the number of prenatal visits and timing of the first prenatal visit. Using this information, prenatal care was classified as adequate, intermediate, or inadequate using the definition of the Institute of Medicine.[11]

Statistical analysis used the chi-square test for categorical comparisons, Mann-Whitney U for ordered data, and Student's *t* tests or analysis of variance for comparison of means of two or three groups, respectively.

Using method of feeding as a dichotomous dependent variable, stepwise logistic regression was used for multivariate analysis of information sources. The likelihood of breast feeding was anticipated to be related ordinally to whether a source favored the bottle, had no preference, or favored the breast. Each source was therefore assigned a value of 1 if it favored bottle feeding, 2 if it was not a source or did not favor one method over the other, or 3 if it favored breast feeding. Significant variables were added to the model until the residual chi-square became nonsignificant.

TABLE 2. TIMING OF FEEDING DECISION

Decision Made	Primiparas* No. (%)	Multiparas No. (%)	Total No. (%)
Before pregnancy	52 (53.6)	119 (77.3)	171 (68.1)
First half of pregnancy	21 (21.6)	16 (10.4)	37 (14.7)
Second half of pregnancy	23 (23.7)	15 (9.7)	38 (15.1)
In hospital	1 (1.0)	4 (2.6)	5 (2.0)
Total	97 (100)	154 (100)	251 (100)

* *Mann-Whitney U for comparison of multiparas and primiparas, $P < .001$*

When a response to an item was missing, that respondent was excluded only from the analyses using that particular item.

RESULTS

Of 385 women who gave birth during the study period, 15 had moved and left no forwarding address. Of the 370 who received the questionnaire, 255 responded with usable information, for a response rate of 69 percent. There was no difference between respondents and nonrespondents with respect to race, parity, or specialty of physician providing prenatal care. Nonrespondents were somewhat younger and less educated than respondents. Information on method of feeding was provided by 252 women.

At discharge from the hospital, 177 women were breast feeding, for an incidence of 70 percent. There was no difference between the incidence for multiparas and primiparas, and the mean ages of those breast and bottle feeding were the same. The mean education of those breast feeding was significantly higher than of those bottle feeding (13.3 vs 12.2 years). Of 157 women with high school education or less, 97 (62 percent) breast fed. Of 94 women with more than a high school education, 79 (84 percent) breast fed. Income was related to the incidence of breast feeding in a nonlinear fashion, with those whose annual income was less than $12,000 or greater than $30,000 breast feeding more often than those whose income was in the $12,000 to $30,000 range.

The relationship between other health-related behaviors and the decision to breast feed was explored. There were no statistically significant relationships found between the method of feeding and smoking or alcohol consumption in pregnancy, adequacy of prenatal care, or attendance at childbirth classes.

The decision regarding whether to breast or bottle feed was made early, in most instances before the pregnancy (Table 2). Primiparas did decide later than multiparas, but 76 percent of primiparas had decided by the end of

TABLE 3. SOURCES OF INFORMATION FOR PRIMIPARAS

Source	Incidence of Breast Feeding When Source		
	Favors Breast No./Total (%)	No Preference or Not a Source No./Total (%)	Favors Bottle No./Total (%)
Husband	43/47 (91)**	23/29 (59)*	2/11 (18)
Mother	30/31 (97)**	9/16 (56)	28/49 (57)
Friends or other relatives	35/41 (85)**	14/22 (64)	18/32 (56)
Physician or nurse	56/75 (75)	11/20 (55)	0/1***
Watching others	18/21 (86)	49/70 (70)	0/2***
Newspapers, books, magazines	57/75 (76)*	9/18 (50)	2/2***
Childbirth classes	53/70 (76)	15/25 (60)	0/0***

*Comparison between no preference group and favors breast and favors bottle: * chi-square, P < .05; **chi-square, P < .01; ***numbers too small for comparison*

TABLE 4. SOURCES OF INFORMATION FOR MULTIPARAS

Source	Incidence of Breast Feeding When Source		
	Favors Breast No./Total (%)	No Preference or Not a Source No./Total (%)	Favors Bottle No./Total (%)
Experience feeding other children	86/88 (98)**	10/18 (56)*	12/46 (26)
Husband	64/70 (91)**	37/56 (66)**	5/24 (21)
Mother	40/43 (93)**	47/73 (64)	19/36 (53)
Friends or other relatives	39/51 (76)	57/84 (68)	10/16 (62)
Physician or nurse	71/89 (80)**	30/52 (58)	0/3***
Watching others	35/40 (87)*	68/95 (72)	2/13 (15)***
Newspapers, books, magazines	70/86 (81)**	35/61 (57)	0/3***
Childbirth classes	54/77 (70)	51/72 (70)	0/0***

*Comparisons between no preference group and favors breast and favors bottle: *chi-square, P < .05; **chi-square, P < .01; ***numbers too small for comparison*

the first half of pregnancy. There was no difference in the timing of the decision for those selecting breast feeding compared with those selecting bottle feeding.

The sources of information for primiparas are shown in Table 3. The most important source is the husband, with almost all women using the method the husband preferred if he had a preference. Less than one third of the respondents' mothers expressed a preference for breast feeding, but virtually all of these women did breast feed. The converse was not true when the mother favored bottle feeding. Friends favoring breast feeding was also associated with a higher incidence of this method of feeding.

It appeared that the effect of various sources were additive, as primiparas choosing to breast feed had on average 4.2 sources of information that favored breast feeding, in contrast to 2.3 sources favoring breast feeding for those who bottle fed ($P < .001$). The mean number of sources favoring bottle feeding for women who chose to bottle feed, however, was actually lower than the number favoring breast feeding (.93 vs 2.3). Thus it would appear that some sources have more influence than others. Stepwise logistic regression was used to attempt to identify which sources had the strongest association with the method used. Only the husband and mother were statistically significant in the multivariate model.

The sources of information for multiparas are displayed in Table 4. The most important single source of information is experience feeding other children. Eighty-eight percent indicated that their prior experience favored one method or the other, and 90 percent of these repeated this method. Of much significance is that 98 percent of women whose prior experience with breast feeding was favorable breast fed again. The husband again seems to be an important source, with almost all women using the method of feeding preferred by the husband when a preference was expressed. Several other sources were significant in bivariate analyses. In multivariate analysis with stepwise logistic regression, however, only prior experience and newspapers, books, and magazines were statistically significant. The lack of an independent association with the husband's preference in the multivariate model is probably secondary to a high concordance between prior experience and husband's preference.

The impact of the physician or nurse recommending

TABLE 5. ATTITUDES TOWARD BREAST FEEDING AND METHOD USED

Attitude	Mean Score*				
	Breast		Switch		Bottle
Women should be able to breast feed discreetly in public	4.0		3.9		3.4
Breast milk is better for babies' health than formula	4.7		4.4	**	3.2
I would feel comfortable breast feeding in the presence of close friends	4.4	**	3.4	**	2.1
The idea of breast feeding is not appealing to me	1.1	**	1.5	**	3.6
Bottle feeding is more convenient than breast feeding	1.8	**	3.2	**	4.2
I would feel comfortable breast feeding discreetly in public	3.3	**	2.6	**	2.0

** Likert scale, 1 = strongly disagree, 5 = strongly agree; "switch" includes women breast feeding at discharge but bottle feeding at 3 months*

*** Tukey multiple comparisons, P < .05. Difference between breast and bottle groups statistically significant for every statement*

breast feeding was examined in the subgroup of women who made the decision during pregnancy. Of 57 women who indicated their physician favored breast feeding, 41 (72 percent) did breast feed. Of 20 women whose physician expressed no preference, 12 (60 percent) breast fed. This difference was not statistically significant. Thus, the apparent lack of influence of the physician or nurse was not entirely related to the timing of the decision.

The relationship between attitudes toward breast feeding and the feeding method used at discharge and three months postpartum was explored. Women were asked to indicate on a Likert scale the degree to which they agreed or disagreed with the statements shown in Table 5, with a score of 1 being strongly disagree and 5 being strongly agree. Because these attitudes reflect not only the women's perceptions prior to this pregnancy but also their experience feeding this child, the women were categorized into three groups: women who breast fed at discharge and three months postpartum, those who breast fed at discharge but switched to the bottle by three months, and those who bottle fed from birth. Of the 177 women breast feeding at discharge from the hospital, only 119 were still breast feeding at three months. The first group, women who breast fed at discharge from the hospital and continued to breast feed at three months, differed on every statement from the third group, those who bottle fed at discharge. Those who breast fed at discharge but switched to bottle feeding by three months had mean scores somewhere between the persistent breast feeders and those bottle feeding. On items more idealistic, ie, women should be able to breast feed in public, the appeal of breast feeding, and breast milk is better for the baby's health, those who switched more closely resembled persistent breast feeders. On more practical considerations, including comfort with breast feeding in more public situations and the convenience of bottle feeding, the mean scores for those who switched were about halfway between the two extremes.

DISCUSSION

This study investigated the incidence of breast feeding in a rural area, the timing of the decision regarding feeding method, and factors associated with the selection of breast feeding. In addition, attitudes associated with successful breast feeding have been explored.

The incidence of breast feeding in this rural area was not substantially different from what would be expected from national studies. Martinez and Krieger[1] found an incidence of breast feeding of 62.3 percent in the West North Central region of the United States in 1983. There was a smaller percentage of blacks in this sample, and unmarried women could not be surveyed; both of these factors may result in a higher rate of breast feeding in this sample.

The strong correlation between breast feeding and education is consistent with previous studies.[1,8,12] The higher rate of breast feeding in the lower income groups, however, was unexpected. It is possible that the motivation for selecting breast feeding in this income group was cost, a factor not addressed in the survey. The finding is still in contrast to national data, however.[1] The low-income women in this sample are different from a national sample with respect to race and marital status. It is possible that a national study looking only at white, married, low-income women might also find a similarly higher rate of breast feeding.

The lack of correlation between breast feeding and other health-related behaviors, such as smoking, alcohol consumption, adequacy of prenatal care, and attendance at childbirth classes, was also a surprising finding. A lack of association between smoking or alcohol consumption and childbirth classes has been reported.[13] These findings certainly suggest that the presence or absence of one health-related behavior during pregnancy is not necessarily a good predictor of other behaviors.

Traditionally interventions to increase the use of breast feeding have targeted women during pregnancy and immediately postpartum.[14] Several findings in this study would suggest that such interventions are unlikely to further increase the current level of breast feeding. First, the timing of the decision precludes any meaningful effect of prenatal efforts. The finding that most women select a feeding method prior to pregnancy confirms other studies.[4,15] Second, this study would suggest that the physician is not very influential, even when the decision has not been made prior to pregnancy. Third, intervention targeted at the pregnant woman is not likely to reach other important sources of information for the mother, specifically the husband. The importance of social networks in the decision to breast feed has been reported previously,[15–17] though the relative influence of the husband has been variable.[16,17] The results here suggest that educational efforts should ideally reach future parents before pregnancy and should optimally target future fathers, not just future mothers.

One of the most important findings is the 98 percent incidence of breast feeding in multiparous women whose experience with previous children favored breast feeding. This finding highlights the importance of trying to ensure that a woman's first experience with nursing is successful and rewarding. Careful attention to problems related to nursing and positive feedback regarding the benefits of nursing while the woman is breast feeding may be of value.

The differences in the attitudes between women who bottle fed, those who breast fed but stopped before three months, and those who breast fed longer than three months are enlightening. Women who chose to breast feed believed in the health benefits for the baby and found this method of feeding appealing. Those who continued to nurse longer than three months also found it convenient and reported feeling comfortable nursing in the presence of close friends, in contrast to those who stopped nursing early. Women who chose to bottle feed were less convinced of the health benefits for the baby and were much more likely to find bottle feeding more convenient. It would seem, then, that anything that could be done to enhance the convenience of breast feeding would be beneficial in promoting the use of this method with respect to both incidence and duration. Part of this effort may simply be educational, ie, teaching women how to best manage situations in which they cannot easily be with their infant at feeding time. However, another aspect may require more widespread social change, ie, assisting women in the workplace who are nursing, and more widespread acceptance of breast feeding discreetly in public situations.

In conclusion, tremendous progress has been made in the use of breast feeding as the method of choice for infant feeding. Continued progress will require public education regarding the use and benefits of breast feeding, both to maintain the upward trend in the incidence of breast feeding, and to ensure a successful and rewarding experience for today's mothers.

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