South Carolina Pregnancy Risk Assessment Monitoring System

SOUTH CAROLINA PRAMS
PREGNANCY RISK ASSESSMENT MONITORING SYSTEM
Special Delivery

Breastfeeding Initiation among WIC Participants in South Carolina, 2004-2008

Introduction

Breastfeeding provides excellent nutrition for infants plus health benefits for the mother. Health benefits for breastfed infants are well documented. Breastfeeding seems to reduce the rates of mortality in preterm infants; hospital admissions; and illnesses such as rashes, ear infections, diarrhea, and respiratory illness (1). Maternal benefits of breastfeeding include decreased risk of type 2 diabetes (2), cardiovascular diseases, ovarian (3) and premenopausal breast cancer (4), and increased loss of pregnancy weight (5, 6). Recognition of the benefits of breastfeeding has led to the promotion of breastfeeding in the United States (US) as well as around the world. The Healthy People 2010 goals in the US and the World Health Organization (WHO) both recommend exclusive breastfeeding for the benefit of infant health. Regardless of these recommendations, only 73.9% of mothers in the United States initiated breastfeeding (2004-2008). Among children born in 2007, 43% were breastfeeding at 6 months and 22% at 12 months of age. Thirty three percent of infants born in 2007 were exclusively breastfed through 3 months of age, and approximately 13% were exclusively breastfed for 6 months (CDC).

What is SC PRAMS?

The South Carolina Pregnancy Risk Assessment Monitoring System (S.C. PRAMS) is an ongoing population-based surveillance system of maternal behaviors and experiences before, during and after pregnancy. About 2,300 mothers are randomly sampled from the state's live birth registry each year.

The data presented in this newsletter reflect live births to South Carolina mothers occurring in South Carolina during the years of 2004 to 2008. The overall response rate for these five years was 67.2 percent.

Overall, in South Carolina (SC) the prevalence of breastfeeding initiation is 64% among children born in 2007. In 2007, 54% of women participating in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) and 74% of women not participating in WIC in SC were breastfeeding (7). Previous studies have shown that women participating in WIC have consistently low initiation rates (8) and short breastfeeding duration (9). To our knowledge, only one study has assessed predictors of breastfeeding duration among WIC and non-WIC mothers (10). They found that introduction of formula, maternal perceived success, frequency of breastfeeding, income, and time of initiation of breastfeeding after delivery explained 48% of the variance in the duration of breastfeeding. Little is known about what other factors, such as race and breastfeeding barriers, affect breastfeeding initiation among WIC and non- WIC participants in SC.

Methods

Study Population and Study Design

SC PRAMS is an ongoing, population-based survey that collects information on SC mothers who delivered a live-born infant. It has been part of the Centers for Disease Control and Prevention's (CDC) multistate PRAMS program since 1991 and provides detailed information on

maternal behaviors, attitudes, and experiences before, during, and shortly after pregnancy. SC PRAMS was approved by the Institutional Review Boards at the SC Department of Health and Environmental Control and the CDC, and participating women provided informed consent.

PRAMS is a mixed-mode surveillance system that uses mail and telephone modes of data collection. A sample size of 100 to 250 new mothers are selected to receive a survey by a stratified systematic scheme every month from eligible birth certificates in SC. Women who deliver low birth weight infants are oversampled to ensure that adequate information is collected on high-risk groups. The final data include information from both PRAMS surveys and birth certificates. Additional details of the PRAMS methods can be found elsewhere (11).

We analyzed data from the 2004 to 2008 SC PRAMS surveys. Of the 11,722 women selected to participate in the project, 7,675 completed the questionnaire, resulting in a weighted response rate of 67.2%. The analyses included only women who completed the questionnaire, and whose infant was alive and lived with them at the time of the interview (N=6,466).

Variables

The outcome variable, breastfeeding initiation, was measured by responses to the question 'Did you ever breastfeed or pump breast milk to feed your new baby after delivery?' 'Yes' responses were classified as 'initiated breastfeeding', and 'no' responses were classified as 'never breastfed.'

The main exposure, participation in WIC during pregnancy, was measured as a dichotomous variable (yes, no).

Additional exposures examined included: maternal race (non-Hispanic black; non-Hispanic white; other: Hispanic, Asian, Pacific Islander), age (20 or less, 21-29, 30 or more years old), mother was trying to get pregnant (yes, no), received child birth classes (yes, no), maternal education (12 or less, 13-15, 16 or more years), household income (less than $10K, $10-19.9K $20-34.9K, $35-49.9K, $50K or more), marital status (married, other), infant gender (girl, boy), maternal smoking during pregnancy (yes, no), infant in intensive care (yes, no), recipient of Medicaid (yes, no), delivery method (vaginal, cesarean), previous live birth (yes, no), and breastfeeding education/information received during pregnancy (yes, no).

Mothers not initiating breastfeeding were asked: "What were your reasons for not breastfeeding your new baby?" They could choose up to 9 precoded options, plus "other" with an option to write in a response. The written responses were reviewed and recoded, resulting in a total of 12 categories. The "bottle feeding preference" category included reasons such as the baby did not want breast milk, the convenience of formula and bottle-feeding, and could not afford a breast pump.

Analysis

A bivariate analysis was performed using chi-square tests of independence to analyze the significance of the association between each maternal characteristic and breastfeeding initiation.

Survey logistic regression was used and risk ratios (RR) were estimated to determine the association between predictors and breastfeeding initiation. All covariates were entered as indicator variables into the logistic regression model simultaneously. A backward stepwise elimination process was used to retain confounders in the final model if they changed the effect of WIC participation by 10% or more. We performed a cumulative analysis using data from 2004 to 2008. SAS survey procedures were used to adjust for the complex survey design.

Using survey logistic regression, the exponential of the coefficient estimates the odds ratio (OR), which is a good estimate of the RR when the prevalence is low (12). The prevalence of the breastfeeding initiation, however, is not low. Thus, an OR is a biased estimator of the RR (12, 13). We converted the ORs into RRs with the following equations:

$$OR = \frac{p_1}{1-p_1} \Big/ \frac{p_0}{1-p_0}$$

thus,

$$p_1/p_0 = OR/[(1-p_0) + (p_0 * OR)].$$

Since $RR = {}^{p_1}/_{p_0}$,

the corrected RR is

$$RR = \frac{OR}{(1 - p_0) + (p_0 * OR)}$$

where:
p_1 = probability of the event in the exposed group
p_0 = probability of the event in the non-exposed group.

Reasons for not initiating breastfeeding were examined. Chi-square tests were used to assess associations between reasons for not breastfeeding and WIC participation.

All data presented were weighted and associations were determined to be statistically significant if $p < 0.05$.

Results

Descriptive Statistics

A total of 6,466 women were included in this study, representing approximately 271,195 SC women whose infant was alive and lived with them at the time of the interview from 2004 to 2008.

A total of 4,478 women initiated breastfeeding over the four years with a weighted percentage of 65.3% (Table 1).

Bivariate analysis

Results showed that 45% of women who participated in WIC did not initiate breastfeeding, whereas about 25% of non-WIC women did not initiate breastfeeding. Women who did not initiate breastfeeding more frequently were non-Hispanic black, unmarried, younger, and had lower education and household income. The incidence for not initiating breastfeeding was greater for women who did not receive breastfeeding education/information during prenatal care, had a cesarean delivery, smoked during pregnancy, had previous live birth(s), were on Medicaid, and were on WIC during pregnancy.

Statistically significant associations were observed between non-initiation of breastfeeding and the following maternal characteristics: race ($p < 0.0001$); maternal age ($p < 0.0001$); breastfeeding education/information received during prenatal care ($p < 0.0001$); maternal education ($p < 0.0001$); household income ($p < 0.0001$); marital status ($p < 0.0001$); maternal smoking ($p < 0.0001$); Medicaid status ($p < 0.0001$); WIC status during pregnancy ($p < 0.0001$); delivery method ($p < 0.0001$); and previous live birth ($p < 0.0001$).

Multivariable analysis

Mothers who participated in WIC were 1.4 times more likely to not initiate breastfeeding than those who did not participate in WIC during pregnancy after controlling for confounders (adjusted RR [aRR] 1.36; 95% confidence interval [CI] 1.20, 1.53) (Table 2).

Of the confounders, maternal education, maternal race, maternal age, and breastfeeding education/information during prenatal care had measurable influences (Table 2). Compared to 16 years of maternal education or more, women with 12 years or less and 13 to 15 years of education had higher risk for not initiating breastfeeding. Regarding breastfeeding education/information during prenatal care, women who received education/information were more likely to initiate breastfeeding than those who did not.

In comparison to non-Hispanic white women, non-Hispanic black women had a higher risk for not initiating breastfeeding (aRR 1.24; 95% CI 1.09, 1.39) (Table 2). Other races were less likely to not initiate breastfeeding (aRR 0.59; 95% CI 0.46, 0.71) compared to non-Hispanic white.

Bivariate analysis of reasons for not initiating breastfeeding

Among women who did not initiate breastfeeding, the most frequent reasons given was not liking breastfeeding (44.9 %) followed by having other children (24.7%), and returning to work or school (23.1%). Among WIC participants the top three reasons given for not breastfeeding were not liking breastfeeding (54.3%), returning to work or school (22.7%), and having other children to take care of (22.1%). Among non-WIC participants the most frequent reasons for not breastfeeding were not liking breastfeeding (43.9%), having other children to take care of (30.7%), and returning to work or school (23.8%). The chi-square

comparison between WIC and non-WIC participants was statistically significant for the following categories: did not want to be tied down (p=0.0141), had other children to take care of (p = 0.0068), and bottle feeding preference (p = 0.0002; Table 3).

Table 1. Characteristics of women who have information on breastfeeding status, South Carolina PRAMS: 2004-2008. Un-weighted sample and weight percentage.

	No Initiation of breastfeeding (N=1,969)		Initiation of breastfeeding (N=4,478)		P value
	Unweighted n	Weighted Percent	Unweighted n	Weighted Percent	
Maternal Race					
Non-Hispanic Black	1042	51.1	1532	48.9	<0.0001
Non-Hispanic White	848	30.4	2420	69.6	
Other	74	13.3	524	86.7	
Maternal Age					
20 or less	499	47.5	730	52.5	<0.0001
21-29	867	35.7	1966	64.3	
30 or more	528	26.9	1552	73.1	
Breastfeeding education/information					
Yes	322	14.3	2343	85.7	<0.0001
No	1597	47.2	2049	52.8	
Maternal Education (years)					
12 or less	1288	46.8	1769	53.2	<0.0001
13-15	520	31.6	1466	68.4	
16 or more	151	12.0	1233	88.0	
Household Income					
Less than 10K	781	48.0	1001	52.0	<0.0001
10K-19.9K	407	38.8	740	61.2	
20K-34.9K	315	36.7	765	63.3	
35K-49.9K	123	26.4	497	73.6	
50K or more	195	16.7	1255	83.4	
Marital Status					
Married	698	23.3	2719	76.7	<0.0001
Unmarried	1256	49.8	1734	50.2	
Maternal Smoking during pregnancy					
Yes	411	49.8	475	50.2	<0.0001
No	1555	32.6	3996	67.4	
Infant gender					
Girl	1030	34.4	2276	65.6	0.007
Boy	939	35.1	2201	64.9	
On Medicaid					
Yes	554	57.9	628	42.1	<0.0001
No	1414	30.1	3844	69.9	
On WIC during pregnancy					
Yes	1362	45.0	2156	55.0	<0.0001
No	568	22.7	2251	77.3	
Vaginal delivery					
Yes	1109	33.9	2291	66.1	<0.0001
No	860	36.5	2186	63.5	
Previous live birth					
Yes	1148	37.3	2126	62.7	<0.0001
No	769	30.4	2297	69.6	

Discussion and Conclusion

Overall, during the years from 2004 to 2008, 65.3% of the SC mothers initiated breastfeeding. Our results reveal two main findings: (1) WIC participation is a risk factor for non-initiation of breastfeeding among SC mothers; (2) regarding reasons for not initiating breastfeeding, a higher proportion of WIC participants report bottle feeding preference as compared to non-WIC participants. (However, only 1.6% of all non-breastfeeding women reported a preference for bottle feeding; Table 3.)

Our results show that non-WIC mothers are more likely to initiate breastfeeding than WIC participants. Further, non-Hispanic white participants are more likely to initiate breastfeeding than non-Hispanic black participants.

One limitation of this study is that the results are only generalizable to non-Hispanic black, non-Hispanic white and other SC resident mothers whose infants lived with them. Second, the quality of the data depends on the ability of the participant to accurately recall information such as whether they participated in WIC during pregnancy. Third, the data are cross-sectional, thus causal inferences cannot be made. Further, mothers were asked to check all that apply for the question on reasons for not breastfeeding. This makes it difficult to identify a mother's primary reason for non-initiation. Finally, the availability of WIC peer breastfeeding counselors may be strongly associated with breastfeeding success among WIC participants. However, data about the availability of peer counselors to WIC participating mothers was not available.

Regardless of the health benefits that breastfeeding provides, breastfeeding initiation among SC mothers has not met the Healthy People 2010 goal of 75%.

Predictors that might explain the lower rate on initiation of breastfeeding have been determined in previous studies. Some of the

Table 2. Association between risk factors and not initiating breastfeeding (n = 5,864).

Risk Factors[#]		(a) Odds ratio [95% CI]	(a) Risk Ratio [95% CI]	p-value
WIC participation	No (reference)	1	1	
	Yes	1.73 (1.36-2.22)	1.36 (1.20-1.53)	<0.0001
Maternal education (years)	12 or less	3.61 (2.57-5.06)	2.30 (1.91-2.69)	<0.0001
	13-15	2.16 (1.58-2.96)	1.58 (1.33-1.82)	<0.0001
	16 or more (reference)	1	1	
Maternal race	Non-Hispanic Black	1.49 (1.17-1.89)	1.24 (1.09-1.39)	0.0012
	Other	0.18 (0.11-0.27)	0.59 (0.46-0.71)	<0.0001
	Non-Hispanic White	1	1	
Maternal age (years)	20 or less	0.72 (0.52-1.03)	0.86 (0.72-1.0)	0.05
	21-29	0.78 (0.61-0.99)	0.89 (0.79-0.99)	0.04
	30 or more (reference)	1	1	
Breast-feeding information/ help	No (reference)	1	1	
	Yes	0.16 (0.13-0.20)	0.58 (0.51-0.64)	<0.0001
Married	Yes	1.88 (1.46-2.42)	1.44 (1.26-1.62)	<0.0001
	No (reference)	1	1	

Odds ratios and risk ratios for specific risk factors were estimated controlling for all other independent variables presented in the table.

predictors of breastfeeding identified in these studies include: income, education, nationality, race, region of residence, age, marital status, breastfeeding intent, gestational age, birth weight, and participation in WIC.

Our results are in agreement with many of these determinants. When we compared breastfeeding prevalence among women participating in WIC to mothers at <185% of the federal poverty level that were not on WIC, we found that 55% of WIC participants initiated breastfeeding compared to over 77% of poorer women who did not participate in WIC. Hence, poorer WIC women more often do not initiate breastfeeding than poorer women who do not participate in WIC.

WIC participation has also been shown to be associated with a lower likelihood of exclusive breastfeeding and a greater likelihood of infant formula introduction (14). In accordance with our results, others studies have found that the rate of initiation of breastfeeding was 54.3% among WIC participants and 76.1% among non-WIC participants in 2003 (15). In general, those with lower incomes and those who participate in the WIC program have a lower breastfeeding rate than other women, with those at a federal poverty level of <100% having a breastfeeding prevalence of 28.9% at six months (16). Examining the low breastfeeding initiation rates among WIC participants, Ziol-Guest and colleagues (2010) estimated the relationship between the timing of prenatal WIC participation and infant feeding practices. They found that entry into the WIC program during the first or second trimester of pregnancy is associated with reduced likelihood of initiation of breastfeeding and WIC participation is positively related to formula use (17). This reduced likelihood to initiate breastfeeding among WIC participants is in spite of extra effort given by WIC programs to promote breastfeeding.

Regarding reasons for breastfeeding non-initiation, we found that it differs slightly by WIC participation. Compared to non-WIC participants, those who participate in WIC were more likely to prefer bottle feeding. In contrast to WIC participants, non-WIC mothers more often reported having to take care of other children and not wanting to be tied down.

Previous studies have found that WIC participants' decisions about breastfeeding are influenced by a number of factors, including family members' and partners' attitudes towards

Table 3. Reasons why women did not initiate breastfeeding, among who never breastfed, South Carolina 2004-2008 (n=1,930).

Reasons	% (n)	WIC participation (n = 1,362) % (n)	Non WIC participation (n = 568) % (n)	p-value
want body to self	11.1 (207)	10.9 (154)	11.8 (53)	0.7149
responsibility of other children	24.7 (442)	22.1 (290)	30.7 (152)	0.0068
embarrassed/ pain/scared	9.6 (159)	10.4 (123)	7.8 (36)	0.2340
household duties	13.8 (230)	13.3 (164)	14.5 (62)	0.6325
did not like BF	44.9 (813)	54.3 (588)	43.9 (225)	0.7073
baby/mom sick/meds	5.7 (233)	6.1 (156)	4.8 (77)	0.4065
Bottle feeding preference[#]	1.6 (61)	2.5 (49)	0.53 (12)	0.0002
tied down	9.5 (138)	8.1 (85)	13.4 (53)	0.0141
work/school	23.1 (413)	22.7 (296)	23.8 (117)	0.7208
smoking	16.8 (423)	17.8 (299)	14.6 (124)	0.2434
personal	2.8 (139)	2.5 (81)	2.9 (58)	0.4825
lactation issues	1.4 (90)	1.7 (53)	1.1 (37)	0.1559

Note: Mothers were given the option to choose all reasons that apply, so percentages do not add up to 100%. All percentage are weighted to provide population estimates.

"Bottle feeding preference" option included reasons such as: the baby did not want breast milk, formula and bottle-feeding convenience, and mothers could not afford a breast pump.

breastfeeding (18). Other studies have found that attitudes towards breastfeeding can be negative despite mothers' knowledge of the health benefits of breastfeeding (19). Wojcicki and colleagues (2010) found that WIC participants were more likely to think of breastfeeding as embarrassing or difficult to do in public, was difficult to maintain because someone else cares for the child, and was physically painful and uncomfortable (20).

The promotion of breastfeeding initiation remains a challenge for WIC, particularly because program participants have characteristics that are associated with a decreased likelihood of adherence to recommended breastfeeding practices. WIC programs should continue to increase the number of WIC breastfeeding peer counselors and promote breast pump distribution. We recommend continued efforts to improve breastfeeding rates in SC, including lactation consultants and counselors educating clients about these physical concerns associated with early cessation of breastfeeding, such as the pain and discomfort that may be associated with breastfeeding.

References

1. Kovar MG, Serdula MK, Marks JS, Fraser DW. Review of the epidemiologic evidence for an association between infant feeding and infant health. *Pediatrics* 1984;74:615-638.
2. Steyn NP, Mann J, Bennett PH, Temple N, Zimmet P, Tuomilehto J, Lindstrom J, Louheranta A. Diet, nutrition and the prevention of type 2 diabetes. *Public Health Nutr* 2004;7:147-165.
3. Rosenblatt KA, Thomas DB. Lactation and the risk of epithelial ovarian cancer. The who collaborative study of neoplasia and steroid contraceptives. *Int J Epidemiol* 1993;22:192-197.
4. Newcomb PA, Storer BE, Longnecker MP, Mittendorf R, Greenberg ER, Clapp RW, Burke KP, Willett WC, MacMahon B. Lactation and a reduced risk of premenopausal breast cancer. *N Engl J Med* 1994;330:81-87.
5. Kac G, Benicio MH, Velasquez-Melendez G, Valente JG, Struchiner CJ. Breastfeeding and postpartum weight retention in a cohort of brazilian women. *Am J Clin Nutr* 2004;79:487-493.
6. Stuebe AM, Schwarz EB. The risks and benefits of infant feeding practices for women and their children. *J Perinatol*;30:155-162.
7. South carolina prams 2007 databook: Surveillance report on maternal health and experiences during pregnancy and the early infancy period: South Carolina Pregnancy Risk Assessment Monitoring System 2007.
8. Racial and socioeconomic disparities in breastfeeding--united states, 2004. *MMWR Morb Mortal Wkly Rep* 2006;55:335-339.
9. Schwartz JB, Popkin BM, Tognetti J, Zohoori N. Does wic participation improve breast-feeding practices? *Am J Public Health* 1995;85:729-731.
10. Hill PD. Predictors of breast-feeding duration among wic and non-wic mothers. *Public Health Nurs* 1991;8:46-52.
11. Gilbert BC, Shulman HB, Fischer LA, Rogers MM. The pregnancy risk assessment monitoring system (prams): Methods and 1996 response rates from 11 states. *Matern Child Health J* 1999;3:199-209.
12. Skov T, Deddens J, Petersen MR, Endahl L. Prevalence proportion ratios: Estimation and hypothesis testing. *Int J Epidemiol* 1998;27:91-95.
13. Zhang J, Yu KF. What's the relative risk? A method of correcting the odds ratio in cohort studies of common outcomes. *JAMA* 1998;280:1690-1691.
14. Jacknowitz A, Novillo D, Tiehen L. Special supplemental nutrition program for women, infants, and children and infant feeding practices. *Pediatrics* 2007;119:281-289.
15. Breastfeeding trends and updated national health objectives for exclusive breastfeeding--united states, birth years 2000-2004. *MMWR Morb Mortal Wkly Rep* 2007;56:760-763.
16. Singh GK, Kogan MD, Dee DL. Nativity/immigrant status, race/ethnicity, and socioeconomic determinants of breastfeeding initiation and duration in the united states, 2003. *Pediatrics* 2007;119 Suppl 1:S38-46.
17. Ziol-Guest KM, Hernandez DC. First- and second-trimester wic participation is associated with lower rates of breastfeeding and early introduction of cow's milk during infancy. *J Am Diet Assoc*;110:702-709.
18. Bentley ME, Caulfield LE, Gross SM, Bronner Y, Jensen J, Kessler LA, Paige DM. Sources of influence on intention to breastfeed among african-american women at entry to wic. *J Hum Lact* 1999;15:27-34.
19. Zimmerman DR, Guttman N. "Breast is best": Knowledge among low-income mothers is not enough. *J Hum Lact* 2001;17:14-19.
20. Wojcicki JM, Gugig R, Tran C, Kathiravan S, Holbrook K, Heyman MB. Early exclusive breastfeeding and maternal attitudes towards infant feeding in a population of new mothers in San Francisco, California. *Breastfeed Med*;5:9-15.

Acknowledgements

Authors:

Nelís Soto-Ramírez, MS, MPH, Graduate Student, University of South Carolina
Michael Smith, MSPH, PRAMS Coordinator
Kristen Helms, MSPH, Director, Surveillance Unit
Kristin Wilkerson, MPA, MSW, PRAMS Operations Manager

South Carolina PRAMS Program
Surveillance Unit, Office of Public Health Statistics and Information Systems, Department of Health and Environmental Control
2600 Bull Street, Columbia, SC 29201

C. Earl Hunter, Commissioner
Guang Zhao, PhD, Director, Public Health Statistics and Information Systems

Funding for the PRAMS Program is provided by the Center for Disease Control and Prevention, Atlanta, GA
(Grant No. 5UR6 DP000502-05)

A special thanks to all mothers that take the time to share their experiences in the South Carolina PRAMS survey!

D H E C
PROMOTE PROTECT PROSPER
South Carolina Department of Health and Environmental Control
www.scdhec.gov