

# WIC Participation, Breastfeeding Practices, and Well-Child Care Among Unmarried, Low-Income Mothers

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We estimated the effect of Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) participation in 1999 to 2000 on breastfeeding initiation and duration and well-child care. We applied multivariate regression to a sample of 2136 unmarried, low-income, urban mothers from the Fragile Families and Child Wellbeing Study. WIC participation was associated with small increases in the probabilities of initiating breastfeeding and having had at least 4 well-child visits since birth—behaviors that benefit infants beyond the newborn period—but not with breastfeeding duration. (*Am J Public Health*. 2004;94:1324–1327)

The Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) provides low-income, nutritionally vulnerable pregnant and postpartum women, infants, and young children with nutrient-dense food packages, nutritional counseling (including breastfeeding support), and linkage to medical and social services. Numerous studies indicate that WIC participation during pregnancy is associated with better birth outcomes.<sup>1–10</sup> However, with the notable exception of the Rush et al.<sup>11</sup> evaluation, little research has focused on the benefits of WIC participation that extend beyond the newborn period.<sup>12</sup>

We estimated the association between WIC participation and 2 maternal health behaviors that benefit infants—breastfeeding and well-child care. The study used 1999 to 2000 survey data on low-income, unmarried, urban mothers from the Fragile Families and Child Wellbeing Study. WIC participation may have mixed effects on breastfeeding because of the

competing effects of activities that promote breastfeeding and the valuable infant formula provided in food packages. However, we expect that WIC participation is associated with greater use of well-child care because of WIC's emphasis on medical referrals.

## METHODS

Data were from a subsample of the Fragile Families and Child Wellbeing Study, a longitudinal survey of 3712 unmarried couples and 1186 married couples, all of whom had newborn infants at baseline. Respondents resided in 20 cities across the United States. We used data from the baseline survey, which was conducted between June 1999 and October 2000 in the hospital after the child's birth, and from the first follow-up survey, which was conducted in person or by telephone approximately 12 to 15 months after the birth. To limit the analysis to mothers who were most likely eligible for WIC participation, we limited the sample to 2136 mothers who were unmarried and living at or below 250% of the federal poverty line at the time of the child's birth.

Our sample included women who were most likely eligible for WIC and who were able to provide fairly complete information for the study. We excluded from the original 4898 respondents: (1) mothers who did not respond to the follow-up survey ( $n=533$ ), (2) mothers whose children were aged younger than 12 months or older than 24 months at the time of the follow-up survey ( $n=383$ ), (3) mothers with incomes greater than 250% of the poverty line at the time of the child's birth ( $n=1173$ ), (4) mothers married at the time of the birth ( $n=378$ ), (5) mothers with multiple births or with missing information on the child's sex ( $n=49$ ), and (6) mothers who were not living with their children by the time of the follow-up survey ( $n=65$ ). We also excluded mothers with missing information on any dependent variable ( $n=181$ ). However, we did include respondents with missing information on independent variables used in the analysis. For these respondents, missing information was replaced with sample means.

We used probit and ordinary least squares models to analyze the 3 outcomes: (1) whether the mother initiated breastfeeding; (2) the logarithm of the number of weeks the mother

breastfed, among those who initiated breastfeeding; and (3) whether the child received at least 4 well-child evaluations during his or her first year. We measured maternal WIC status with a dummy variable indicating whether the mother participated in WIC since the child was born; mothers were not asked about prenatal participation. The models also included detailed information about the child (e.g., age in weeks, low birthweight), the mother (e.g., race/ethnicity, education, age, living arrangements, health behaviors), and the household (e.g., size, health insurance, income, city of residence).

We estimated parsimonious models (which included only demographic covariates) and more fully specified models (which included all of the covariates) to gauge the sensitivity of the WIC participation coefficient to the inclusion of additional factors. Compared with the national data sets used in previous work, our sample included a fairly homogeneous sample of mothers. Nevertheless, we lacked information on the timing of WIC participation, and it is still possible that mothers may have self-selected into WIC along unobserved factors that also affect health investments, which may have led to biased estimates.

## RESULTS

About half of the mothers reported breastfeeding initiation, and the average duration of breastfeeding was about 18 weeks among mothers who initiated (Table 1). Breastfeeding initiation rates in the analysis samples were similar to those in other recent national surveys of low-income women.<sup>13,14</sup> Approximately 91% of the mothers reported that their child had at least 4 well-child evaluations since birth, and 86% of the mothers reported WIC participation, which is consistent with WIC's high participation rate among eligible persons.

In both the parsimonious model (Table 2, column 1) and the larger model (Table 2, column 2), WIC participation was associated with a statistically significant increased probability of breastfeeding initiation of about 0.07 at the sample means (i.e., approximately 52% WIC vs 45% comparison,  $P<.05$ ). The magnitude of the estimate was almost identical in the parsimonious model and the larger model. We did not find any evidence that WIC participation was associated with breastfeeding duration

**TABLE 1—Sample Characteristics (N = 2136)**

	Percentage	Mean (SD)
<b>Outcomes</b>		
Initiated breastfeeding	50.2	
Number of weeks of breastfeeding among those who initiated		18.2 (18.0)
Child had at least 4 well-child evaluations	91.4	
<b>Maternal characteristics</b>		
Participated in WIC after child's birth	86.0	
Moved since child's birth	51.8	
Had another baby since child's birth	15.8	
Lives in own apartment or house	64.3	
Enrolled in Medicaid	73.7	
Smoked during past 30 days	30.4	
Enrolled in school	21.3	
Has worked since child's birth	79.1	
Age at 12-month interview		24.8 (5.5)
Lives with at least 1 parent	31.4	
Number of children in household		1.5 (1.4)
Foreign born	14.5	
Hispanic	31.3	
African American	56.2	
White	23.9	
Asian	1.4	
Other race	18.4	
Native American	5.6	
< High school	45.3	
High school graduate	34.1	
Some college completed	19.5	
College graduate	1.1	
Household income, \$		16222 (11661)
Smoked during pregnancy	22.9	
Prenatal care during first trimester	77.4	
<b>Child characteristics</b>		
Age at 12-month interview, weeks		64.3 (12.6)
Low birthweight	11.2	
Physically disabled	2.7	

Note. WIC = Special Supplemental Nutrition Program for Women, Infants, and Children. Hispanic ethnicity was asked independently of race (e.g., a respondent could report White race and Hispanic ethnicity).

among mothers who initiated breastfeeding (Table 2, columns 3–4), but WIC participation had a statistically significant positive association with the receipt of at least 4 well-child visits (Table 2, columns 5–6). Including additional covariates did not reduce this estimate, and the increase in probability was about 0.06 at the sample means (i.e., approximately 93% WIC vs 87% comparison,  $P < .05$ ).

The positive association between WIC participation and well-child care and breastfeed-

ing initiation is consistent with the WIC goals of linking participants to medical services and promoting breastfeeding, a health behavior that is associated with numerous benefits for infants.<sup>15–19</sup> Previous WIC evaluations indicated that participation improves pregnancy outcomes. These findings add to existing research by suggesting that WIC participation also may be associated with health behaviors that benefit infants beyond the newborn period. ■

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### Contributors

Both authors developed the study hypotheses, analyzed the data, and wrote the brief.

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### Human Participant Protection

The Fragile Families and Child Wellbeing Study was reviewed and approved by the Princeton University and the Columbia University internal review boards.

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**TABLE 2—Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) Participation and Health Investments**

	Initiated Breastfeeding		Logarithm of Weeks of Breastfeeding		At Least 4 Well-Child Visits	
	Probit Model Marginal Effects (P)		Ordinary Least Squares Model Coefficients (P) <sup>a</sup>		Probit Model Marginal Effects (P) <sup>b</sup>	
	Parsimonious Model	Larger Model	Parsimonious Model	Larger Model	Parsimonious Model	Larger Model
Participated in WIC	0.071 (.022)	0.074 (.026)	-0.154 (.135)	-0.113 (.290)	0.054 (.005)	0.060 (.002)
Child's age	-0.001 (.599)	-0.001 (.497)	-0.002 (.539)	-0.002 (.585)	-0.001 (.257)	-0.001 (.298)
Mother is foreign born	0.396 (.000)	0.384 (.000)	0.808 (.000)	0.715 (.000)	-0.015 (.374)	-0.023 (.222)
Mother is Hispanic	0.074 (.294)	0.058 (.392)	-0.015 (.885)	-0.073 (.461)	-0.024 (.239)	-0.030 (.094)
Mother is African American	-0.087 (.054)	-0.102 (.013)	0.205 (.027)	0.159 (.096)	-0.062 (.000)	-0.061 (.000)
Mother is Asian	-0.097 (.368)	-0.079 (.473)	-0.496 (.107)	-0.461 (.143)	0.008 (.903)	0.012 (.858)
Mother is Native American	-0.015 (.825)	-0.011 (.859)	0.007 (.938)	-0.017 (.843)	0.012 (.654)	0.010 (.721)
Mother is other race	-0.064 (.239)	-0.059 (.284)	-0.110 (.303)	-0.082 (.290)	-0.037 (.069)	-0.033 (.114)
Mother is high school graduate	0.110 (.000)	0.106 (.000)	0.022 (.775)	0.001 (.990)	0.048 (.000)	0.043 (.000)
Mother completed some college	0.270 (.000)	0.254 (.000)	0.134 (.224)	0.135 (.233)	0.056 (.000)	0.045 (.014)
Mother is college graduate	0.377 (.004)	0.350 (.004)	0.794 (.000)	0.865 (.001)	0.027 (.578)	0.011 (.806)
Log household income	0.011 (.147)	0.012 (.123)	-0.019 (.433)	-0.011 (0.646)	0.000 (.967)	0.000 (.999)
Mother's age	-0.009 (.000)	-0.007 (.000)	0.016 (.048)	0.005 (.544)	-0.002 (.108)	-0.002 (.112)
Mother moved since child's birth		0.041 (.128)		-0.059 (.373)		-0.002 (.894)
Mother had another baby since child's birth		-0.015 (.631)		-0.277 (.002)		-0.010 (.482)
Mother lives in own apartment or house		-0.015 (.570)		-0.002 (.970)		0.003 (.781)
Mother is enrolled in Medicaid		0.007 (.820)		-0.000 (.999)		-0.025 (.063)
Mother smoked in past 30 days		-0.027 (.492)		-0.283 (.089)		-0.022 (.202)
Mother is enrolled in school		0.098 (.000)		-0.037 (.627)		0.009 (.533)
Mother has worked since child's birth		-0.020 (.501)		-0.146 (.158)		-0.006 (.513)
Child is low birthweight		-0.020 (.590)		-0.390 (.003)		-0.019 (.272)
Mother lives with at least 1 parent		-0.040 (.023)		-0.248 (.020)		-0.014 (.319)
Number of children in household		0.002 (.976)		0.065 (.015)		-0.003 (.589)
Mother smoked during pregnancy		-0.043 (.190)		0.023 (.879)		0.000 (.988)
Mother had prenatal care during first trimester		0.044 (.134)		-0.006 (.940)		0.010 (.599)
Child is physically disabled		-0.103 (.276)		0.335 (.074)		0.036 (.377)
N	2136	2136	1063	1063	2107	2107

Note. All models included 19 dummy variables representing the city of residence at baseline. The coefficients on the 19 dummy variables representing city of residence and the coefficients on the intercepts in each model are not shown. Omitted category: nonparticipant, White, high school dropout, born in United States. We present Huber-adjusted P values with an additional adjustment for clustering at the city level. These P values are obtained from robust variance estimates that also account for the possibility that observations from the same city are not independent of each other. Marginal effects should be interpreted as the change in the probability of the outcome associated with a small change in the independent variable (for a continuous variable) or a discrete change from 0 to 1 (for a dummy variable).

<sup>a</sup>Logarithm of weeks of breastfeeding model is limited to the 1036 mothers of 2136 who initiated breastfeeding.

<sup>b</sup>Sample size is 2107 instead of 2136 in well-child visits model because all observations of living in 1 city (n = 29) were associated with at least 4 well-child visits. These observations were dropped.

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