

# WIC Participation and Improved Birth Weight Outcomes: Connecticut, 2000

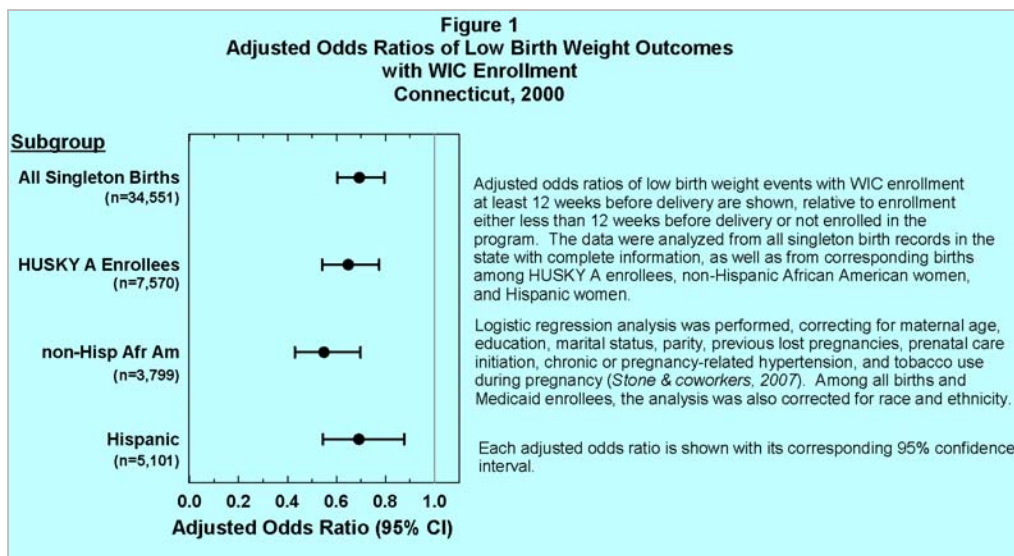
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Since implementation of the first statewide Special Supplemental Nutrition Program for Women, Infants, and Children (WIC) in Vermont in 1974 (Henchy, 2005), underprivileged pregnant women and young children have received supplemental foods and other nutritional services from the federal program. Currently, women with incomes up to 185% poverty level are eligible for enrollment in the WIC program (U.S. Dept Agriculture, 2007), which is managed in Connecticut by the state Department of Public Health. This report summarizes a recent study to evaluate the effect of WIC enrollment on low birth weight (LBW) outcomes in Connecticut (Stone et al., 2007). Data from birth records, and WIC and HUSKY A enrollment databases, were used to evaluate the association between WIC enrollment and LBW, controlling for multiple maternal characteristics known to be risk factors for low birth weight. Data were supplied courtesy of the Health Information Systems & Reporting Section and WIC program within DPH, and the Connecticut Department of Social Services.

## WIC Enrollment and Low Birth Weight Outcomes

Logistic regression techniques were used to evaluate the association of WIC enrollment at least 12 weeks before delivery with LBW outcomes, controlling for ten maternal characteristics known to be associated with increased risk for LBW (Stone et al., 2007). These maternal characteristics were: race/ethnicity, age, education level, marital status, previous deliveries and lost pregnancies, month of prenatal care initiation, presence of chronic or pregnancy-related hypertension or other medical risk factors, and tobacco use during pregnancy. The analysis was conducted of all singleton birth records to Connecticut residents during calendar year 2000, and corresponding births among HUSKY A enrollees, non-Hispanic Black/African American women, and Hispanic women. Birth records with missing data were excluded from the regression analysis.

Among all singleton births in the state, women enrolled in WIC at least 12 weeks before



delivery exhibited 69% (95% CI: 60% – 80%) the risk of delivering a LBW baby, relative to women who were either enrolled in WIC less than 12 weeks before delivery or who were not enrolled in the program (**Figure 1**). This reduced risk was statistically significant ( $p < 0.0001$ ). Similarly, a significantly reduced risk for LBW with WIC enrollment at least 12 weeks before delivery was observed among women enrolled in HUSKY A, and among women of minority race and ethnicity. The risk of LBW was reduced to 65% among HUSKY A enrollees (95% CI: 54% - 77%), 55% among non-Hispanic Black/African American women (95% CI: 43% - 70%), and 69% among Hispanic women (95% CI: 55% - 88%). The reduced risks seen among these sub-groups were not statistically different from that observed among all singleton births in the state.

These data collectively indicate that, when controlled for multiple characteristics known to be predictors of LBW, WIC enrollment at least 12 weeks before delivery is protective against LBW events, decreasing the risk of LBW by 31%, relative to women who enroll in WIC either earlier than 12 weeks before delivery or who do not enroll in WIC. Significantly reduced risk of LBW with WIC enrollment is also observed among women co-enrolled in HUSKY A, and among both non-Hispanic Black/African American and Hispanic women.

### Characteristics of WIC Enrollees

Of the 43,075 Connecticut women who gave birth in 2000, 10,028 (23%) were enrolled in WIC before delivery (**Table I**), and 9,630 (22%) were enrolled in the state’s public insurance program, called HUSKY A. Based on federal poverty level, pregnant women enrolled in HUSKY A were also eligible for WIC participation (Stone et al., 2007), yet only 67% (6,432) of women enrolled in HUSKY A were co-enrolled in WIC before delivery. Among all births in the state, 15% were co-enrolled in WIC and HUSKY A.

**Table I**  
**WIC and Medicaid Enrollment**  
**Connecticut Births, 2000**

		Enrolled In WIC		Total
		Yes	No	
Enrolled in HUSKY A	Yes	6,432	3,198	9,630
	No	3,596	29,849	33,445
Total		10,028	33,047	43,075

WIC enrollment was that which occurred at or before the time of delivery; HUSKY A enrollment was that which occurred at the time of delivery.

Frequencies were determined among all births to Connecticut residents, 2000.

Among all women in the state with singleton births in 2000, WIC enrollees were significantly more likely than non-WIC enrollees to: be of minority race and ethnicity, be unmarried, be less than 24 years old, use tobacco during pregnancy, have no more than 12 years of education, and gain no more than 15 pounds during pregnancy (**Table II**). Among births in the state to HUSKY A enrollees, women co-enrolled in WIC were generally similar in characteristics to those who were not enrolled in WIC. Some significant differences remained, however. HUSKY A enrollees who were co-enrolled in WIC were significantly more likely to: be of minority race and ethnicity, be unmarried, be less than 18 years old, and have less than 12 years of education. These data confirm that the characteristics of WIC enrollees are different than those of non-WIC enrollees.

### Discussion

Logistic regression analysis of the Connecticut birth cohort in 2000, controlling for multiple predictors of adverse birth events, revealed a significant protective association against LBW with WIC enrollment at least 12 weeks before delivery. This study was conducted of state data and cannot be generalized to the national level. It does, however, contribute to increasing evidence

**Table II**  
**Comparison of WIC and non-WIC Populations**  
**Percentage Ratios for Selected Maternal Characteristics**  
**Connecticut Singleton Births, 2000**

WIC to non-WIC Percent Ratio	Selected Maternal Characteristics							
	Race/Ethnicity		Not Married	Age		Tobacco Use During Pregn	Education	
	non-Hisp BI/Afr Am	Hispanic		< 18 yo	18-24 yo		< 12 yrs	12 yrs
<b>All Births</b>	<b>4.03</b>	<b>5.04</b>	<b>4.67</b>	<b>7.11</b>	<b>3.77</b>	<b>2.66</b>	<b>5.70</b>	<b>2.06</b>
<b>HUSKY A Enrollees</b>	<b>1.25</b>	<b>1.83</b>	<b>1.18</b>	<b>1.65</b>	1.07	0.90	<b>1.28</b>	1.01

WIC and non-WIC percentages that differed significantly ( $p < 0.001$ ) are shown in **bold**.

The ratio of percent frequencies for women enrolled *versus* not enrolled in WIC at the time of delivery were calculated from either all singleton births in the state or from singleton births among women enrolled in HUSKY A at the time of delivery.

of the protective effect of the WIC program in other states. Earlier studies in Missouri (Schramm, WF; 1986), Massachusetts (Kotelchuck, M, et al; 1984), and Oklahoma (Metcoff, J, et al; 1985), and more recent studies in New Jersey (Gregory, PM, and De Jesus, ML; 2003), Minnesota (Ross, JA, et al; 2002), and New York (Lazariup-Bauer, V, et al; 2004), also show a protective effect of WIC participation against adverse birth outcomes.

Adverse birth outcomes are often associated with increased hospitalization costs. Newborn hospitalization costs for LBW infants in the state during 2003, on average, were \$32,670 more per event among women enrolled in HUSKY A, relative to costs associated with higher birth weights (*Source*: HCQSAR, unpublished results, 2006). For births in year 2000 to women enrolled in WIC, 607 were LBW and cost, on average, an estimated \$19.8 million beyond that of births that were not LBW (**Table III**). Enrollment in WIC, associated with a 31% reduced risk of LBW in 2000, may have reduced the number of LBW events by 273, and, therefore, may have reduced these additional hospitalization costs by as much as \$8.9 million. This estimated savings

**Table III**  
**Estimated Hospital Cost Savings for Low Birth Weight Outcomes**  
**Attributable to WIC Enrollment**  
**(at least 12 weeks before delivery)**  
**Connecticut, 2000**

	Actual Number	Expected Number	Estimated Additional Hospitalization Costs (\$ million)
<i>Birth Cohort</i>			
LBW, among women enrolled in WIC	607		\$19.8
LBW, if women were not enrolled in WIC		880	\$28.7
Change in LBW, with WIC enrollment		<b>-273</b>	<b>(\$8.9)</b>
<i>HUSKY A Enrollees</i>			
LBW, if women were co-enrolled in WIC		309	\$10.1
LBW, among women not co-enrolled in WIC	475		\$15.5
Change in LBW, with WIC co-enrollment		<b>-166</b>	<b>(\$5.4)</b>

Additional average hospitalization costs for LBW events charged to HUSKY A enrollees (\$32,670 per event) were calculated from the difference between the average cost of a LBW (\$35,502) and that of a birth of greater weight (\$2,832 per event), and were based on 2003 figures (*Source*: HCQSAR, unpublished results, 2006).

The number of expected LBW events was calculated using the odds ratio of 0.69 for all births, and 0.65 for HUSKY A enrollees.

in hospitalization costs attributable to WIC enrollment could have increased to approximately \$14.3 million if all women enrolled in the HUSKY A insurance program were co-enrolled in WIC. These estimated cost savings for acute medical care attributable to LBW outcomes are based on simple estimation methods that are intended to provide a rough estimate of the magnitude of WIC program benefits.

The data used for this analysis were from existing birth records, limiting analysis to an observational study. Also, use of only a single calendar year of WIC enrollment data precluded analysis of teen mothers and may have limited the strength of the results observed among minority race and ethnic groups. The DPH has available birth-linked HUSKY A enrollment data for years 2000 through 2005. Accompanying data for WIC enrollment would permit more comprehensive studies of WIC participation, as well as analysis of program efforts to modify maternal behaviors such as smoking and drinking during pregnancy, and breastfeeding after birth. These data collection efforts are being pursued.

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