Pregnancy Outcomes In an Initiative Preceeding Onset of Prenatal Care

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About one in twelve infants born in Rhode Island during 2004–2006 were low birth weight and nearly one in ten were premature.[1] These conditions greatly increase the risk of perinatal complications and of disability and poor health across the life course. Nationally, there is evidence of preconception care effectiveness for screening/referral of reproductive risks, folate supplementation, and treatment of metabolic conditions.[2] Research evidence indicates that improvements in birth outcomes require pregnancy readiness and appropriate antenatal care, and that low birth weight and prematurity reductions cannot be achieved solely by improving access to reproductive services and prenatal care.[3,4] The 2005 National Preconception Care Summit recommended the evaluation of interconception care and care coordination models for women with high social and medical risks.[5]

Rhode Island Title X agencies started offering the **Women Health Screening and Referral Program (WHSRP)** in 1998 as a no-cost pregnancy testing and health risk management strategy for women who believe they may be pregnant. Women complete a questionnaire while they wait for test results. Their responses help Title X staff assess their health risks to link them with appropriate services before or early in pregnancy, when preventing and treating potential health problems provides greater benefits to the mother and child. This evaluation was conducted to determine whether the WHSRP has influenced birth weight and gestational age and if there is evidence to support funding continuation. Funding for this program ended in November 2010.

Methods

This study compared pregnancy outcomes of women receiving screening/referral with community controls not receiving these services. Birth information was provided by the Rhode Island Birth File and consisted of 31,979 women with a live birth during 2004-2006. Birth records confirmed whether each woman had a low birth weight (<2500 grams), high birth weight (>4,250 grams), and/or preterm delivery (<37 weeks of gestation). Records were linked using delivery date, maternal date of birth and zip code with Title X and WHSRP databases to determine whether, before starting prenatal care, they: a) participated in the WHSRP (N=708); b) visited a Title X agency but did not participate in the WHSRP (N=477); or c) received no WHSRP or Title X services (N=30,794). Algorithms verified the correspondence of race/ethnicity in linked records, and the window of exposure to Title X or WHSRP. Women were considered exposed if they had a Title X visit with a positive pregnancy test after the date of their **last menstrual period (LMP)** and before starting prenatal care. An error margin for the LMP of +/- 3 weeks helped account for potential recall bias and/or menstrual irregularities. Linked records not meeting one or more of these criteria were not considered exposed to Title X (model 2) or WHSRP (model 1) and were reclassified as community controls (model 3). Re-

Table 1
Pregnancy Outcomes in Models 1 and 3 Controlling for Educational Level and Age (All Births and Core Areas)

Variable Levels	Outcome Compared	MH Chi-Sq p	Stratum-Specific OR (95% CI)	Breslow-Day p	CMH p	Adjusted OR (95% CI)
All Births	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	1.5171 (0.9777-2.3542)			
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	Hs***[1]	11.6796 (2.0514-465.5811)[1]	S*	Vs**	1.5067 (1.1079-2.049
	Gestational Age					
HS or less and age 21-34	Premature (<37) Full term (37-42)	S*	1.5614 (1.0244-2.3800)			
More than HS and age 21-34	Premature (<37) Full term (37-42)	Ns	1.6987 (0.7906-3.6502)	Ns	S*	1.3896 (1.0453-1.847
Singleton Births	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	1.5019 (0.9486-2.3779)			
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	Vs**[1]	9.8935 (1.7370-394.4516)[1]	S*	S*	1.4180 (1.0355-1.941
Core Areas	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	1.3148 (0.7945-2.1758)			
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	S*[1]	7.0100 (1.2145-281.0423)[1]	Ns	Ns	1.3481 (0.9440-1.925
HS or less and age 21-34	Hbw (<2500) Nbw (2500-4250)	S*[1]	2.7266 (1.0313-10.2083)			
More than HS and age 21-34	Hbw (<2500) Nbw (2500-4250)	Ns	0.7706 (0.3109-2.4696)	Ns	Ns	1.5818 (0.8619-2.903
	Gestational Age					
HS or less and age 21-34	Premature (<37) Full term (37-42)	S*	1.6802 (1.0181-2.7728)			
More than HS and age 21-34	Premature (<37) Full term (37-42)	Ns	1.2502 (0.5740-2.7228)	Ns	Ns	1.3774 (0.9950-1.906

* significant
** very significant
*** highly significant
[1] Fisher exact test/Exact confidence limits

Table 2
Pregnancy Outcomes in Models 1 and 3 Controlling for Educational Level and Age (Hispanics)

Variable Levels	Outcome Compared	MH Chi-Sq p	Stratum-Specific OR (95% CI)	Breslow-Day p	CMH p	Adjusted OR (95% CI)
All Births	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	S*	2.7421 (1.1265-8.6786)	Ns		
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	zero cell—not computed	Ns	Vs**	2.1890 (1.2155-3.9422)
HS or less and age 21-34	Hbw (<2500) Nbw (2500-4250)	Ns	1.4131 (0.5701-4.5276)[1]			
More than HS and age 21-34	Hbw (<2500) Nbw (2500-4250)	Hs***	0.1929 (0.0760-0.4895)	S*	Ns	0.7630 (0.4283—1.3593)
	Gestational Age					
HS or less and age 21-34	Premature (<37) Full term (37-42)	S*	2.2650 (1.0987-4.6692)			
More than HS and age 21-34	Premature (<37) Full term (37-42)	Ns	4.8609 (0.8071-198.3595)[1]	Ns	S*	1.8104 (1.1128-2.9455)
Singleton Births	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	S*	2.5686 (1.0538-8.1373)[1]			
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	zero cell—not computed	Ns	S*	2.0363 (1.1298-3.6700)
HS or less and age 21-34	Hbw (<2500) Nbw (2500-4250)	Ns	1.4102 (0.5688-4.5188)[1]			
More than HS and age 21-34	Hbw (<2500) Nbw (2500-4250)	Hs***	0.1946 (0.0767-0.4938)	S*	Ns	0.7637 (0.4286-1.3607)
	Gestational Age					
HS or less and age 21-34	Premature (<37) Full term (37-42)	S*	2.1442 (1.0393-4.4236)			
More than HS and age 21-34	Premature (<37) Full term (37-42)	Ns	4.2532 (0.7045-173.7608)[1]	Ns	S*	1.7007 (1.0445-2.7690)
Core Areas	**Birth Weight**					
HS or less and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	2.2457 (0.9149-7.1469)[1]			
More than HS and age 21-34	Lbw (<2500) Nbw (2500-4250)	Ns	zero cell—not computed	Ns	S*	2.0067 (1.0836-3.7164)
HS or less and age 21-34	Hbw (<2500) Nbw (2500-4250)	Ns	1.7167 (0.6295-6.5532)[1]			
More than HS and age 21-34	Hbw (<2500) Nbw (2500-4250)	Vs***	0.2041 (0.0694-0.7374)[1]	S*	Ns	0.8657 (0.4628-0.6194)
	Gestational Age					
HS or less and age 21-34	Premature (<37) Full term (37-42)	Ns	1.9447 (0.9388-4.0284)			
More than HS and age 21-34	Premature (<37) Full term (37-42)	Ns	4.4767 (0.7320-183.8474)[1]	Ns	S*	1.6914 (1.0227-2.7974)

* significant
** very significant
*** highly significant
[1] Fisher exact test/Exact confidence limits

cords with unclassified race/ethnicity information (N=5,587 or 17.5%) were excluded from the racial/ethnic group analysis but were part of the overall analysis. Relationships between models of care and pregnancy outcomes were tested via chi-square (crude odds ratio), Mantel-Haenszel (stratum-specific odds ratios) and Cochran-Mantel-Haenszel (adjusted odds ratio) analyses. Fisher exact test and exact calculation of OR confidence limits was used when there were <5 observations per cell. All information including that used for data linkages excluded personal identifiers. The Rhode Island Department of Health Institutional Review Board approved this project in February 2010.

Results

Overall, after controlling for educational level and maternal age at delivery, women receiving health risk screening/referral before prenatal care started were less likely to have low birth weight babies and premature deliveries than women who received no program or Title X-only services. The greatest benefits occurred among women age 21-34 from all state areas and women of similar ages living in core areas of the state (Providence, Pawtucket, Central Falls, Woonsocket, West Warwick, and Newport). Stratum-specific odds ratios were used to report study estimates. This was due to the large effect modification observed for educational level and age on the model of care/pregnancy outcomes relationship. Women age 21-34 with more than a high school education and who did not participate in the WHSRP were almost 12 times more likely to deliver a low birthweight baby than their WHSRP peers (Table 1). Women age 21-34 with less education not participating in the WHSRP were about 1.6 times more likely to deliver prematurely than WHSRP women. Similar findings and differences across age and educational levels were observed among women living in core areas. Hispanic women benefited the most from early pregnancy risk assessment/referral, particularly those with less education. Less-educated Hispanic women age 21-34 not participating in the WHSRP were almost three times more likely to have a low birthweight baby and 2.3 times more likely to deliver prematurely compared to their WHSRP counterparts (Table 2). Hispanic women also had the highest rates of WHSRP participation, representing almost 50% of participants both statewide and in core areas. Findings for Hispanic women suggest similar program benefits for women of other racial/ethnic groups, though these analyses could not fully account for a similar effect because some strata had no observations. While most race/ethnic-specific analyses showed better pregnancy outcomes associated with WHSRP participation, one exception exists. Hispanic participants age 21-34 with more than a high school education were 80% more likely to have a high birthweight baby than their model 3 counterparts. This occurred for the entire Hispanic population and for Hispanics in core areas. This finding may represent a potential risk for other program participants, especially for minorities with sample sizes that were insufficient for analysis.

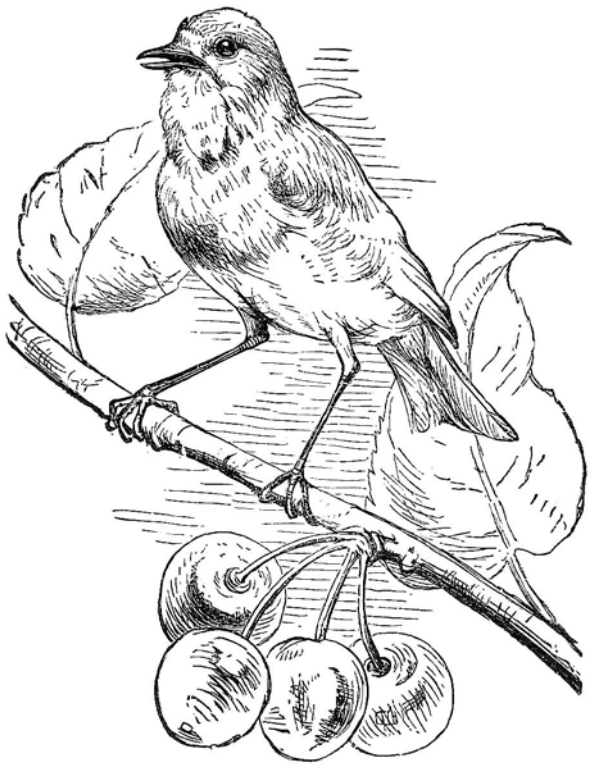
Pregnancy outcomes for women who received only Title X services did not differ significantly from those for women who received neither Title X nor WHSRP services. This suggests that, for pregnant women with a live birth, lower risks for WHSRP participants stemmed mainly from early screening/referral and follow-up care, rather than from other Title X services. As the analysis found no significant differences in pregnancy outcomes between women receiving WHSRP versus Title X-only services, this indirect evidence is inconclusive.

Discussion

After adjusting for age and educational level, health assessments/referrals provided prior to the onset of prenatal care are associated with better birth weight and gestational age. This occurred mainly among 21 through 34 year-old women of all educational levels and Hispanic women with less education.

Pregnancy testing is often the first point of access to care for pregnant and non-pregnant women. Removing financial barriers by offering free pregnancy tests, risk screening, and referral to Title X clients before prenatal care begins can help link pregnant women with needed care and give their newborns a healthier start in life. Health risk screening/referral initiatives may be especially important for women with unintended pregnancies. In Rhode Island, these women are significantly more likely than those with intended pregnancies to report having delayed or no prenatal care (24.5% versus 9.3%). They are also more likely to report other pregnancy risks, such as smoking or experiencing intimate partner violence during pregnancy.[6] Despite evidence supporting WHSRP benefits, this evaluation has several limitations. First, study methodology is not appropriate for establishing causality between an early pregnancy intervention model and birth outcomes. This requires a longitudinal study design with cohort follow-up. The study did not assess explanatory factors that may account for model differences. In addition, it used broad age categories (<21, 21-34, and 35+). Subsequent analyses will assess explanatory factors and possible residual confounding by age (i.e., if risk varied within categories). Sample sizes of some racial/ethnic groups were insufficient to arrive at meaningful conclusions. This suggests the need for additional outreach to Rhode Island non-Hispanic minorities, especially Southeast Asians, Native American Indians, and African Americans.

The Institute of Medicine estimates that in 2005 preterm birth cost US society $26 billion.[7] In 2008, two-thirds of all low-weight births in the United States were premature.[8] To prevent perinatal complications and reduce health care costs from high-risk pregnancies, Rhode Island should reconsider funding for initiatives that address social and medical risks before or early in pregnancy.



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Disclosure of Financial Interest

The author has no financial interests to disclose.

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