

MI PRAMS DELIVERY



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Points of Interest

- Michigan led the nation in pioneering the concept of a regionalized perinatal system in the 1970's and 80's.
- As of 2009, Michigan has 24 hospitals with NICU.
- During 2004-2006 (average) in Michigan, the highest preterm birth rate was among non-Hispanic black infants (18.9%).
- In 2006 in Michigan, 21.4% of infant deaths were due to prematurity/low birthweight.

THE RIGHT PLACE AT THE RIGHT TIME: DELIVERY AT A HOSPITAL WITH A NEONATAL INTENSIVE CARE UNIT (NICU)

Over the past several decades, rates of neonatal morbidity and mortality have dramatically declined mostly in part to increasing level of technology combined with regionalization.¹ Perinatal regionalization is a tiered structure of health care facilities linked by referral patterns where high-risk mothers and newborns are directed to the central facilities containing the highest level of technology and appropriate staff, namely a facility with a neonatal intensive care unit (NICU) or subspecialty centers.² Since many conditions and complications may deem a woman's pregnancy high-risk and may have adverse outcomes for both mother and infant, it is imperative to deliver and receive care at hospitals with high level capacity.

Having a history of preterm delivery (defined as

delivery before 37 completed weeks gestational age), and chronic conditions such as diabetes and hypertension are considered pregnancy risks. For instance, women who have a preterm birth are at an increased risk of a subsequent preterm birth.^{3,4} The risk has also been shown to increase with the number of prior preterm births⁵ and with decreasing gestational age of the prior preterm birth.⁶ Although most preterm babies survive with today's medical advances, preterm births still account for 75% of perinatal mortality and have been associated with long-term neurodevelopmental problems, pulmonary dysfunction and visual impairments.⁷ On the other hand, type II diabetes mellitus or hypertension could have adverse impact on both, the mother and the infant. Pre-pregnancy type II diabetes mellitus has been inde-



pendently associated with perinatal mortality and/or major congenital malformations and low birth weight among specific racial/ethnic groups.^{8,9} Chronic hypertension has been associated with perinatal mortality, preeclampsia, preterm delivery, and fetal growth restriction (a.k.a small-for-gestational-age).¹⁰

This issue is about the impact of these risks on pregnancy outcomes but most important on the referral pattern to subspecialty centers.

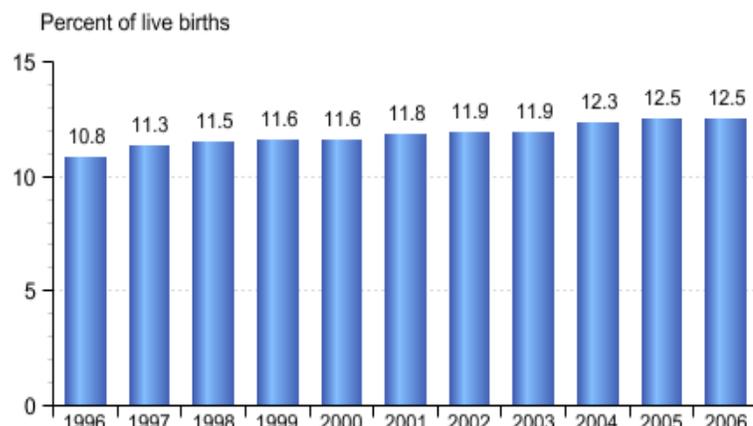


Figure 1. Percent of singleton preterm births in Michigan, 1996-2006.

Source: National center for Health Statistics, final natality data retrieved April 16, 2009 from www.marchofdimes.com/peristats



METHODS

Data from the 2004-2006 Michigan Pregnancy Risk Assessment Monitoring System (PRAMS) statewide survey was used to assess whether women whose pregnancies were considered high-risk were more likely to delivery at a hospital with a NICU.

A composite variable was created to define a "high-risk pregnancy" by the presence of either one of the two self-reported chronic conditions, diabetes prior to pregnancy and hypertension, or both.

DEMOGRAPHICS

Analysis of Michigan PRAMS data indicate that High-risk women accounted for 15.1% of the study population. The high-risk women were more likely to deliver a preterm infant (15.3%), or a low birth weight infant (13.2%) and at a subspecialty facility (48.3%) than women with no chronic conditions. (Figure 4).

Previous preterm delivery is an important risk for subsequent pregnancy. About 61% (60.3%) of PRAMS respondents reported a previous live birth with 11.8% of those being premature. Figure 2 shows the relationship between place of delivery and preterm birth among women with previous preterm.

Women delivering at a hospital with NICU were more likely Non-Hispanic black or Other race (62.1% and 47.3%, respectively), age 35 years or older (55.1%) (Figure 3), had private health insurance (62.6%), and were college-educated (57.5%). As to the prevalence of preterm delivery and low birth weight infants, that was significantly higher among non-Hispanic black women than all other races. Overall, hypertension and pre-pregnancy diabetes were reported by 14.0% and 2.0% of the women, respectively.

"While the improvement of the pregnancy outcomes is the major goal, regional perinatal education, expanded role of nursing, inter - hospital care, shared services and systems development can be identified as well as benefiting from the macro concept of regionalization."
 -(Butterfield, 1980).

Figure 2. Prevalence of preterm birth and place of delivery among women reporting a prior preterm birth, MI PRAMS 2004-2006.

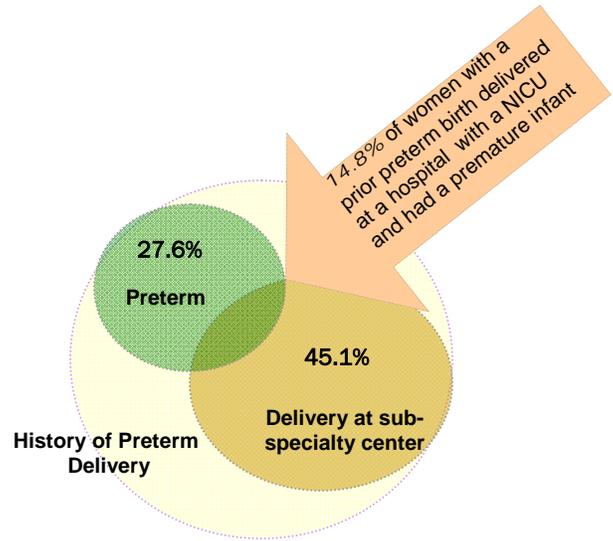


Figure 3. Prevalence of delivering at a subspecialty facility by maternal race/ethnicity and maternal age, MI PRAMS 2004-2006.

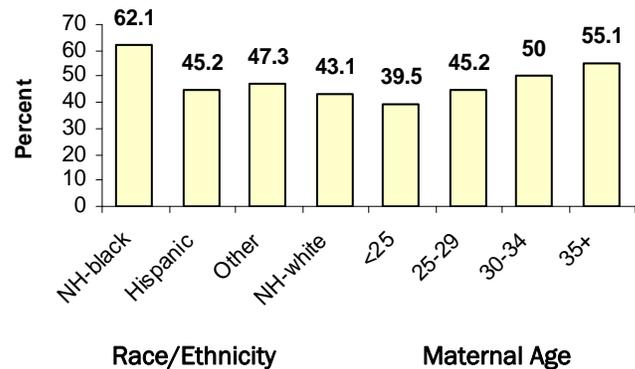
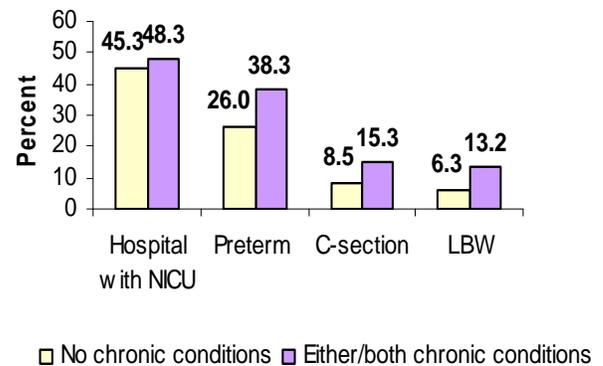


Figure 4. Prevalence of delivering at a subspecialty facility and selected birth outcomes by high-risk status, MI PRAMS 2004-2006.



LOGISTIC REGRESSION MODEL OF THE ASSOCIATION OF HIGH-RISK STATUS WITH DELIVERY OF A PRETERM INFANT AND DELIVERY AT A TERTIARY HOSPITAL, MI PRAMS 2004-2006

Logistic regression in SAS 9.1 (Cary, NC) was used to assess possible predictors for preterm birth and delivery at subspecialty centers. (Table 1).

After adjusting for potential confounders, women who reported a prior preterm delivery were more than 4 times as likely to delivery a preterm infant than women who did not report a prior preterm delivery. The next two strongest predictors of preterm delivery were placenta morbidities such as placenta previa or abruptio placenta and high-risk status defined by the composite variable. Women reporting placenta morbidities were nearly 3 times more likely than women without these complications to deliver a preterm infant. Women considered high risk by the composite variable were 80% more likely to deliver a preterm infant.

The same logistic regression model was used to assess the same predictors but this time for delivery at a subspecialty facility. Non-Hispanic black women were more than twice as likely to deliver at a subspecialty facility than non-Hispanic white women (odds ratio (OR) 2.31, 95% confidence interval (CI) 1.72-3.10). Women considered high risk based on the composite variable were only 40% more likely



Table 1. Odds ratios (OR) and 95% confidence intervals (CI) of association of predictors for preterm delivery and delivery at a tertiary hospital, MI PRAMS 2004-2006.

Predictors	Preterm Birth		Tertiary Center	
	OR	95% CI	OR	95% CI
High risk	1.79	1.25-2.54	1.36	1.0-1.84
Placenta morbidities	2.91	1.76-4.82	0.96	0.63-1.46
Prior preterm birth	4.22	3.0-5.95	0.92	0.68-1.25
Race/Ethnicity				
NH-black (vs. NH-white)	1.49	1.03-2.16	2.23	1.67-3.0
Hispanic	0.39	0.14-1.06	1.03	0.65-1.64
Other	1.04	0.40-2.73	0.84	0.49-1.46
Maternal Education (vs. College)				
< High school	1.58	0.90-2.77	0.56	0.38-0.68
High school/GED	1.18	0.75-1.85	0.51	0.37-0.68
Some college	0.95	0.61-1.48	0.68	0.52-0.90
Insurance				
Medicaid vs. all other types	1.61	1.07-2.42	0.75	0.57-1.0
Maternal Age (vs. age <25 years)				
Age 25-29 years	0.77	0.50-1.19	0.88	0.66-1.18
Age 30-34 years	0.83	0.53-1.30	0.98	0.72-1.34
Age 35 or older	0.69	0.42-1.12	1.07	0.76-1.51

to deliver at a subspecialty facility than lower risk women (OR 1.40, 95% CI 1.04-1.90; not significant). Placenta morbidities and prior preterm delivery showed no association with delivery at a subspecialty facility.

This analysis demonstrates that women with high risk pregnancy due to the pregnancy history and other health conditions were more likely to have an adverse birth outcome. However, this was not mirrored by having the delivery at a hospital more equipped to meet theirs and infants' needs. Further research is needed to understand why women who have a history of preterm birth, chronic conditions and pregnancy related complications do not always deliver at subspecialty centers.

Recommendations: Providers should identify women who have a history of preterm birth and pregnancy complications such as diabetes and hypertension during preconception assessment and counseling, and educate them about the risk for subsequent pregnancy and the importance of receiving the adequate care. Once the pregnancy occurs, providers should assist all women identified with a high risk pregnancy in planning their prenatal care and, most importantly, their delivery at the nearest hospital with NICU so they may receive optimal health care.

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available electronically at:
<http://www.michigan.gov/prams>

ABOUT MICHIGAN PRAMS

The Pregnancy Risk Assessment Monitoring System (PRAMS), a population-based survey, is a CDC initiative to reduce infant mortality and low birthweight births. It is a combination mail/telephone survey designed to monitor selected self-reported maternal behaviors and experiences that occur before and during pregnancy, as well as early-postpartum periods of women who delivered a live infant in Michigan. Information regarding the health of the infant is also collected for analysis. Annually, over 2,000 mothers are selected at random to participate from a frame of eligible birth certificates. Women who delivered a low birthweight infant were over-sampled to ensure adequate representation. The results are weighted to represent the entire cohort of women who delivered a live infant during that time.

SUGGESTED CITATION

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