

The Michigan Monitor

Following trends, promoting prevention
and linking families to resources

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Inside this issue:

About the Program	1
Diabetes and Birth Defects	1
Study Purpose and Methodology	2
Study Results	2-3
Public Health Implications	3
Resources	3
Program Updates	4

Points of Interest

- * Per PRAMS data, about 9% of Michigan women experienced problems with high blood sugar before or during pregnancy in 2006.³
- * Multiple birth defects are 8 times more likely to occur in babies of mothers who have diabetes prior to pregnancy.²
- * Women who control their diabetes before pregnancy lower the risk for birth defects.⁴

Michigan's Birth Defects Program

The Michigan Birth Defects Program, housed in the Michigan Department of Community Health (MDCH), has three primary aims: 1) monitor the rate of birth defects via the Michigan Birth Defects Registry (MBDR), 2) conduct follow-up activities, and 3) educate individuals, professionals and the public about preventable risk factors. In 2008, the Birth Defects Program received grant funding from the March of Dimes, Michi-

gan Chapter, to promote important health messages to teen women with diabetes. Diabetes mellitus in women of reproductive age, whether type 1 or type 2, increases the risk for birth defects. The Birth Defects Program partnered with other MDCH programs to survey teen women with diabetes, parents of these teens, and health care professionals about their knowledge of reproductive risks associated

with diabetes mellitus in the mother. This issue of the *Michigan Monitor* discusses the risks of birth defects associated with having diabetes mellitus prior to pregnancy and teens' awareness of these risks from results of the teen survey, 'Teens with Diabetes Mellitus: Promoting Preconception Care to Prevent Adverse Pregnancy Outcomes'. The issue also looks at public health implications related to preconception care.

Diabetes and Birth Defects

Major congenital malformations are the leading cause of mortality and serious morbidity in infants of mothers who have uncontrolled diabetes prior to pregnancy. Anomalies of all types, including nervous system defects, heart defects, orofacial clefts, and limb deficiencies, are more likely to occur in babies born to women with pre-pregnancy diabetes type 1 or type 2.¹ Isolated defects are three times more likely to occur and multiple defects are eight times more likely to occur than in the babies of mothers without pre-pregnancy diabetes.² Fortunately, there is little or no increased risk for birth defects when blood glucose is well controlled *prior to* conception and throughout pregnancy. Gestational diabetes mellitus (GDM) occurs during pregnancy and often resolves after delivery. GDM also increases risks for poor outcomes such as high birth weight, prematurity, and low blood sugar in babies. Again, odds improve with good prenatal control of blood glucose levels.

Insight concerning the impact of diabetes on Michigan women of child-bearing age comes from the Michigan Pregnancy Risk Assessment

Monitoring System (PRAMS), a population-based survey of resident postpartum mothers who delivered a live-born infant. Per responses to the 2006 PRAMS Survey, an estimated 11,327 Michigan women (9.3% [95% CI: 7.6%, 10.9%]) experienced problems with high blood sugar either before or during their pregnancy.³ Of those, about 9% had problems with high blood sugar *prior to* pregnancy and about 91% had problems *during* pregnancy (figure 1). Teens are more likely to experience an unplanned pregnancy, with about 18-20,000 pregnancies to teen women 15-19 years of age in Michigan yearly. Therefore, preconception health education must begin early.

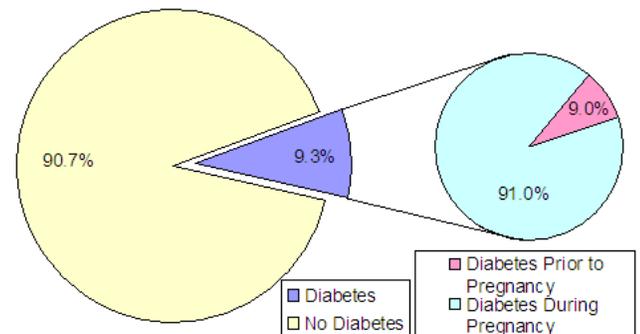


Figure 1. The prevalence and type of diabetes reported by women reporting diabetes during pregnancy, 2006 MI PRAMS.

Teens with Diabetes Mellitus:

Promoting Preconception Care to Prevent Adverse Pregnancy Outcomes

Purpose:

The purpose of this study was to estimate the effects of selected variables on teens' awareness of the risk of birth defects associated with having diabetes prior to pregnancy, in order to identify potential needs and strategies for increasing awareness. Predictors selected for analyses included age, race, age at diagnosis, diabetes care location, frequency of provider visits, and help from providers regarding pregnancy planning.

Methods:

Study participants, 15-20 years old with diabetes type 1 or 2, were selected from Children's Special Health Care Services (CSHCS). A total of 609 teen women were invited to take the survey 'Teens with Diabetes Mellitus: Promoting Preconception Care to Prevent Adverse Pregnancy Outcomes', of which we analyzed the responses received by the cut-off date. The crude and adjusted associations (odds ratios and 95% confidence intervals) between the outcome and predictors were determined using Statistical Analysis Software (SAS) version 9.1.

Results:

The response rate was 34% (207 participants returned the survey on time). Of the respondents, 152 were white (73.4%), 138 had 3-4 doctor's visits per year (66.7%), 85 participants received care in hospital settings (41.1%), and 132 received no help related to pregnancy planning from providers (63.8%) (table 1). About 45% of teens were aware of the risks of birth defects associated with having diabetes prior to pregnancy. Figure 2 shows the percentage of total participants who were aware of risks by each predictor. Awareness was highest among those who were: 20 years old, white, diagnosed when less than 5 years old, seen by their providers 5 or more times a year, or helped with pregnancy planning more than once (figure 2). Awareness was lowest among those who were: 15 years old, of an other race (not white; not black), diagnosed when 5-9 years old, receiving diabetes care at community centers, or not helped by a provider.

Table 1 provides the estimated crude and adjusted associations (odds ratios [OR] and 95% confidence intervals [CI]) between the predictors and awareness of risks of birth defects associated with pre-pregnancy diabetes. The OR indicates the likelihood of awareness of risks for one group compared to a reference group which is indicated for each of the predictors. Blacks were about 1/3 as likely as whites to be aware of risks, when adjusted for all predictors. (table 1). Those diagnosed with diabetes when they were 15-20 years old were about 1/5 as likely as those who were diagnosed when less than 5 years old to be aware of risks in pregnancy, when adjusted for all predictors (table 1). Those who were helped by providers once were about 5 times as likely as those with no help to be aware of risks, while those who were helped

Figure 2. Percentage of total teens aware of risks in pregnancy from diabetes mellitus, by selected predictors: Teen Survey, Michigan, 2008.

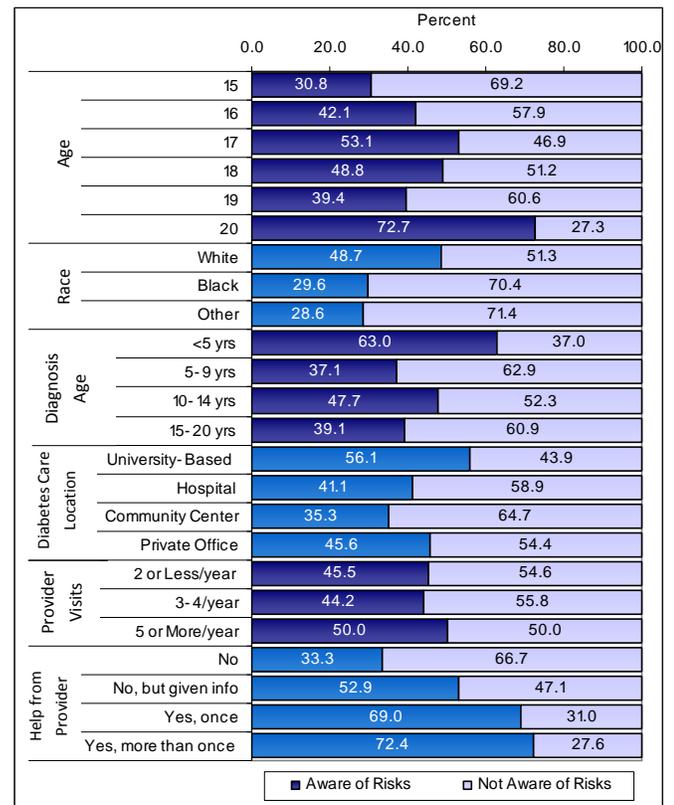


Table 1. Estimated crude and adjusted effects (OR and 95% CI) of selected predictors on awareness of risks in pregnancy from diabetes mellitus: Teen Survey, Michigan, 2008.

Predictor	Number of Subjects	OR	Adjusted*	
			OR	95% Confidence Interval
Age				
15	39	1	1	reference group
16	38	1.6	1.2	(0.39, 3.9)
17	32	2.6	2.9	(0.93, 9.1)
18	41	2.1	2.4	(0.78, 7.4)
19	33	1.5	1.0	(0.30, 3.4)
20	22	6.0	2.6	(0.62, 10.8)
Race				
White	152	1	1	reference group
Black	27	0.44	0.32	(0.11, 0.92)
Other	14	0.42	0.43	(0.11, 1.64)
Diagnosis Age				
<5 yrs old	27	1	1	reference group
5-9 yrs old	62	0.35	0.51	(0.17, 1.5)
10-14 yrs old	95	0.53	0.68	(0.24, 1.9)
15-20 yrs old	23	0.38	0.19	(0.039, 0.89)
Diabetes Care Location				
University-based Clinic	41	1	1	reference group
Hospital Setting	85	0.55	0.61	0.25, 1.5)
Community Center	17	0.43	0.32	(0.075, 1.3)
Private Office	57	0.61	0.45	(0.17, 1.2)
Frequency of Provider Visits				
2 or Less/year	33	1	1	reference group
3-4/year	138	1.0	0.73	(0.27, 2.0)
More than 5/year	36	1.2	1.0	(0.30, 3.3)
Helped by Provider				
No	132	1	1	reference group
No, but given info	17	2.3	1.5	(0.42, 5.5)
Yes, once	29	4.4	5.3	(2.0, 14.2)
Yes, more than once	29	5.3	7.1	(2.3, 22.2)

*Adjusted for all predictors in the table.

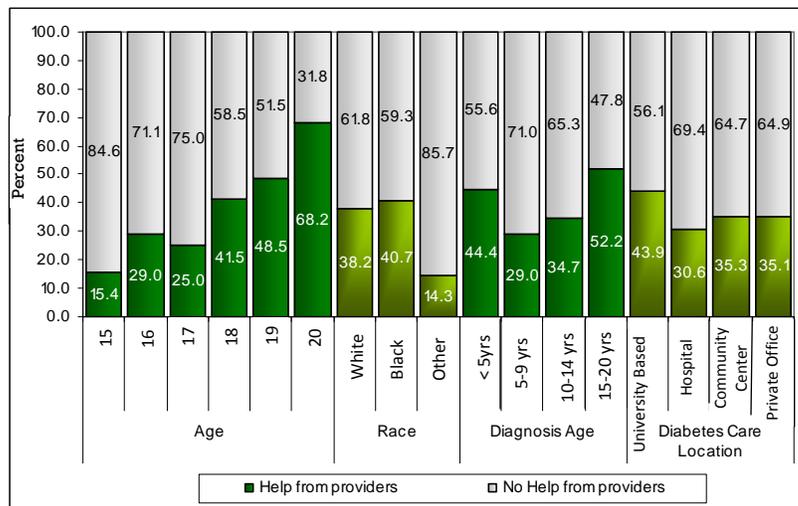


Figure 3. Percentage of total teens with some pregnancy planning help from providers, regardless of awareness, by selected predictors: Teen Survey, Michigan, 2008

more than once were about 7 times as likely as those with no help to be aware of risks, when adjusted for all predictors (table 1).

Because pregnancy planning help from providers was found to be the strongest predictor for awareness of risks, we wanted to get a better idea of who was receiving help. Figure 3 shows the percent of each category that received help (either verbal or written information) from providers, regardless of their awareness. Prevalence of receiving help from providers was lowest in those who were 15-17 years old, those who were a race other than white or black, those who were diagnosed when they were 5-9 years old, and those receiving care in a hospital setting (figure 3).

Results should be interpreted with caution due to the limitations of this study. Because the response rate was about 34%, there could be bias in that those who did not respond to the survey may have different experience than the responders. The study population was limited to teen women enrolled in CSHCS so the results may not apply to teen women not enrolled in CSHCS or to older women of childbearing age. Analyses of surveys to parents of teens with DM and health care providers, concerning their awareness, experiences and practices related to reproductive risks associated with DM will be presented elsewhere.

References

- ¹Becerra JE, Khoury MJ, Cordero JF, Erickson JD. Diabetes mellitus during pregnancy and the risks for specific birth defects: a population-based case-control study. *Pediatrics*. 1990; 85: 1-9.
- ²Correa A, et. Al. and the National Birth Defects Prevention Study: Diabetes mellitus and birth defects. *American Journal of Obstetrics and Gynecology*. 2008; 200. Downloaded from the worldwideweb July 30, 2008.
- ³Pregnancy Risk Assessment Monitoring System (PRAMS). Michigan, 2006.
- ⁴American Diabetes Association. Standards of medical care in diabetes-2008. *Diabetes Care*. 2008; 31 (Supplement 1); S12-54.

Public Health Implications and Future Directions

Only about 45% of teen women in this study were aware of the risk of birth defects associated with having DM type 1 or 2 prior to pregnancy. We must increase awareness so that women with DM seek help from providers before becoming pregnant. Because about *half* of all pregnancies are unintended, it is all the more important for women of childbearing age with DM to maintain target blood glucose levels. Women who do so significantly reduce the relative risk for major anomalies.⁴ We found that teens were significantly more aware of the risks if a provider discussed the issue. Providers have an important role in preconception care and need to talk to their patients with diabetes about how to plan for pregnancy. Our program is supporting provider action by development of a fact card for teen women with diabetes and a provider toolkit of teen-oriented prevention resources.

What teens said:

- * "I would like to see more teens who have diabetes learn more."
- * "Thanks for sending me and my mom this... it really helped us out...."
- * "I'm really interested in the effects of diabetes on pregnancy."

Information and Resources

More information about teens and diabetes, including how to order a provider toolkit and a *new* fact card can be found at the *new* **MI Genetics Connection** website: www.migeneticsconnection.org/teensanddiabetes.shtml.

Information about **Children's Special Health Care Services** can be found at www.michigan.gov/cshcs.

For information about preconception health, diabetes in pregnancy, prematurity, and more from the **March of Dimes**, visit www.marchofdimes.com.

For **Michigan Birth Defects Statistics** per MBDR reporting, visit www.mdch.state.mi.us/pha/osr/index.asp?Id=7.

Information about Michigan's **Diabetes Prevention and Control Program** at MDCH can be found at: www.michigan.gov/diabetes.

Learn about the Michigan **Child and Adolescent Health Centers Program** at MDCH. Visit: www.michigan.gov/cahc.

Visit the **American Diabetes Association** (www.diabetes.org) and the **National Diabetes Education Program** (www.NDEP.NIH.gov) to find age and culturally appropriate resources to support diabetes management.

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For more information or to receive future editions, please contact:

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*You can find the Michigan Monitor
online at www.michigan.gov/genomics*

Michigan Department
of Community Health



Program Updates

The MBDR is continually working on a smooth transition to the new ICD-10-CM and ICD-10-PCS disease classification system. Please look for the usual coding updates in the Fall of 2009. For more information regarding the new classification systems, please visit www.ahima.org or www.aapc.com.

The MDCH Newborn Screening (NBS) Follow-up Program works to monitor the mandated screening of all newborns for 50 disorders which are also included in the Michigan Birth Defects Registry (MBDR). NBS has recently made the results of the screening available on the Michigan Care Improvement Registry (MCIR) so that physicians can access results within the baby's first 14 days of life. For more information, please go to www.michigan.gov/newbornscreening.

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