



Diabetes and Pregnancy

Diabetes, a chronic condition reaching epidemic proportions, is frequently mentioned in the media. The three most common type of diabetes are: diabetes mellitus Type 1, diabetes mellitus Type 2, and gestational diabetes. Of the

three types of diabetes, gestational diabetes is the most prevalent among pregnant women. It is a transient condition that could resolve itself after pregnancy. However, it is of concern to health professionals because it is associated

with adverse birth outcomes and an increased risk for mothers of developing Type 2 diabetes later on in life. Previous MI PRAMS questionnaires were unable to differentiate between women with diabetes before their pregnancy (either

diabetes mellitus Type 1 or Type 2) and those who developed gestational diabetes. An additional question was added to the Phase 5 PRAMS questionnaire to resolve this issue. ◊

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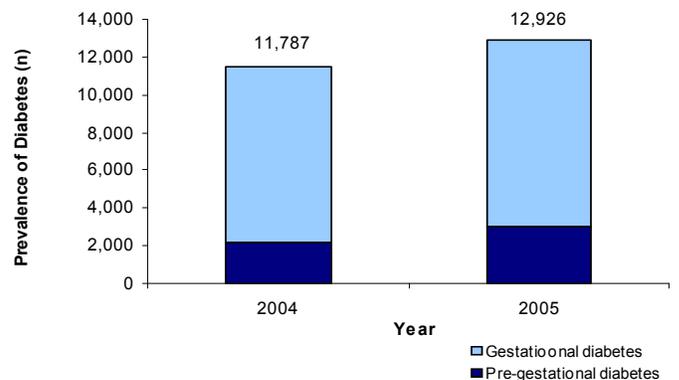
Prevalence of Diabetes Among Pregnant Women

Before 2004, there was only one question about diabetes in PRAMS and that didn't allow differentiation between pre-existing and gestational diabetes. This significant limitation was addressed in 2004 by adding to PRAMS questionnaire (Phase 5) a revised diabetes question. Based on the answers provided by PRAMS respondents in 2004, the overall estimated prevalence of women that had problems with high blood sugar either before or during their pregnancy was 11,787 (95%CI: 9,448-14,127), which represented 9.4% (95%CI: 7.5%-11.2%) of all live births in Michigan in 2004. Of those women 9,343 (79.3% (95%CI: 70.4%-88.1%)) reported having diabetes during their pregnancy (gestational diabetes) while 2,445 women (20.7% (95%CI: 11.9%-29.6%)) were diabetic before their pregnancy (pre-

gestational diabetes). In 2005, 12,926 women (10.4% (95%CI: 8.5%-12.4%)) of all live births indicated experiencing diabetes. The majority of women, 76.9% (95%CI: 68.2%-85.5%), had gestational diabetes and the remaining 23.1% (95%CI: 14.5%-31.8%) reported having pre-gestational diabetes. We concluded that the increase noted in 2005 for overall as well as the two types

of diabetes, pre-gestational and gestational was not significant. Overall, 24,713 (9.9% (95%CI: 8.6%-11.2%)) of the total live births in Michigan in 2004 and 2005 were the outcomes of diabetic pregnancies, either pre-existing or gestational. This is of concern because of the association between diabetes and other adverse outcomes affecting both the mother and the infant. ◊

Figure 1: The prevalence and type of diabetes reported by women reporting diabetes during pregnancy, 2004-2005 MI PRAMS



Demographic Characteristic of Pre-gestational and Gestational Diabetic Women in Michigan

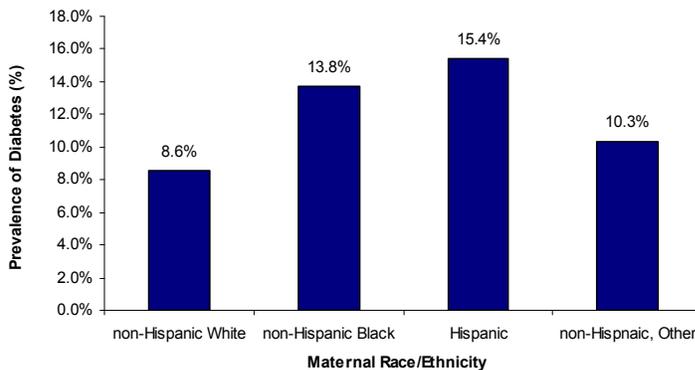
Through the remainder of this newsletter combined 2004 and 2005 data were used in order to more accurately describe the answers related to pre-gestational and gestational diabetes provided by PRAMS respondents.

Most of the 24,713 (75.5% (95%CI: 69.2%-81.8%)) live births resulting from diabetic pregnancies were to women over the age of twenty-four years. However, a different picture emerges once the prevalence of diabetic pregnancies were observed within each age group. Figure 2 shows the prevalence of diabetes in women who delivered a live birth within each age group. The highest prevalence of pre-gestational or gestational diabetes of 12.6% (95%CI: 3.3%-21.9%) was recorded in the age group below 18 years of age* followed by those of 25 and above years old with 11.3%

(95%CI: 9.6%-13.1%). Women between the ages of eighteen and twenty-four years old had a prevalence of diabetes approximately half that of their older and younger peers. Among the largest group of diabetic new mothers, women over the age of twenty-four years, 17.7% (95%CI: 10.7%-23.2) indicated that they were diabetic prior to their pregnancy and 69.7% (95%CI: 76.8%-89.3%) experienced diabetes only during their pregnancy.

Of the estimated 24,713 live births resulting from diabetic pregnancies, 15,352 (62.1% (95%CI: 55.1%-69.1%)) were to non-Hispanic White women. The prevalence of diabetic mothers within each specific race/ethnic group were as follows: 8.6% (95%CI: 7.2%-10.0%) among non-Hispanic White live births; 13.8% (95%CI: 9.6%-17.9%) among Black live births; 15.4% (95%CI: 7.8%- 23.0%) among His-

Figure 3: The prevalence of women reporting diabetes during pregnancy by maternal race/ethnicity, 2004 & 2005 MI PRAMS



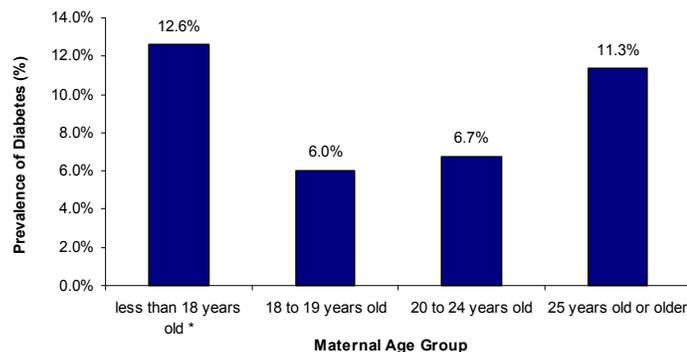
panic live births; and 10.3% (95%CI: 5.6%-15.0%), among Other, non-Hispanic live births (Fig .3). The distribution of the type of diabetes among non-Hispanic White and Other non-Hispanic, racial/ethnic groups mimic that of the general population. The majority of those women, 8.6% (95%CI: 7.2%-10.0%) and 10.3% (95%CI: 5.6%-15.0%), respectively, had gestational diabetes. Meanwhile just over half of Black and Hispanic diabetic live births were to women reporting diabetes only during pregnancy: 56.1% (95% CI: 39.7%-72.4%) and 58.9% (95%CI: 32.1%-85.7%), respectively. An estimated 43.9% (95%CI: 27.6%60.2%) of Black women and 41.1% (95%CI: 14.3%-67.9%) of Hispanic women, who had diabetes, reported having pre-gestational diabetes.

The prevalence of pre-gestational or gestational diabetes was nearly equally

distributed among women when stratified by educational level: approximately 9.6% (95%CI: 6.0%-13.2%) of women who did not complete high school, 11.4% (95%CI: 8.8%-14.0%) of women with a high school diploma or GED equivalent, and 9.0% (95%CI: 7.3%-10.6%) of women with at least some post-secondary education.

Women with lower educational levels had a higher prevalence of pre-gestational diabetes. An estimated 37.7% (95%CI: 18.5%-56.8%) of women with less than a high school education and 32.3% (95%CI: 20.4%-44.1%) of those with a high school diploma/GED, reported pre-gestational diabetes. Meanwhile only 10.6% (95%CI: 4.5%-16.8%) of women with at least some college education reported having pre-gestational diabetes. ◊

Figure 2: The prevalence of women reporting diabetes by grouped maternal age, 2004 & 2005 MI PRAMS



*“Less than 18 year old” age group just met the minimum sample size criteria for reporting.

Outcomes and Risk Factors of Diabetic Pregnancies

Diabetes is a complicated condition, having multiple risk factors and a variety of adverse outcomes. Uncontrolled glucose regulation during pregnancy is associated with a variety of adverse pregnancy outcomes such as congenital malformations (birth defects), macrosomia (high birthweight), c-section deliveries and neonatal respiratory distress syndrome. The overall C-section prevalence in Michigan, in 2004 and 2005 was 27.7% (95%CI: 25.8%-29.7%). Women experiencing no diabetes during their pregnancy had a c-section prevalence of 26.4% (95%CI: 24.3%-28.4%). Meanwhile, women with either pre-gestational or gestational diabetes had a c-section prevalence of 40.1% (95%CI: 33.2%-47.0%) during the same time period (2004 and 2005).

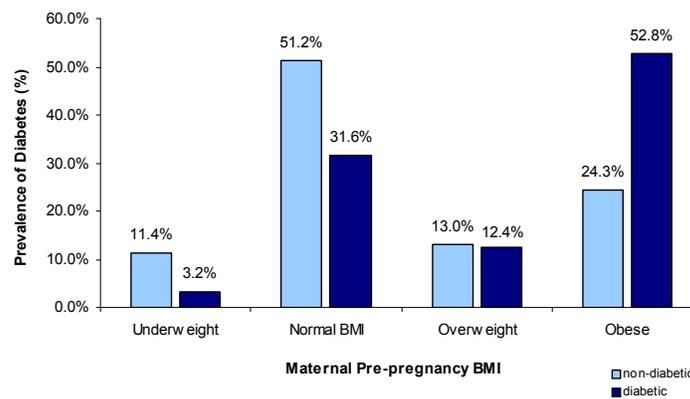
Women reporting diabetes either before or during pregnancy had a slight higher prevalence of both low birthweight (birthweight less than 2500g (5 lbs 8 oz)) and high birthweight (birthweight

greater than 4000g (8 lbs 13 oz)). The prevalence of low birthweight among the general population was 7.3% (95%CI: 6.7%-8.0%), compared to 9.5% (95%CI: 7.1%-12.0%) among the diabetic mothers. The overall prevalence of high birthweight was 10.1% (95%CI: 8.7%-11.4%), while for pregnancies to diabetic mothers it was 15.0% (95%CI: 9.8%-20.1%). High birthweight is associated with birth trauma and delivery complications.

A major risk factor associated with diabetes (particularly diabetes mellitus Type 2 and gestational

diabetes) is obesity. Women with diabetes who were pregnant in 2004 and 2005 were heavier compared to women who reported no diabetes. Among women with pre-gestational or gestational diabetes, 52.8% (95%CI: 45.6% -60.0%) were obese compared to 24.2% (95%CI: 22.3%-26.4%) among non-diabetics. Surprisingly, the overweight prevalence was higher (13.0% (95%CI: 11.4%-14.7%)) among non-diabetic women compared to diabetics (12.4% (95%CI: 7.8%-17.0%)) but the difference was not statistically significant. ◊

Figure 4: The prevalence of grouped maternal BMI stratified by diabetes status during pregnancy, 2004 & 2005 MI PRAMS



Diabetic Pregnancies Validation Project

To date there exist few population based, studies assessing the validity of gestational diabetes information recorded in vital records (birth records) or in PRAMS. An ideal study would compare data from the previously mentioned sources to

information gathered via medical chart review. The Centers for Disease Control and Prevention (CDC) is currently working with few states to implement this kind of validation study. Michigan is one of six states selected to participate in this

project. The results of the study will be crucial to the development and/or enhancement of state and national policies as well as programs aimed at improving maternal and child health outcomes. ◊

Points of Interest:

- ◆ In 2004, 9.4% (95%CI: 7.5%-11.2%) of all live births in Michigan were the outcome of a diabetic pregnancy.
- ◆ In 2005, 10.4% (95%CI: 8.5%-12.4%) of all live births were the outcome of a diabetic pregnancy.
- ◆ In 2004 and 2005, 52.8% (95%CI: 45.6% -60.0%) of women with either pre-gestational or gestational diabetes were obese.
- ◆ Women with either pre-gestational or gestational diabetes had a c-section prevalence of 40.1% (95%CI: 33.2%-47.0%) between 2004 and 2005.

References:

1. Coustan DR: *Gestational Diabetes*. In: *Diabetes in America, 2nd Ed.* Harris MI, Cowie CC, Reiber G, Boyko E, Stern M, Bennett P, Eds. National Institutes of Health, National Institute of Diabetes and Digestive and Kidney Diseases. NIH Publication No. 95-1468. 1995, p. 703-718.
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About Michigan's PRAMS

The Pregnancy Risk Assessment Monitoring System (PRAMS), a population-based survey, is a CDC initiative to reduce infant mortality and low birth weight.

It is a combination mail/telephone survey designed to monitor selected self-reported maternal behaviors and experiences of women

who delivered a live infant in Michigan that occur before and during pregnancy, as well as early postpartum periods. 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-birth weight infant were over-sampled in order to ensure adequate representation. The results are weighted to represent the entire cohort of women who delivered during that time frame.

Suggested Citation

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