



# Gestational diabetes mellitus among Massachusetts women, 2007-2008

## What is gestational diabetes mellitus (GDM)?

GDM is a type of diabetes that occurs during pregnancy.

The digestive system breaks down food into glucose, which is the main source of energy for the body. Normally, the pancreas produces a hormone called insulin – that helps the body convert the glucose into energy.

However, during pregnancy, the body becomes less sensitive to the action of insulin. GDM develops when the body is not able to produce enough insulin to make up for the decrease in insulin sensitivity, and blood sugar (glucose) levels becomes higher than normal.<sup>1</sup>

## How common is GDM?

In Massachusetts (MA), GDM was reported in 6.9% of women who had a live birth in 2007-2008 based on MA PRAMS compared to 5% or 200,000 cases nationally.<sup>2</sup>

Risk factors for GDM include:

- Age 25 years or older;
- Overweight (Body Mass Index [BMI] 25 or greater);
- Race/ethnicity other than White, non-Hispanic;
- Family history of diabetes\*;
- Previous history of GDM\*;
- Previous baby with birth weight >4,090g\*.

\*MA PRAMS does not capture this information.

## How is GDM diagnosed?

GDM is diagnosed by testing high-risk women for undiagnosed diabetes at the first prenatal visit using standard diagnostic criteria.

Women at high-risk who are found not to have diabetes at the first prenatal visit, and all women not at high-risk for gestational diabetes are screened between 24 and 28 weeks of gestation.

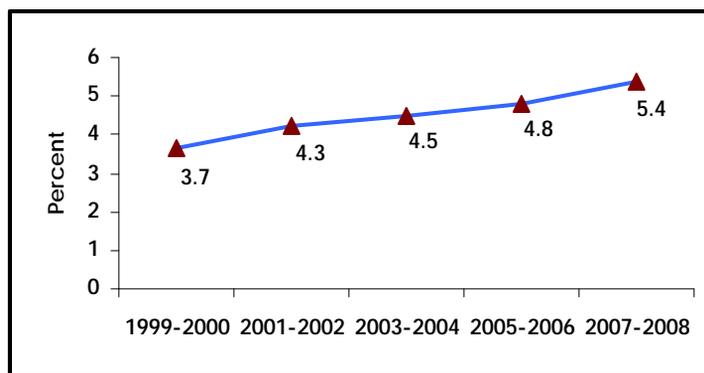
## Why is GDM important?

High blood sugar can lead to complications for both mother and child such as:

- Macrosomia (birth weight >4,090g)
- Cesarean delivery
- Preeclampsia (high blood pressure)
- Low blood sugar for the baby after delivery

Lastly, while GDM usually resolves after birth, it is associated with an increased risk for future type 2 diabetes for both mother and child.<sup>3</sup>

**Figure 1. GDM trend in Massachusetts residents<sup>†</sup>, 1999-2008**



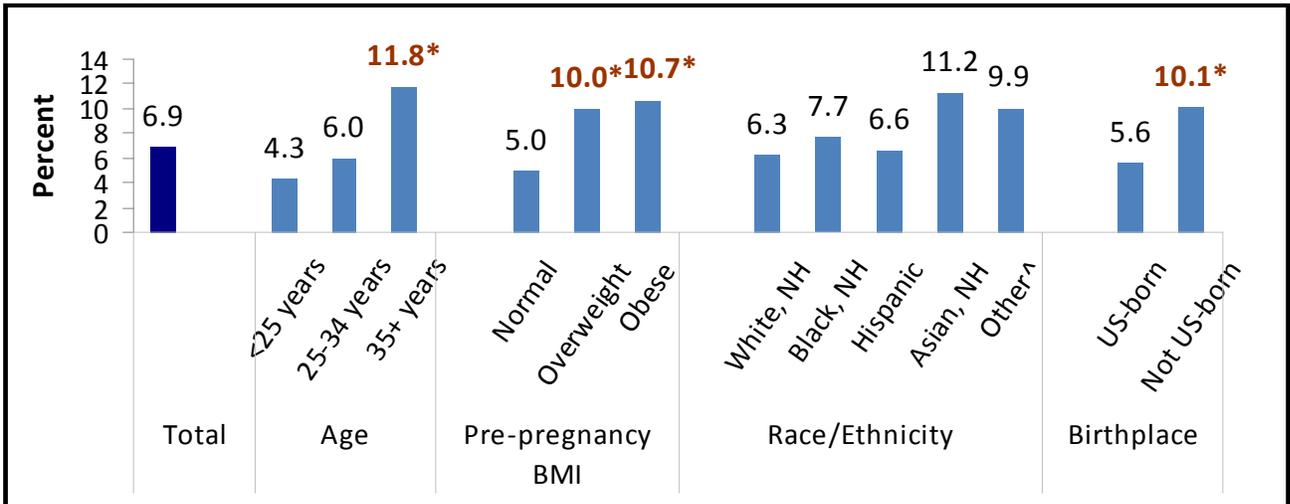
<sup>†</sup> GDM reported on birth certificate, fetal death certificate, or hospital discharge delivery record. Source: MA Pregnancy to Early Life Longitudinal (PELL) Data.

### How is GDM identified in PRAMS?

An individual is identified as having GDM:

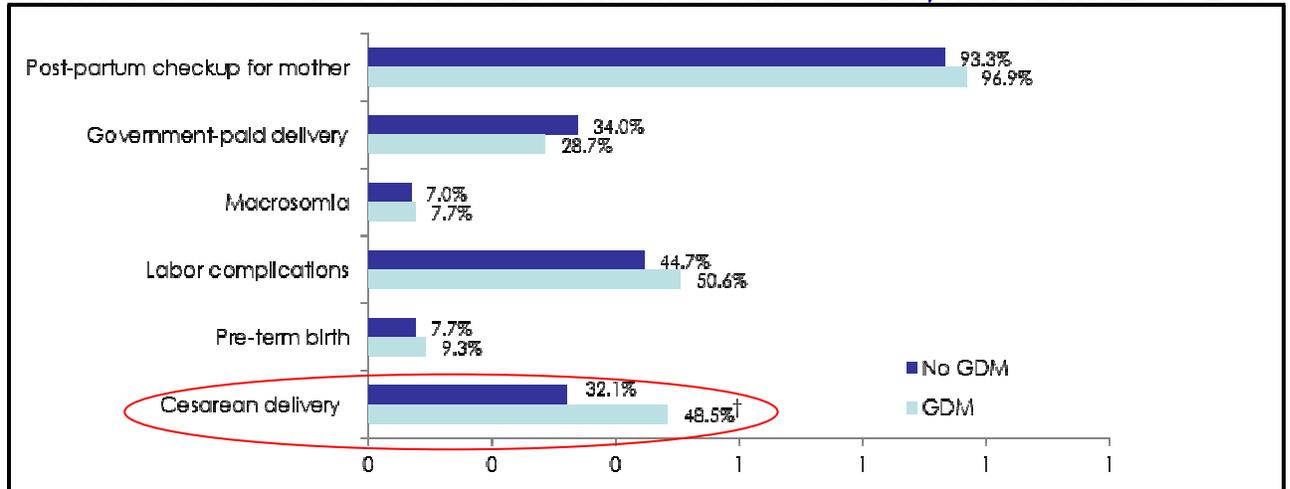
1. If the birth certificate indicates 'gestational' diabetes, but not 'other' diabetes; and/or
2. When asked "Did you have any of these problems during your most recent pregnancy? The mother marked 'Yes' to (b) High blood sugar (diabetes) that started *during* this pregnancy" and not 'Yes' to (a) High blood sugar (diabetes) that started *before* this pregnancy."

**Figure 2. Gestational Diabetes by Selected Maternal Characteristics, MA PRAMS 2007-2008**



^Includes Portuguese-speaking, Native American, Middle Eastern, African, West Indian, and Caribbean ethnic groups.  
 \*Statistically significant from the comparison group at alpha=0.05; comparison group: <25 years, normal pre-pregnancy BMI, white, non-Hispanic (NH), and US-born.

**Figure 3. Prevalence of Selected Pregnancy Outcomes and Maternal Characteristics: Mothers with GDM vs. Mothers without GDM, MA PRAMS 2007-2008**



†Statistically significant at alpha=0.05.

One outcome associated with GDM is having a large baby (>4,090g at birth) due to the extra blood glucose in the baby's bloodstream. The large baby may require a cesarean delivery. Among MA women who reported having GDM, 48.5% had a cesarean delivery. Among the mothers who did not report GDM, 32.1% had a cesarean delivery.

**Table 1. Comparing MA women who reported having GDM across various factors, MA PRAMS 2007-2008**

	Adjusted <sup>†</sup> Ratio of Percents	95% Confidence Interval
<b>Compared to women less than 25 years of age</b>		
25-34 years old	1.4	0.7-2.6
35+ years old	3.0*	1.7-5.1
<b>Compared to women with pre-pregnancy BMI less than 25 kg/m<sup>2</sup></b>		
Overweight (25-29 kg/m <sup>2</sup> )	2.5*	1.5-4.1
Obese (30+ kg/m <sup>2</sup> )	2.9*	1.7-5.1
<b>Compared to White, non-Hispanic women</b>		
Black, non-Hispanic	0.9	0.5-1.6
Hispanic	0.9	0.5-1.6
Asian, non-Hispanic	1.5	0.8-2.6
Other, non-Hispanic	1.2	0.5-3.1
<b>Compared to women who reported exercising &lt;1 day/week in the 3 months prior to this pregnancy</b>		
1-4 days/week	0.6*	0.4-0.9
5+ days/week	0.8	0.4-1.5
<b>Compared to primiparous women (this was the first birth)</b>		
1+ previous births	1.3	0.9-2.1
<b>Compared to women who were born in the U.S.</b>		
Not born in the U.S.	1.8*	1.0-3.3

<sup>†</sup> These ratios are "adjusted" since we look at the effects of all other factors at the same time. Logistic regression was used to hold all factors included constant.

\*Statistically different from the comparison group (alpha=0.05).

Who does GDM affect at higher rates in MA?

- Women over 35 years of age;
- Women who are overweight or obese;
- Women who reported exercising less than one day/week (at least 30 min.);
- Women born outside of the United States (U.S.).

## What is the "ratio of percents"?

The ratio of percents describes how likely one group of women is to have GDM compared to a different group of women after adjusting for other factors. The comparison group is the group of women indicated in the gray boxes in Table 1. A ratio greater than one indicates a higher risk than the comparison group. A ratio less than one indicates a lower risk than the comparison group. Statistically significant differences between groups are marked with an asterisk (\*); otherwise, the two groups are similar.

## What does "adjusted" mean?

When calculating the difference that might exist within two groups for a specific factor, other factors such as age, education, and race are taken into consideration. Adjusted means that these other factors are kept the same for both groups so that the main factor of interest can be observed. For example, when calculating whether there is a difference between age groups in the women who reported having GDM, other factors such as race/ethnicity, BMI, frequency of exercise, number of pregnancies and place of birth are all kept constant in the calculation.

## How do I interpret the adjusted ratio of percents?

**Example:** Compared to women less than 25 years of age, women over 35 years of age were 3 times more likely to have GDM while adjusting for pre-pregnancy BMI, race/ethnicity, pre-pregnancy frequency of exercise, the number of previous live births, and whether or not the mother was born in the U.S.

## Conclusions

- Among women delivering a live birth in 2007-2008 in MA, 6.9% reported having GDM.
- GDM is prevalent at different rates across race/ethnic groups with Asian, non-Hispanic having the highest prevalence at 11.2%, other non-Hispanic at 9.9%, Black, non-Hispanic at 7.7%, and Hispanic at 6.6%.
- Pre-pregnancy BMI has the strongest association with GDM. Women with pre-pregnancy BMI greater than 30 were 2.9 times more likely to report GDM than women with BMI less than 25.
- Women who reported exercising one to four days each week for at least 30 minutes per day were 60% less likely to report GDM than those who reported exercising less than one day each week in the three months before their pregnancy (Table 1).
- MA women with GDM had a higher rate of cesarean delivery than MA women who did not report GDM.

## Recommendations

- Reduce the risk of developing GDM by incorporating 30 minutes of physical activity daily.
- Emphasize preventive health. With pre-pregnancy BMI as a strong predictor of developing GDM, steps towards a healthy pregnancy occur before conception. Forming a pre-conception plan with your health care provider can include lifestyle strategies for reaching or maintaining a healthy weight before pregnancy.
- Continue to examine how the built environment influences physical activity and how to adapt existing infrastructure to promote an optimal physical activity level for all.
- Continue GDM surveillance to collect adequate data to help explore the effect of GDM on different race/ethnic groups.

## Resources

- MA Department of Public Health's Diabetes Prevention and Control Program:  
<http://www.mass.gov/dph/diabetes>
- National Institute of Child Health & Human Development's "Managing Gestational Diabetes: A Patient's Guide to a Healthy Pregnancy":  
[http://www.nichd.nih.gov/publication/s/pubs\\_details.cfm?from=&pubs\\_id=297](http://www.nichd.nih.gov/publication/s/pubs_details.cfm?from=&pubs_id=297)
- American Congress of Obstetricians and Gynecologists publication on "Exercise during pregnancy":  
[http://www.acog.org/publications/patient\\_education/bp119.cfm](http://www.acog.org/publications/patient_education/bp119.cfm)
- American Diabetes Association:  
<http://www.diabetes.org/>

## References

1. CDC. "Gestational Diabetes Fact Sheet." Retrieved from <http://www.cdc.gov/diabetes/pubs/pdf/gestationalDiabetes.pdf> Nov 2010.
2. National Institute of Health's Eunice Kennedy Shriver National Institute of Child Health & Human Development. (2008) "Gestational Diabetes." Retrieved from [http://www.nichd.nih.gov/health/topics/Gestational\\_Diabetes.cfm](http://www.nichd.nih.gov/health/topics/Gestational_Diabetes.cfm) Nov 2010.
3. CDC. (2010). "Gestational diabetes and pregnancy." Retrieved from [http://www.cdc.gov/NCBDDD/pregnancy\\_gateway/diabetes-gestational.html](http://www.cdc.gov/NCBDDD/pregnancy_gateway/diabetes-gestational.html) Nov 2010.

## Study Limitations

- PRAMS surveys women with live births only.
- PRAMS is a self-report survey and some mothers may recall experiences more or less accurately than others.
- While PRAMS is weighted to reflect the population of MA as a whole, 30% of women did not respond to this survey and we have no way of knowing how they might have answered the questions.
- PRAMS is only available in English and Spanish in MA, and may not be accessible to mothers who speak other languages.

## ABOUT MASSACHUSETTS PRAMS

The Massachusetts Pregnancy Risk Assessment Monitoring System (PRAMS) is a collaborative surveillance project between CDC and the Massachusetts Department of Public Health. PRAMS collects state-specific, population-based data on maternal attitudes and experiences before, during, and shortly after pregnancy. The goal of the PRAMS project is to improve the health of mothers and infants by reducing adverse outcomes such as low birth weight, infant mortality and morbidity, and maternal morbidity.

The PRAMS survey is distributed throughout the year, by mail or phone, to MA residents who delivered a live infant in Massachusetts. Annually, approximately 2,400 women are randomly selected to participate from a sample of eligible birth certificates. Minority women are oversampled to ensure adequate representation. Final results are weighted to represent the entire cohort of MA resident women who delivered a live infant during the calendar year.

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