

## Background

- Diabetes during pregnancy increases the risk of adverse maternal and infant health outcomes.<sup>1,2</sup>
- Some mothers have type 1 or type 2 diabetes before pregnancy. This is called pre-pregnancy diabetes.<sup>1</sup>
- Other mothers develop diabetes during pregnancy. This type is called gestational diabetes mellitus (GDM).<sup>1</sup>
- The following fact sheet reports GDM prevalence (percentage) estimates and selected maternal characteristics among Michigan females who had a live birth.<sup>A</sup>
- The Michigan Pregnancy Risk Assessment Monitoring System (MIPRAMS) collects data from a population representative sample of recent mothers who reported GDM during their most recent pregnancy data was also used from the Michigan Resident Live Birth Files.<sup>A,B,3,4</sup>

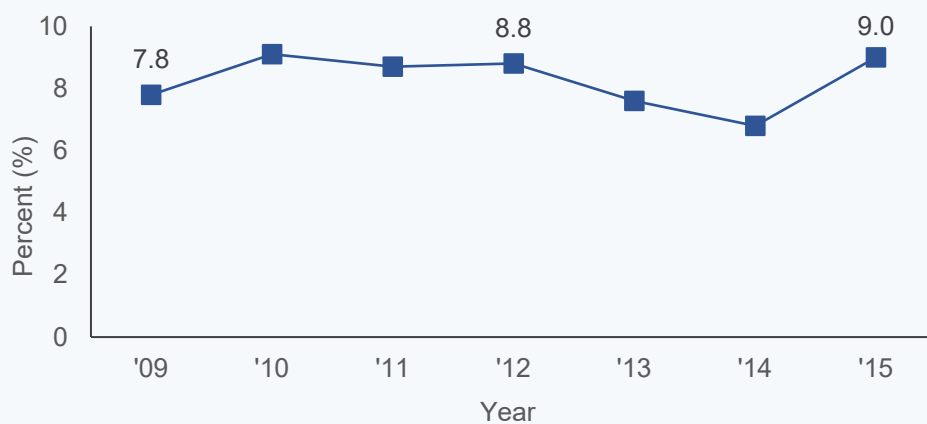
## Key Points

- In 2015, 9.0% of Michigan mothers who had a live birth had gestational diabetes during their most recent pregnancy (Figure 1).
- Mothers with a family history of diabetes reported GDM twice as often as mothers with no family history (Figure 3).
- Four in five mothers with GDM reported that their health professional referred them to a nutritionist or told them about their risk for developing type 2 diabetes (Figure 4).
- Forty three percent of mothers with GDM had a Caesarian Section during their delivery (Table 2).

## Michigan Gestational Diabetes Trend

- In 2009, 7.8% of mothers had gestational diabetes during their most recent pregnancy.<sup>3</sup>
- In 2015, the percentage was 9.0%.<sup>3</sup>
- However, there was no evidence of a statistically significant linear change in GDM estimates over time (Figure 1).<sup>C,3</sup>

Figure 1. Gestational Diabetes among Michigan Mothers (13 years and older), 2009-2015



Source: MIPRAMS (2009-2015)

## Disparities in Gestational Diabetes by Age Group

- Significantly more mothers age 35 years and older reported having GDM than younger age groups.<sup>C,3</sup>
- GDM among mothers age 35 years and older was *four times* that of mothers less than 20 years (Table 1).<sup>C,3</sup>

Table 1. Gestational Diabetes among Michigan Mothers (13 years and older) by Age Group, 2012-2015 Combined\*

Age Group	Gestational Diabetes (95% CI)
Less than 20 years	3.8% (1.9% -7.2%)
20-24	5.2% (3.9% -6.9%)
25-29	6.9% (5.5% -8.6%)
30-34	9.2% (7.6% -11.2%)
35 and older	15.7% (12.8% -19.1%)

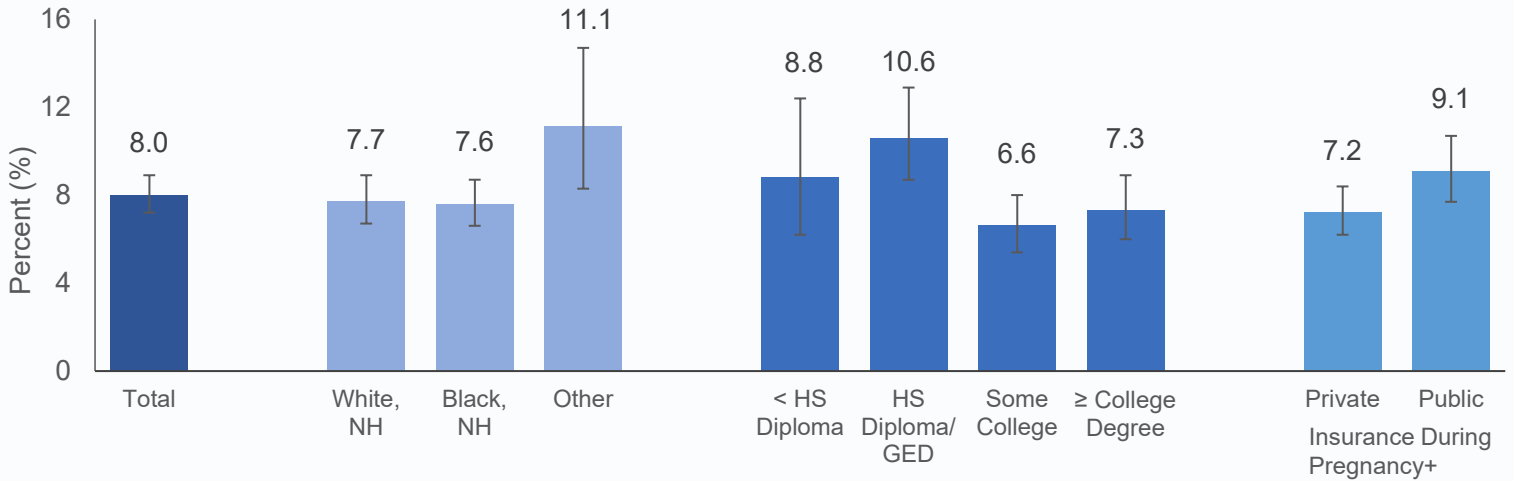
\*95% CI – 95% Confidence Interval

Source: MIPRAMS 2012-2015 Combined

## Disparities in Gestational Diabetes by Selected Characteristics

- Between 2012 and 2015, 8.0% of Michigan mothers had GDM during their most recent pregnancy.<sup>C,3</sup>
- Significantly more mothers who graduated from high school or had a GED had GDM compared to mothers who had some college or graduated from college.<sup>C,3</sup>
- Significantly more mothers using public insurance had GDM compared to mothers using private insurance (Figure 2).<sup>C,3</sup>

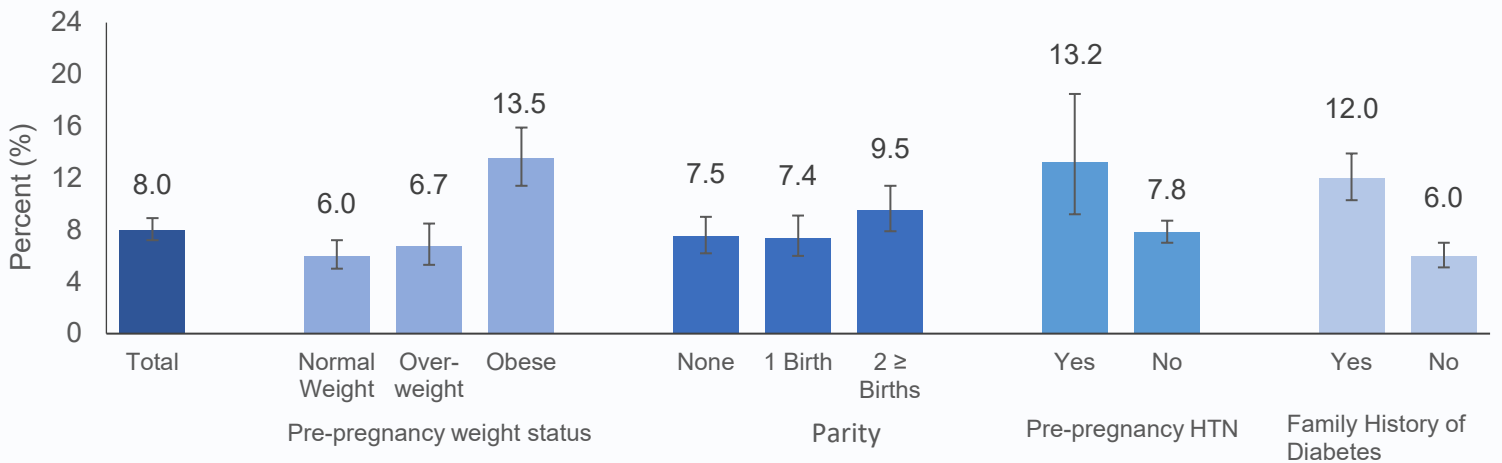
Figure 2. Gestational Diabetes among Michigan Mothers (13 years and older) by Selected Characteristics, 2012-2015 Combined\*<sup>+,</sup>



\*95% Confidence Interval; NH - non-Hispanic; Other – American Indian/Alaska Native, Asian/Pacific Islander, Hispanic/Latina, and Other/Multiracial Ethnic Groups; HS – High School; Private – Commercial Insurance; Public – Government-Assisted Insurance; \*p = 0.05 (See notes C)  
 Source: MIPRAMS 2012-2015 Combined

- Mothers who were obese before pregnancy reported GDM more than twice as often as mother of normal weight.<sup>C,3</sup>
- Mothers with hypertension (HTN) before pregnancy reported GDM nearly twice as often as mothers with no HTN.<sup>C,3</sup>
- Mothers with a family history of diabetes reported GDM twice as often as mothers with no family history (Figure 3).<sup>C,3</sup>

Figure 3. Gestational Diabetes among Michigan Mothers (13 years and older) by Maternal Health Risk, 2012-2015 Combined\*

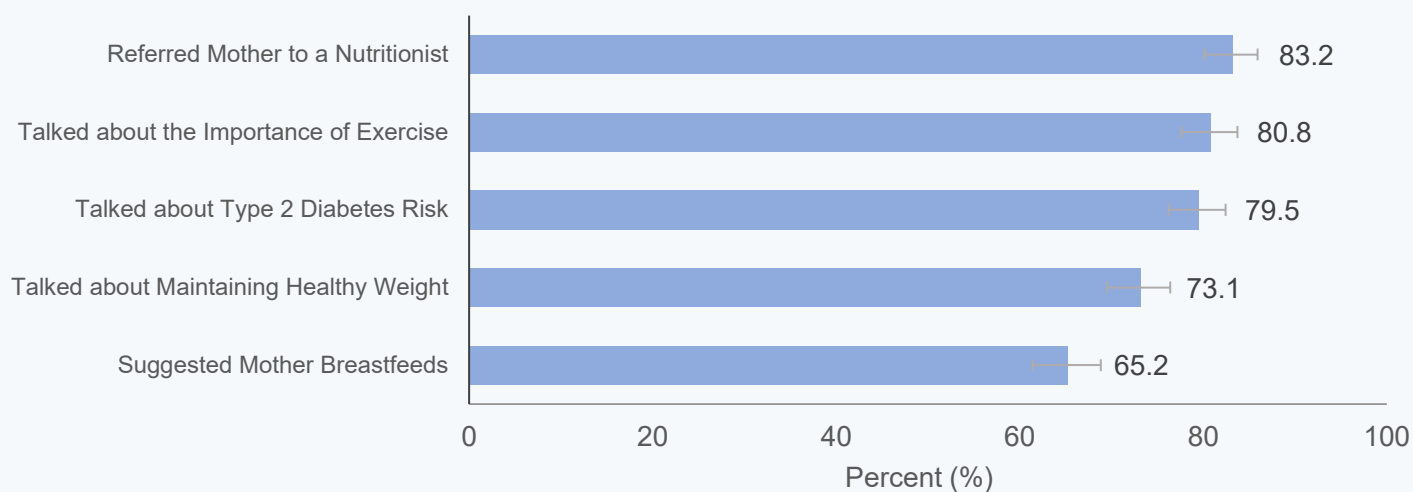


\*95% Confidence Interval; HTN – Hypertension  
 Source: MIPRAMS 2012-2015 Combined

## Pre-Natal Care Recommendations by Health Provider to Mothers with Gestational Diabetes During Their Pregnancy

- During pregnancy:
  - More than four in five Michigan mothers with GDM reported being referred to a nutritionist.<sup>3</sup>
  - Four in five mothers with GDM reported being told about their risk for developing type 2 diabetes.<sup>3</sup>
  - Four in five mothers with GDM report being told about the importance of exercise and maintaining a healthy weight.<sup>3</sup>
  - Two-thirds reported being told about breastfeeding their infant (Figure 4).<sup>3</sup>

Figure 4. Pre-Natal Care Recommendations by Health Provider to Michigan Mothers with Gestational Diabetes (13 years and older) during Pregnancy, 2009-2015 Combined\*



\*95% Confidence Interval  
Source: MIPRAMS 2009-2015 Combined

## Delivery Complication and Infant Outcomes

Table 2. Delivery Complications by Gestational Diabetes Status among Michigan Mothers (13 years and older), 2012-2015 Combined \*\*, \*\*

- Michigan mothers who had GDM during the most recent pregnancy had a higher prevalence of:
  - High birthweight infants compared to those without GDM.<sup>C,D,3,4</sup>
  - Caesarean section when compared to those without GDM.<sup>C,3,4</sup>
  - Infants who were in the neonatal care unit when compared to those without GDM (Table 2).<sup>C,3,4</sup>

	Mothers with GDM (95% CI)	Mothers without GDM (95% CI)
High Birthweight <sup>∅,**,</sup>	13.8% (10.0%-18.6%)	9.1% (8.1%-10.1%)
Caesarian Section**	43.8% (38.3%-49.5%)	31.3% (29.8%-32.8%)
Infant Stay in NICU**	16.3% (12.8%-20.6)	10.9% (10.1%-11.8%)

\*95% CI – 95% Confidence Interval  
∅High Birthweight is defined as infants greater than 4,500 grams (See Note D); NICU – Neonatal Intensive Care Unit  
Source: MIPRAMS 2012-2015

- The odds of a mother with GDM having a high birthweight newborn was almost double the odds of a mother without GDM after accounting for other factors such as pre-pregnancy weight status, maternal race and age, and education.<sup>F</sup>
- GDM status was not the sole factor contributing to the likelihood of a mother having a Caesarean section nor a newborns' risk of a NICU stay.<sup>F</sup>

## Standard of Care Recommendations

- GDM management during pregnancy is important in reducing delivery complications, poor maternal and infant outcomes and developing type 2 diabetes risk.<sup>1</sup> Standards of care recommend a female with GDM should be referred to a medical nutrition therapy program upon diagnosis and throughout the pregnancy as needed.<sup>1</sup> The Registered Dietitian should be familiar with diabetes management.<sup>1</sup>
- For postpartum care:
  - A mother diagnosed with GDM should receive a follow-up screening 4-12 weeks postpartum due to the risk of persistent diabetes or prediabetes.
  - If the 4-12-week postpartum diabetes screening tests normal, the mother should be screened routinely every 1-3-years thereafter.
- More detailed information can be found in the Standards of Medical Care in Diabetes and the American College of Obstetricians and Gynecologists Practice Bulletin.<sup>1,5</sup>

## Notes and Methods

- A) The Michigan Pregnancy Risk Assessment Monitoring System (MIPRAMS) collects data from a population representative sample of recent mothers who reported GDM during their most recent pregnancy supplemented by Michigan Resident Birth Files.
- B) This fact sheet reported estimates determined from a cross-sectional study. A limitation of this type of study is that no temporal relationship or causality can be drawn between selected characteristics or outcomes and gestational diabetes.
- C) An orthogonal contrast test for linear changes was conducted on the gestational diabetes trend. Statistically significant differences between most estimates reported when the 95% confidence intervals of the estimates did not overlap (e.g., GDM percentage estimates among age groups). Some differences between estimates were tested for statistical significance ( $p < 0.05$ ). All statistical significance tests were conducted in SAS version 9.4 (Cary, NC) and SAS-Callable SUDAAN version 11.0.1 (Research Triangle Institute) using the CROSSTAB and DESCRIPT procedures.
- D) High birthweight is defined as infants greater than 4,500 grams.<sup>5</sup>
- E) To determine the association between GDM and infant outcomes of interest, logistic regression models were run using SAS Proc Surveylogistic. Risk ratios were produced as needed using Proc Rlogist. All models began by controlling for potential confounders of maternal race, age, education, income, previous live births, high blood pressure, smoking status, and infant gestational age. Backwards elimination was then used to adjust model fit.

## References:

- 1) American Diabetes Association: Clinical Practice Recommendations 2020. Standards of Medical Care in Diabetes—2019. Diabetes Care January 2020 Jan; 43 (Supplement 1).
- 2) Deputy NP, Kim SY, Conrey EJ, and KM Bullard. Prevalence and changes in preexisting diabetes and gestational diabetes among women who had a live birth-United States, 2012-2016. MMWR Morb Mortal Wkly Rep 2018; 67:1201-1207.
- 3) Michigan Pregnancy Risk Assessment Monitoring System, Lifecourse Epidemiology and Genomics Division, Michigan Department of Health and Human Services (2009-2015).
- 4) Michigan Resident Birth Files, Division for Vital Records and Health Statistics, Michigan Department of Health and Human Services (2012-2015).
- 5) ACOG Practice Bulletin No. 190: Gestational Diabetes Mellitus. Obstetrics and Gynecology. 2018 Feb; 131(2):e49-e64.

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