

MI PRAMS Delivery



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Pre-pregnancy Obesity and Infant Mortality, MI PRAMS 2001-2008

Maternal obesity has been implicated as a cause of many adverse perinatal outcomes, such as preeclampsia, gestational diabetes mellitus, postpartum weight retention, intrauterine growth retardation, macrosomia, and childhood

overweight/obesity.¹

Since attempting weight loss during pregnancy is not recommended and can actually increase negative outcomes,² both public health and clinical experts are focusing on the preconception period as the

optimal time for maternal obesity intervention.³⁻⁴

Further highlighting the importance of preconception intervention, data from the MI Behavioral Risk Factor Surveillance System (BRFSS) revealed that the prevalence of obesity

for women of reproductive age rose 33% from 2004 to 2010.⁵

This issue of the MI PRAMS Delivery reports recent trends and characteristics of pre-pregnancy obesity in Michigan and tests the association between obesity and infant mortality.

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Trends of Pre-pregnancy Normal Weight, Overweight, and Obesity, MI PRAMS 2001-2008

The MI PRAMS survey asked respondents to fill in both their height and pre-pregnancy weight, from which BMI groups were calculated according to the World Health Organization's (WHO) guidelines.⁶

The prevalence of pre-pregnancy normal weight ($18.5 \leq$

BMI < 25.0) did exhibit a linear decrease from 2001 (53.6%) to 2008 (51.2%), but the trend did not reach significance (p-value for trend = 0.06, Figure 1).

The prevalence of overweight ($25.0 \leq$ BMI < 30.0) did not demonstrate a change in either direction during the

same time period (p-value for trend = 0.36).

However, pre-pregnancy obesity (BMI ≥ 30.0) did show a general increasing trend from 2001 (18.8%) to 2008 (22.7%), and this rise was statistically significant (p-value for trend = 0.0005). ◇

Figure 1: Trends of Pre-pregnancy Body Mass Index (BMI) Groups, MI PRAMS 2001-2008



Demographic Characteristics of Pre-pregnancy Obesity

Figure 2: Prevalence of Pre-pregnancy Obesity by Age and Race/Ethnicity, MI PRAMS 2001–2008

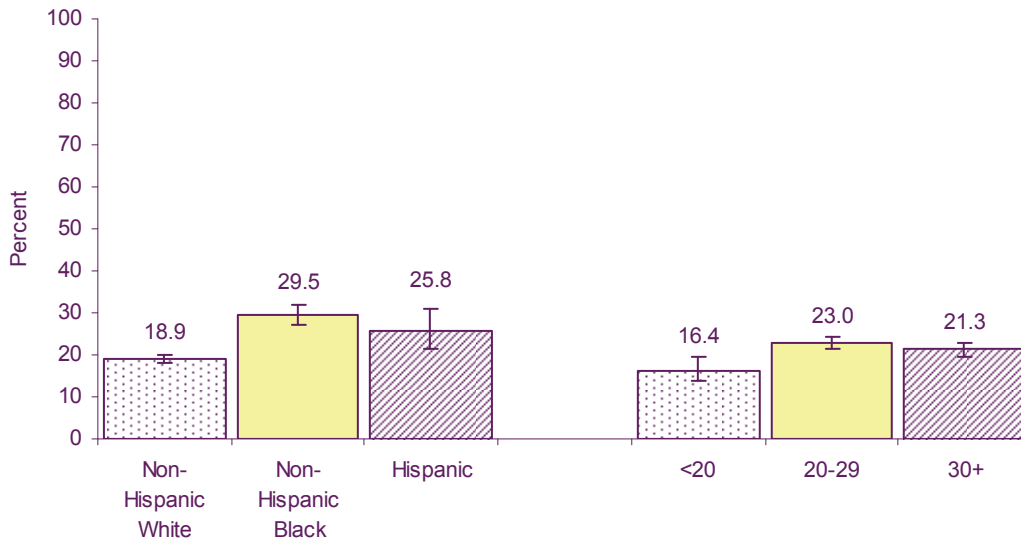


Figure 3 highlights important socioeconomic differences in the prevalence of pre-pregnancy obesity. Twenty-three percent of mothers with a high school education or less were obese, compared to only 19% of those with at least a college degree.

Likewise, 28% of women who received Medicaid during the preconception period were obese, while only about 20% of privately insured women were obese before pregnancy. Women with no preconception health insurance exhibited a prevalence similar to that of privately insured women.

More research is necessary to elucidate the causes of these disparities in preconception obesity and to identify effective clinical and public health intervention strategies to reduce obesity. ◇

About MI 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 post-partum periods. Information regarding the health of the infant is also collected for analysis.

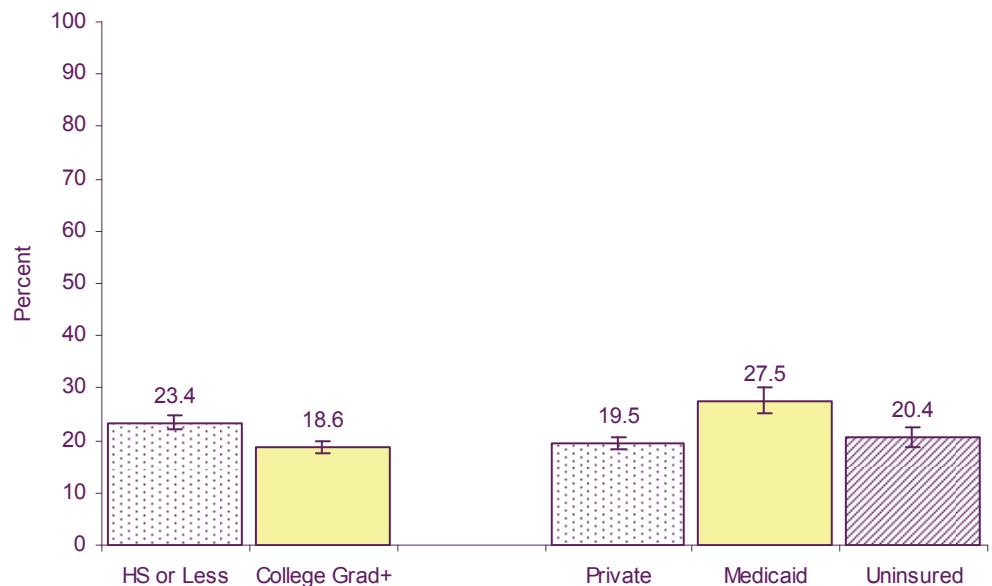
Annually, over 2,000 mothers are selected at random to participate from a frame of eligible birth certificates. Women who delivered a low birth weight infant were over-sampled in order to ensure adequate representation. The results are weighted to represent the entire cohort of women who delivered during each year. ◇

Between 2001 and 2008, the prevalence of pre-pregnancy obesity in Michigan among women who gave birth was higher among specific demographic groups.

(For a detailed description of the rationale behind combining years of data for analysis, see the Epi Corner on page 4.)

As shown in Figure 2, 30% of non-Hispanic black and 26% of Hispanic moms were obese, roughly seven to ten percentage points higher than their non-Hispanic white counterparts. Further, a smaller proportion of teen mothers were obese than moms in the older age groups.

Figure 3: Prevalence of Pre-pregnancy Obesity by Education and Pre-pregnancy Insurance Status, MI PRAMS 2001–2008



Association Between Pre-pregnancy Obesity and Infant Mortality

Michigan PRAMS data from 2001-2008 was used to construct a multivariate logistic regression model, in order to assess the relationship between pre-pregnancy obesity and infant mortality after adjustment for confounding factors.

Before any analysis was conducted, records with birth defects reported on the birth certificate were excluded from the dataset. This was done because obese women are more likely to deliver an infant with a congenital abnormality,⁷ which was the second leading cause of infant mortality in Michigan between 2001 and 2008, at 18.5% of deaths.⁸ Therefore, these records were excluded in order to explore the association between obesity and infant mortality that may exist outside this potential causal pathway.

Information on infant mortality was collected from the survey question: "Is your baby alive now?" Possible confounders considered for analysis were maternal age, race, education, marital status, parity, trimester of entry into prenatal care, pregnancy intention, and whether the delivery was paid for by Medicaid.

Those variables that were significantly associated with infant mortality in a bivariate analysis were entered into the full logistic regression model. Only maternal race/ethnicity remained significant and was included in the final regression model.

Table 1 displays the logistic regression results for the association between pre-

pregnancy obesity and infant mortality, after adjustment for confounding by race/ethnicity. Compared to women within the normal BMI range before pregnancy, those who were obese were more than twice as likely to report that their infant was no longer living at the time of survey (OR = 2.1; 95% CI: 1.1-4.0).

Also of note is that the risk of infant mortality was *not* elevated among overweight mothers, when compared to those with a normal pre-pregnancy weight (OR = 1.0; 95% CI: 0.5-1.9).

Finally, non-Hispanic black race was also an independent predictor of infant mortality. When holding BMI values constant, black mothers were 2.6 times more likely to experience infant mortality (95% CI: 1.4-4.6) than white moms.

The elevated risk of infant mortality among obese women shown in Table 1 is similar in magnitude to results reported by researchers in Kalamazoo County, who investigated the risk factors of fetal-infant mortality in Kalamazoo County from 2004-2005.⁹ The study found that women with pre-pregnancy obesity were 2.8 times more likely to experience fetal-infant mortality than women in the normal BMI range (95% CI: 1.1-6.8).

Although the Kalamazoo County study measured mortality differently than PRAMS and did not exclude infants with reported congenital abnormalities, the results of both analyses add to the knowledge base on the perinatal risks of maternal obesity. ♦

Table 1: Association Between Pre-pregnancy Obesity and Infant Mortality, MI PRAMS 2001-2008

Factor	Odds Ratio	95% Confidence Interval
Normal weight	1.0	Reference
Overweight	1.0	(0.5 - 1.9)
Obese	2.1	(1.1 - 4.0)
Non-Hispanic White	1.0	Reference
Non-Hispanic Black	2.6	(1.4 - 4.6)
Hispanic	0.9	(0.4 - 2.0)

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Epi Corner: Combining Years of Data

There are several issues Epidemiologists must consider before choosing which years of data to combine for different types of analysis.

Linear trend analysis examines the changes in prevalence between each year and provides a summary statistic for the overall trend, so combining many years of data is relatively straightforward.

However, if the prevalence of a variable changes over time, as was observed with obesity in this issue, information may be lost when data from the entire time period of interest is lumped together for

the purpose of examining demographic characteristics. Specifically, Figure 2 shows the prevalence of obesity, stratified by race/ethnicity and age, for the combined years 2001-2008, but it doesn't reflect the overall increase in obesity depicted in Figure 1.

Combining all eight years of data does have advantages, though: using the years 2001-2008 provided a large enough sample size to report the prevalence of obesity among the subgroup of Hispanic moms.

The advanced statistical methodology of logistic regression deals with this issue in

a different way: an interaction term between BMI and year of birth can control for the effect of time. An interaction term was added to the full logistic regression model described on page 3, but it did not reach statistical significance, so it was not included in the results of Table 1. ♦

