



Pre-Pregnancy Body Mass Index and Related Maternal Health and Infant Outcomes Among Mothers in Florida, 2009-2011

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Summary

- From 2009 to 2011, 51.1% of Florida new mothers were a normal weight before pregnancy. Almost 20% of mothers were obese and over 24% were overweight; 4.8% of mothers were underweight.

UNDERWEIGHT:

- The prevalence of being underweight before pregnancy was highest among mothers 24 years old and younger, mothers who had never had a previous live birth, and mothers with an annual household income of less than \$15,000.
- Underweight mothers had a significantly higher prevalence of smoking cigarettes during the last three months of pregnancy compared to normal weight mothers.
- Compared to normal weight mothers, underweight mothers had a significantly higher prevalence of severe nausea, vomiting, or dehydration during pregnancy.
- Underweight mothers had a significantly higher prevalence of having a baby with low birth weight than normal weight mothers.

OVERWEIGHT:

- The prevalence of being overweight before pregnancy was highest among mothers 25-34 years old, mothers who had one or more previous live births, and mothers who were Medicaid recipients.
- Compared to normal weight mothers, overweight mothers had a significantly higher prevalence of smoking cigarettes during the last three months of pregnancy.
- Compared to normal weight mothers, there was a significantly higher prevalence of overweight mothers who had high blood pressure during pregnancy.
- The prevalence of delivery by cesarean section was significantly higher among overweight mothers than among normal weight mothers.

OBESE:

- The prevalence of being obese before pregnancy was highest among non-Hispanic black mothers, mothers 20-34 years old, mothers who had four or more previous live births, mothers with an annual household income of less than \$35,000, and mothers who were Medicaid recipients.
- Obese mothers also had a significantly lower prevalence of taking prenatal vitamins before pregnancy compared to mothers who had a normal weight.
- Compared to mothers with a normal weight, obese mothers had a significantly higher prevalence of smoking cigarettes during the last three months of pregnancy and a significantly lower prevalence of drinking alcohol during the last three months of pregnancy.
- Compared to mothers with a normal weight, obese mothers had a significantly higher prevalence of gestational diabetes, high blood pressure during pregnancy, and severe nausea, vomiting, or dehydration. Obese mothers also had a higher prevalence of early labor pains.
- The prevalence of cesarean sections among obese mothers was 1.45 times as high as normal weight mothers.
- Obese mothers had a significantly higher prevalence of giving birth to infants with very low birth weight, infants large for gestational age, infants born premature, and infants having to go to the neonatal intensive care unit (NICU) than normal weight mothers.
- There was a significantly lower prevalence of breastfeeding among obese mothers than among normal weight mothers.

Introduction

Being overweight or obese is associated with diabetes, hypertension, heart disease, high cholesterol, stroke, and a number of others conditions.¹ A large percentage of adults in the United States, including in Florida, are either overweight or obese. According to the 2013 Florida Behavioral Risk Factor Surveillance System (BRFSS) Survey, 62.8% of Florida adults were overweight or obese. Among Florida women, 55.3% were overweight or obese.

Being overweight or obese at any time can lead to increased health risks, however, being overweight or obese during pregnancy carries the risk of health problems for the infant and the mother. Maternal health conditions, including gestational diabetes and hypertension during pregnancy, occur at higher rates among obese mothers. Obese mothers also have higher rates of complications during pregnancy and delivery. Additionally, there can be increased risk of infants being stillborn or born at an unhealthy birth weight.² Being underweight may be associated with giving birth to a preterm infant or a low birth weight infant.³

This report looks at the 2009-2011 prevalence of pre-pregnancy obesity and related pregnancy behaviors, maternal health, and infant outcomes among new mothers in Florida.

The Florida Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing surveillance system designed to collect data on maternal behaviors and experiences before, during, and shortly after pregnancy. PRAMS data enhance our understanding of maternal behaviors and their relationship with pregnancy outcomes. PRAMS is a multi-state surveillance system operated jointly by the Centers for Disease Control and Prevention (CDC) and the states. Florida has been participating in the PRAMS surveillance project since June 1993.

Each month, Florida PRAMS selects approximately 200 new mothers among all live births from the Florida birth certificate database. PRAMS is a mail surveillance project with a telephone follow-up of nonresponders. Surveys in English and/or Spanish are mailed to new mothers two to five months after giving birth. Mothers are contacted by telephone if no response is received after multiple attempts to contact by mail. Florida PRAMS currently maintains an average response rate of 60%.

If any assistance is needed with interpretation or survey methods, please contact the Bureau of Epidemiology at (850) 245-4401.



Methods

Body Mass Index (BMI) is a classification used to help determine if a person has problems with their weight based on their height. The calculation for BMI is $[(\text{weight in pounds})/(\text{height in inches})^2] \times 703$.

BMI is commonly used to group people into one of four categories, which adhere to the CDC's categories¹:

- Underweight: BMI of less than 18.5
- Normal weight: BMI of 18.5 to 24.9
- Overweight: BMI of 25.0 to 29.9
- Obese: BMI of 30.0 or higher

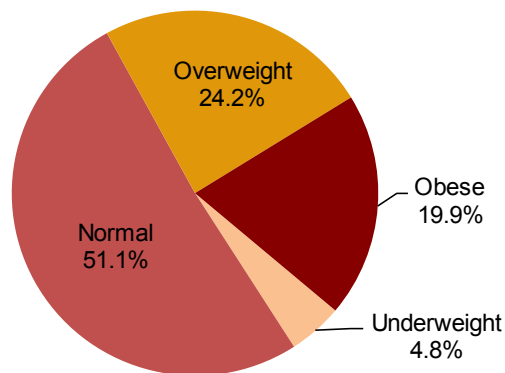
This report categorizes new mothers into one of the four BMI groups based on pre-pregnancy weight and height. BMI was analyzed with each of the included maternal behavior/health and infant health variables. These analyses were conducted using chi-square tests, independent of other variables. Table 1 includes 95% confidence intervals (CI) and all bar graphs include 95% CI error bars. For the purposes of this report, statistical significance was based on non-overlapping 95% CIs. The possibility of confounding was not analyzed in this report. The findings in this report are unadjusted and associations between variables may not be causal.

In order to have a larger sample size, three years of data—2009, 2010, and 2011—were combined for this analysis. From 2009 to 2011, 7,202 new mothers in Florida were randomly selected to participate and a total of 4,281 respondents completed the survey. The data presented in this report are adjusted, or “weighted,” by the CDC to be representative of the entire Florida population of pregnancies which resulted in a live birth (excluding those that resulted in pluralities of four or greater).

Results

In the 2009-2011 study period, 19.9% of new mothers in Florida were obese, 24.2% were overweight, 51.1% were a normal weight and 4.8% were underweight before their pregnancy (Figure 1). One of the U.S. Healthy People 2020 objectives is to increase the percentage of mothers who had a pre-pregnancy BMI in the normal range to 53.4%. Florida has not yet achieved this goal.

Figure 1: Percentage of Florida New Mothers by Pre-Pregnancy BMI Category, 2009-2011



Source: Florida PRAMS, 2009-2011

BMI and Demographic Factors

BMI can be influenced by a number of factors, including demographic characteristics. Table 1 displays, for each of the demographic categories, the percentage of new mothers in each of the BMI groups.

The prevalence of pre-pregnancy obesity among Florida new mothers was significantly higher among non-Hispanic black mothers compared to non-Hispanic white mothers.

The younger age groups had a significantly higher prevalence of being underweight than the older age groups. Compared to mothers younger than 19 years old, there was a significantly higher prevalence of overweight mothers 25-34 years old and a higher prevalence of obese mothers 20-34 years old.

There was a significantly higher prevalence of being underweight among mothers who never had a previous live birth. Mothers who had one to three previous live births had a significantly higher prevalence of being overweight than mothers who never had a previous live birth, while mothers who had four or more previous live births had a significantly higher prevalence of being overweight or obese than mothers who never had a previous live birth.

Mothers who had an annual household income of \$35,000 or more had a significantly lower prevalence of being underweight compared to mothers with an annual household income of less than \$15,000, and a significantly lower prevalence of being obese compared to mothers with an annual household income of less than \$35,000.

Mothers who were Medicaid recipients had a significantly higher prevalence of being overweight or obese than mothers who were not Medicaid recipients.

Table 1: Demographic Characteristics of Florida New Mothers by Pre-Pregnancy BMI, 2009-2011

Characteristic	Underweight N=225		Normal N=2068		Overweight N=967		Obese N=804	
	%	95% CI	%	95% CI	%	95% CI	%	95% CI
Overall	4.8	4.1, 5.6	51.1	49.2, 52.9	24.2	22.6, 25.8	19.9	18.4, 21.3
Race/Ethnicity								
NH White	5.6	4.4, 6.9	53.6	51.0, 56.3	23.3	21.1, 25.6	17.4	15.4, 19.4
NH Black	4.6	2.8, 6.5	42.1	37.6, 46.5	24.9	21.0, 28.8	28.4	24.3, 32.4
Hispanic	3.7	2.5, 5.0	49.9	46.5, 53.3	26.0	23.0, 29.0	20.4	17.6, 23.2
Age								
≤19 Years	8.8	5.3, 12.3	61.1	54.8, 67.3	16.9	12.2, 21.6	13.2	8.8, 17.6
20-24 Years	7.1	5.2, 9.0	49.5	45.7, 53.3	22.5	19.3, 25.7	20.9	17.8, 24.0
25-34 Years	3.6	2.6, 4.5	49.7	47.2, 52.2	26.0	23.8, 28.3	20.7	18.7, 22.8
≥35 Years	3.1	1.4, 4.8	52.6	47.8, 57.3	25.1	20.9, 29.3	19.2	15.4, 23.0
Number of Past Live Births								
None	6.4	5.1, 7.7	54.4	51.7, 57.1	20.8	18.6, 23.0	18.4	16.3, 20.6
1 to 3	3.6	2.7, 4.6	49.5	46.9, 52.1	26.5	24.2, 28.9	20.3	18.2, 22.4
4 or More	1.6	0.0, 4.1	32.3	22.8, 41.7	33.8	24.1, 43.4	32.3	22.9, 41.8
Education								
<High School	5.8	3.6, 8.0	44.1	39.1, 49.0	27.5	23.0, 31.9	22.7	18.5, 26.8
High School	5.9	4.4, 7.5	46.0	42.6, 49.4	26.0	23.0, 29.0	22.0	19.2, 24.8
>High School	3.9	3.0, 4.9	56.2	53.8, 58.7	22.1	20.1, 24.2	17.7	15.8, 19.6
Annual Household Income								
<\$15,000	6.7	5.1, 8.2	46.9	43.6, 50.2	23.7	20.9, 26.5	22.8	20.0, 25.5
\$15,000-\$34,999	4.2	2.7, 5.6	46.9	43.2, 50.5	27.3	24.0, 30.6	21.6	18.6, 24.6
\$35,000 or More	3.5	2.3, 4.6	58.4	55.5, 61.4	22.1	19.6, 24.7	15.9	13.7, 18.2
Marital Status								
Married	4.3	3.2, 5.3	53.3	50.8, 55.8	23.6	21.5, 25.8	18.7	16.8, 20.7
Unmarried	5.5	4.3, 6.7	48.6	45.9, 51.4	24.8	22.4, 27.2	21.1	18.8, 23.3
Medicaid Status								
Medicaid Recipient	5.7	4.6, 6.8	45.5	43.0, 48.0	26.4	24.2, 28.6	22.4	20.3, 24.5
Not Medicaid Recipient	3.8	2.7, 4.8	58.6	55.8, 61.3	21.3	19.0, 23.6	16.4	14.3, 18.4

Source: Florida PRAMS, 2009-2011

BMI and Maternal Behaviors

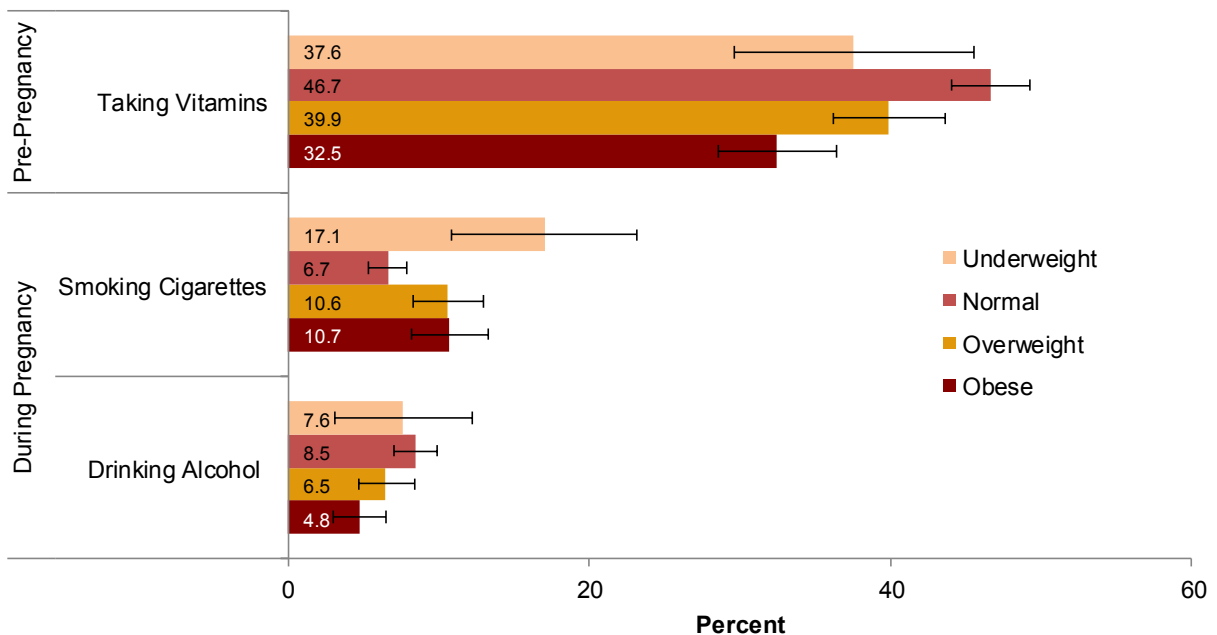
Before getting pregnant, 19.5% of new mothers discussed the importance of having a healthy weight with a health care worker.

The prevalence of taking a multivitamin, a prenatal vitamin, or a folic acid vitamin at least once per week during the month before pregnancy was significantly lower among obese mothers compared to normal weight mothers.

The prevalence of smoking cigarettes during the last three months of pregnancy was significantly higher among mothers who were underweight, overweight, or obese compared to mothers with a normal weight. However, the prevalence of drinking alcohol during the last three months of pregnancy showed a different result, with obese mothers having a significantly lower prevalence when compared to mothers who had a normal weight (Figure 2).

Florida overweight mothers had a mean weight gain of 32.6 pounds during pregnancy, while obese mothers had a mean weight gain of 27 pounds. The Institute of Medicine recommends overweight mothers gain 15-25 pounds and obese mothers gain 11-20 pounds during pregnancy. Florida overweight and obese mothers exceeded these recommendations. Florida normal weight mothers had a mean weight gain of 33.6 pounds and underweight mothers had a mean weight gain of 35 pounds. Both of these groups were within the recommended weight gain range of 28-40 pounds for underweight mothers and 25-35 pounds for normal weight mothers.⁴

Figure 2: Prevalence of Maternal Behaviors Among Florida New Mothers, by BMI Category, 2009-2011



Source: Florida PRAMS, 2009-2011

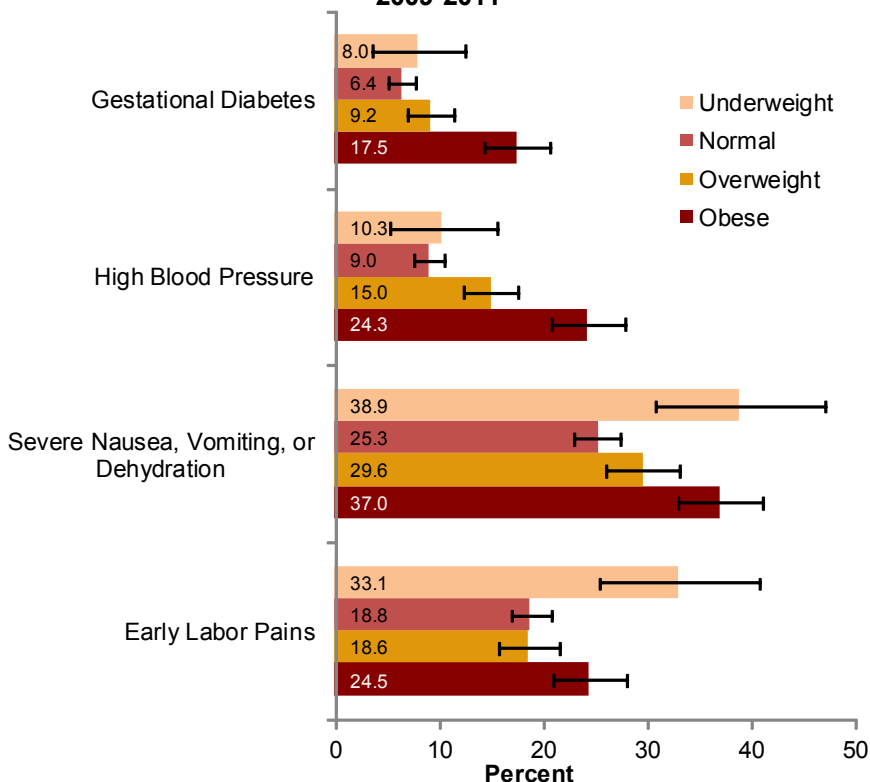
BMI and Maternal Health Conditions

Compared to mothers with a pre-pregnancy BMI in the normal category, mothers in the obese category had a significantly higher prevalence of gestational diabetes, high blood pressure, early labor pains, and severe nausea, vomiting, or dehydration.

Overweight mothers, compared to normal weight mothers, had a significantly higher prevalence of high blood pressure during pregnancy.

Underweight mothers had the highest prevalence of severe nausea, vomiting, or dehydration during pregnancy and early labor pains. The prevalence for both of these conditions was significantly higher compared to normal weight mothers (Figure 3).

Figure 3: Prevalence of Maternal Health Conditions Among Florida New Mothers, by BMI Category, 2009-2011

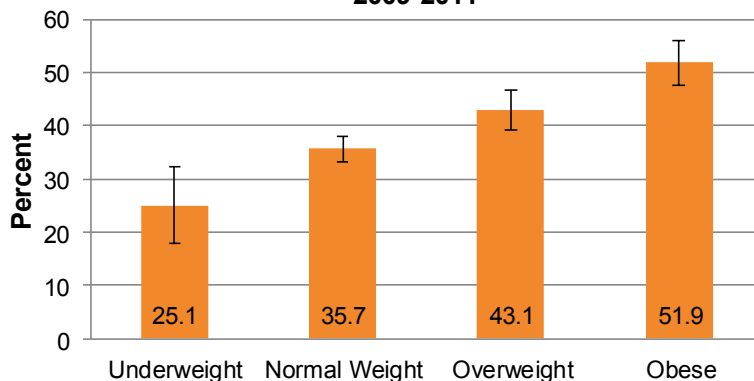


Source: Florida PRAMS, 2009-2011

BMI and Cesarean Sections

The prevalence of cesarean sections significantly increased as the mothers' BMI level increased. Each BMI level had a significantly higher prevalence of cesarean section deliveries than the previous BMI level. More than half of obese mothers delivered their babies by cesarean section. This rate was 1.45 times as high as normal weight mothers (Figure 4).

Figure 4: Prevalence of Cesarean Delivery Among Florida New Mothers, by BMI Category, 2009-2011



Source: Florida PRAMS, 2009-2011

BMI and Infant Outcomes

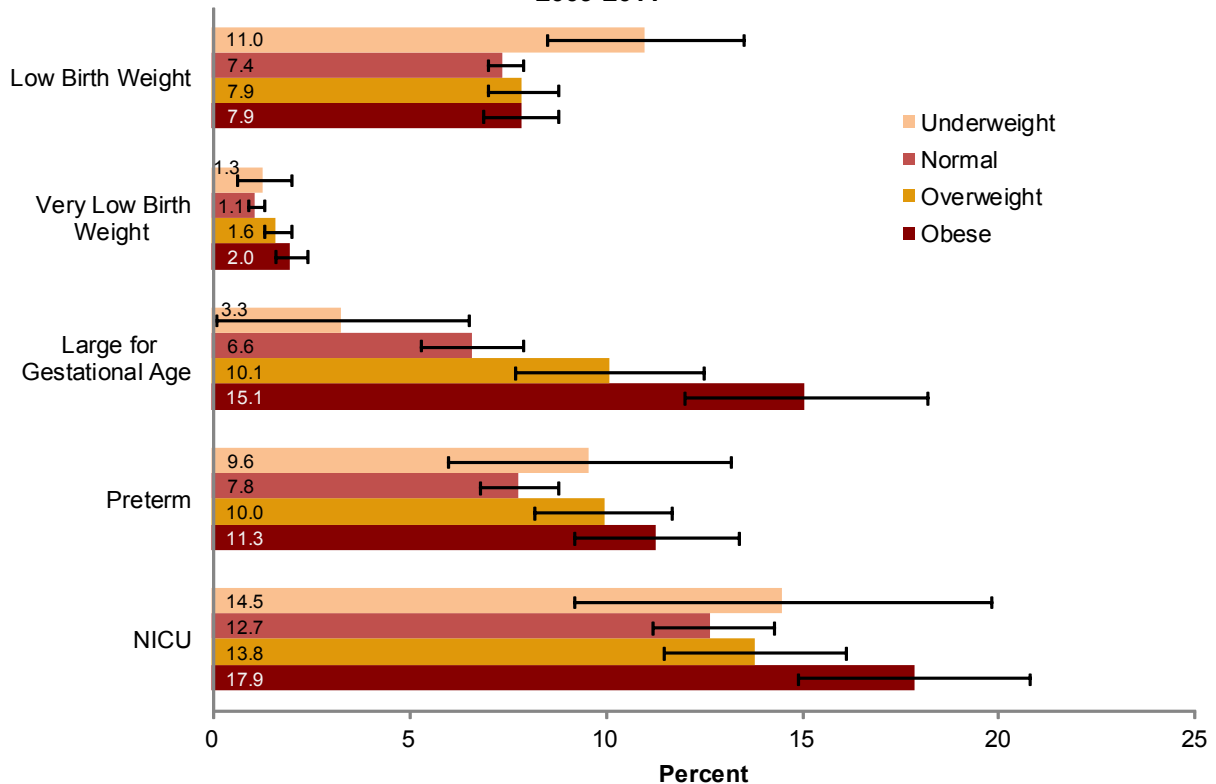
Infant low birth weight, defined in this report as 2,500 grams or less, was significantly higher among underweight mothers than normal weight mothers. Conversely, very low birth weight, defined as an infant weighing 1,500 grams or less, was highest among obese mothers, and their prevalence was significantly higher compared to normal weight mothers.

Large for gestational age means that an infant was born larger than expected based on the number of weeks of pregnancy.⁵ In this report, large for gestational age was measured as an infant having a birth weight above the ninetieth percentile of all babies born at the same gestational age. Obese mothers had a significantly higher prevalence of giving birth to babies large for gestational age compared to normal weight mothers.

Preterm infants are born earlier than 37 weeks of pregnancy. Obese mothers had a significantly higher prevalence of giving birth to a preterm infant compared to normal weight mothers.

Additionally, compared to mothers who were a normal weight, mothers who were obese had a significantly higher prevalence of infant entry into the NICU (Figure 5).

Figure 5: Prevalence of Infant Health Outcomes, by Mother's BMI Category, Florida, 2009-2011

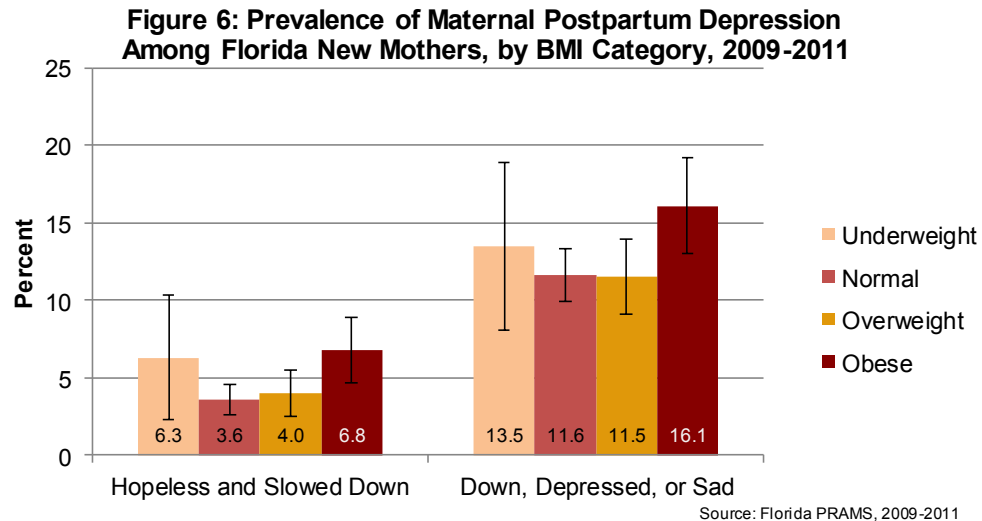


Source: Florida PRAMS, 2009-2011

BMI and Maternal Postpartum Health

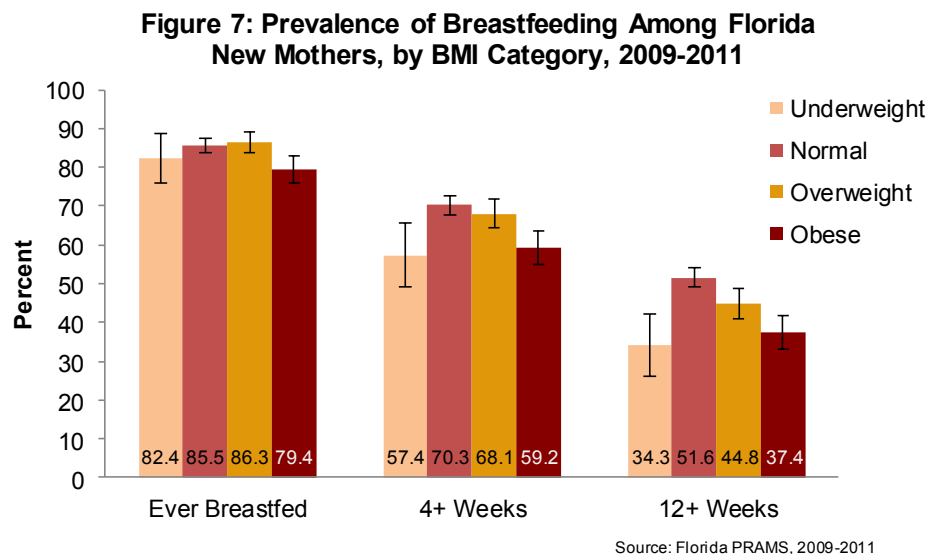
Both obese and underweight mothers were most likely to report that they often or always felt down, depressed, or sad after pregnancy. However, compared to normal weight mothers, there was no significant difference.

Compared to normal weight mothers, obese mothers had a significantly higher prevalence of often or always feeling hopeless after pregnancy and often or always feeling slowed down after pregnancy (Figure 6).



BMI and Breastfeeding

Compared to mothers in the normal BMI category, there was a significantly lower prevalence of ever breastfeeding among obese mothers. When the infant was four weeks old, underweight mothers and obese mothers had a lower prevalence of breastfeeding than normal weight mothers. When the infant was 12 weeks old, all non-normal BMI categories—underweight, overweight, and obese—had a lower prevalence of breastfeeding than normal weight mothers (Figure 7).



Recommendations for Women

- Women who believe they may get pregnant in the future should discuss the importance of being at a healthy weight with their doctor or health care provider.
- Women who are pregnant should know the recommended amount of weight to gain during pregnancy for women in their BMI category.
- Every pregnancy is different. Women should discuss their specific needs with a doctor or health care provider to determine what is right for them and their pregnancy.

Resources for Pregnant Women, New Mothers, and Families

- Call the Family Health Line at 1-800-451-2229 or go to www.floridahealth.gov/programs-and-services/womens-health/index.html for more information about being healthy before, during, and after pregnancy.
- Go to the Healthiest Weight Florida website at www.healthiestweightflorida.com for more information about the importance of being a healthy weight.
- Get information about good nutrition for women, infants, and children through the WIC program at www.floridawic.org or by calling 1-800-342-3556.
- Contact the Healthy Start Coalition for information and resources to have a healthy pregnancy and baby. Find your local Healthy Start Coalition here: www.healthystartflorida.com/find-a-coalition.
- Find tips for quitting smoking by calling the Florida Quitline at 1-877-822-6669 or going to www.tobaccofreeflorida.com.
- For information about breastfeeding, go to www.womenshealth.gov/breastfeeding.

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