

Pre-pregnancy body mass index, maternal morbidity, and birth outcomes among women with Medicaid reimbursed births

# Maternal Obesity



## Fact sheet purpose

The purpose of this fact sheet is to describe demographic characteristics, access to care, prenatal morbidity, method of delivery, and birth outcomes by maternal pre-pregnancy body mass index (BMI) among Medicaid reimbursed births during 2012. This information may be useful to program managers and prenatal care providers to develop and implement programs that improve the health outcomes of the women and infants who rely on Medicaid coverage.

## Key findings

Over six percent (6.5%; n=1002) of mothers with a Medicaid reimbursed birth during calendar year 2012 had a pre-pregnancy body mass index (BMI) of 40 or greater.

The highest percentages of women determined to be morbidly obese were among non-Hispanic white women (7.1%; n=785) and non-Hispanic Black women (7.2%; n=116). [See Figure 1.](#)

Body mass index and age were inversely related among women with Medicaid reimbursed births in Iowa during 2012. In this case, the percent of women with extreme obesity increased with age. [See Figure 2.](#)

Women with a pre-pregnancy BMI of 40 or more were more likely to experience gestational diabetes ([Figure 3](#)) and/or gestational hypertension ([Figure 4](#)).

Significantly higher percentages of newborns admitted to the NICU were among women at the opposite ends of the BMI categories ([Figure 7](#)).

A significantly higher percentage of low birth weight (LBW) infants were born to underweight women (12.5%; n=81) ([Figure 8](#)). Like LBW, a significantly higher percentage of pre-term infants were born to underweight women (16.7%; n=103) ([Figure 9](#)).

The percentage of cesarean deliveries was significantly higher than the overall percentage among women with morbid obesity (52.0%; n=521) ([Figure 12](#)) and obese women (37.4%; n=1,374).

## Background

Obesity has reached epidemic proportions in the United States; more than two-thirds of American adults are overweight or obese <sup>(1)</sup>. Specifically, more than one-third of women are obese, more than one half of women aged 20 and older are overweight or obese, and eight percent of reproductive-aged women are morbidly obese. Overweight is defined as a body mass index (BMI) of 25.0 to 29.9 <sup>(2)</sup>. Obesity is defined as a BMI of 30.0-39.9 and morbid obesity is defined as a BMI of greater than or equal to 40.0. Racial minorities, particularly non-Hispanic Black and Hispanic women, are disproportionately affected by obesity <sup>(2)</sup>. Consistent with the prevalence of overweight and obesity in the general population, more women are overweight and obese when they enter pregnancy <sup>(3)</sup>.

Maternal obesity has potential complications for both mothers and their newborns. Mothers with a high BMI are more likely to develop gestational hypertension and gestational diabetes mellitus <sup>(3, 4, 5, 6, 7, and 8)</sup>. These mothers are also more likely to deliver via cesarean section and to have induced labor. In one prospective study, the cesarean delivery rate drastically increased with maternal BMI <sup>(5)</sup>. The cesarean delivery rate was 20.7% for women with a BMI of 29.9 or less, 33.8% for women with a BMI of 30–34.9, and 47.4% for women with a BMI of 35–39.9 <sup>(5)</sup>. Furthermore, operative and post-operative complications of cesarean delivery, such as infection and excessive blood loss, increase among obese women.

The newborns of overweight and obese women are at greater risk for neonatal intensive care (NICU) admission and being large for gestational age. Whereas infants born to underweight women are at greater risk to be born at a low birth weight.

Overweight and obese women are also less likely to breastfeed their infants <sup>(9)</sup>. Additionally, researchers have recently reported that infants born to overweight and obese mothers are at greater risk for developing obesity, diabetes, and cardiovascular problems later in life. It is not known if this relationship is due to the pregnancy itself or other genetic predispositions of the mother.



## Data sources

Data for this report were derived from a matched file of the 2012 birth certificate and Medicaid paid claims for calendar year 2012. Medicaid status was based on a paid claim for any one of the delivery related DRGs. We used paid claims for maternal diagnostic related groups (DRGs) 765 through 775. DRGs 795 through 775 are the reporting categories for vaginal and cesarean deliveries. The birth certificate was used for maternal demographic characteristics, access to care, breastfeeding at hospital discharge, prenatal morbidities, and newborn NICU admission. Birth certificate data also allowed us to calculate BMI; women reported their height and pre-pregnancy weight.

## Results

In 2012, the labor and delivery costs for 40 percent of Iowa resident births were reimbursed by Medicaid (40.3%; n=15,598 of 38,686 births). Please note that missing data were not included in this analysis and percentages are rounded. For these reasons, total values may not equal 15,598 births or 100 percent respectively.

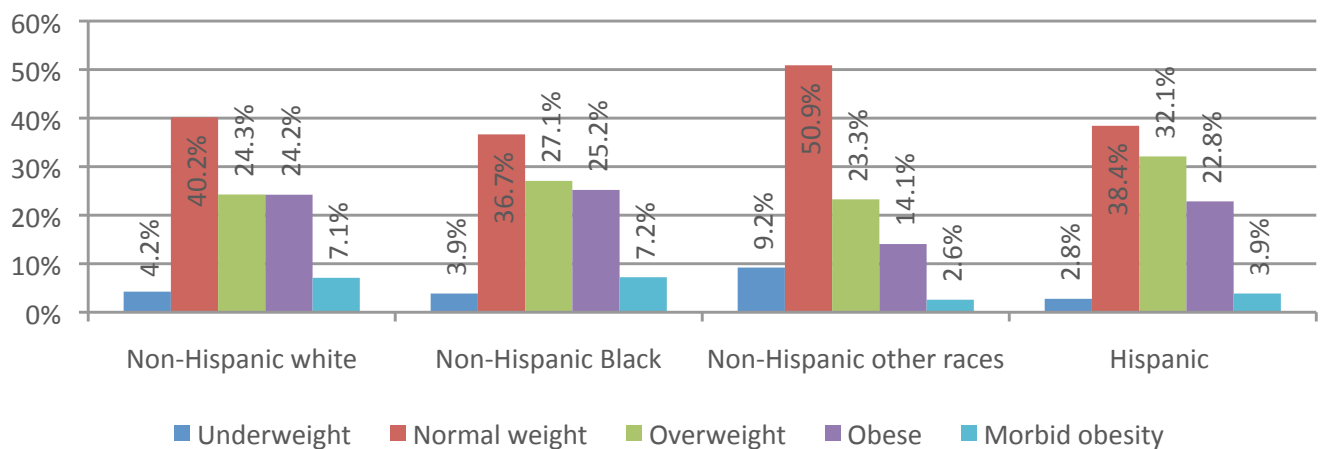


# Pre-pregnancy body mass index (BMI)

Six percent (6.5%; n=1002) of mothers with a Medicaid reimbursed birth were characterized as being morbidly obese. Four percent of mothers with a Medicaid reimbursed birth in 2012 were underweight based on their pre-pregnancy BMI (4.2%; n=650). Forty percent (40.0%; n=6,196) were of a normal weight, twenty-five percent (25.6%; n=3,971) were considered overweight, and twenty-three percent (23.7%; n=3675) of mothers with a Medicaid reimbursed birth were determined to be obese.

## Pre-pregnancy BMI by maternal race ethnicity

Figure 1. Pre-pregnancy BMI by maternal race/ethnicity among Medicaid reimbursed births, Iowa 2012

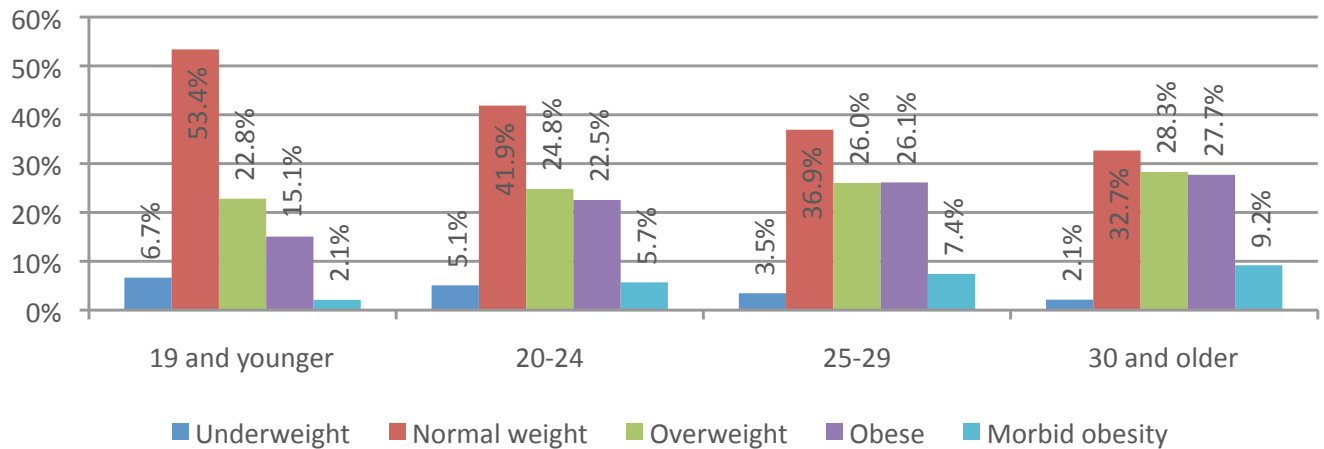


The percentage of women determined to be overweight or obese based upon pre-pregnancy BMI varied by race and ethnicity (Figure 1). Fifty-four percent of Hispanic women were either overweight (32.1%; n=707) or obese (22.8%; n=503) during their last pregnancy compared to fifty-two percent of non-Hispanic Black women who were overweight (27.1%; n=435) or obese (25.2%; n=405). Forty-eight percent of non-Hispanic white women were either overweight (24.3%; n=2,685) or obese (24.2%; n=2,680) during their last pregnancy. The lowest percentage of overweight and obese women was among non-Hispanic women of other races (23.3% + 14.1% = 37.4%).

The highest percentages of women determined to be morbidly obese were among non-Hispanic white women (7.1%; n=785) and non-Hispanic Black women (7.2%; n=116). The lowest percentage of women determined to be morbidly obese was among non-Hispanic women of other races (2.6%; n=16).

# Pre-pregnancy BMI by maternal age

Figure 2. Pre-pregnancy BMI by maternal age, among Medicaid reimbursed births, Iowa 2012



Body mass index and age were inversely related among women with Medicaid reimbursed births in Iowa during 2012 (Figure 2). For example, the percent of women of a normal weight decreased from more than fifty percent (53.4%; n=1,067) among women ages 19 and younger to thirty-two percent (32.7%; n=1,067) among women 30 and older.

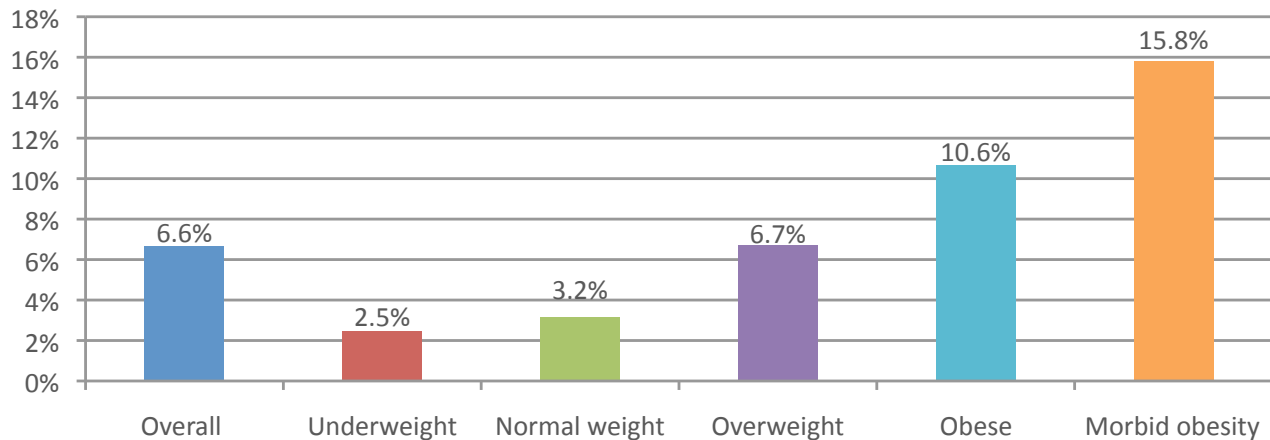
In contrast, the percent of morbid obese women increased from two percent (2.1%; n=42) among women ages 19 and younger to nine percent (9.2%; n=300) among women 30 and older. The inverse relationship between age and pre-pregnancy BMI remains consistent for underweight women, as well as, those found to be overweight or obese.



# Prenatal morbidity

## Gestational diabetes

Figure 3. Distribution of women with gestational diabetes by pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012

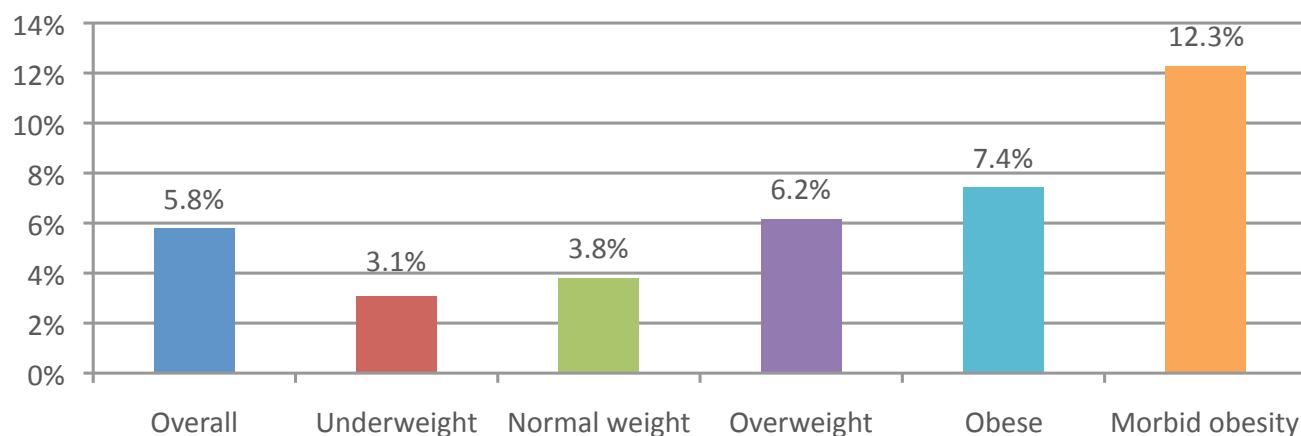


Overall, six percent (6.6%; n=1,028) of mothers with a Medicaid reimbursed births in 2012 were reported to have gestational diabetes. Among this group, the percent of mothers with gestational diabetes increased as pre-pregnancy BMI increased (Figure 3). Mothers who were morbidly obese (15.8%; n=158) and those who were obese (10.6%; n=391) were significantly more likely to have gestational diabetes than the overall percent of six percent. Significance was determined at  $p < 0.05$ . Mothers who were underweight (2.5%; n=16) and those who were of a normal weight (3.2%; n=196) were significantly less likely to have gestational diabetes than the overall percent of six percent.



# Hypertensive disorders during pregnancy

Figure 4. Distribution of women with hypertensive disorders during pregnancy by pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012



Overall, five percent (5.8%; n=896) of mothers with Medicaid reimbursed births in 2012 were reported to have hypertensive disorders during pregnancy (Figure 4). Among this five percent, the percent of mothers with gestational hypertension increased as pre-pregnancy BMI increased. Mothers who were morbidly obese (12.3%; n=123) and those who were obese (7.4%; n=273) were significantly more likely to have a hypertensive disorder during pregnancy than the overall percent of five percent. Mothers who were underweight (3.1%; n=20) and those who were of a normal weight (3.8%; n=235) were significantly less likely to have a hypertensive disorder during pregnancy than the overall percent of five percent.

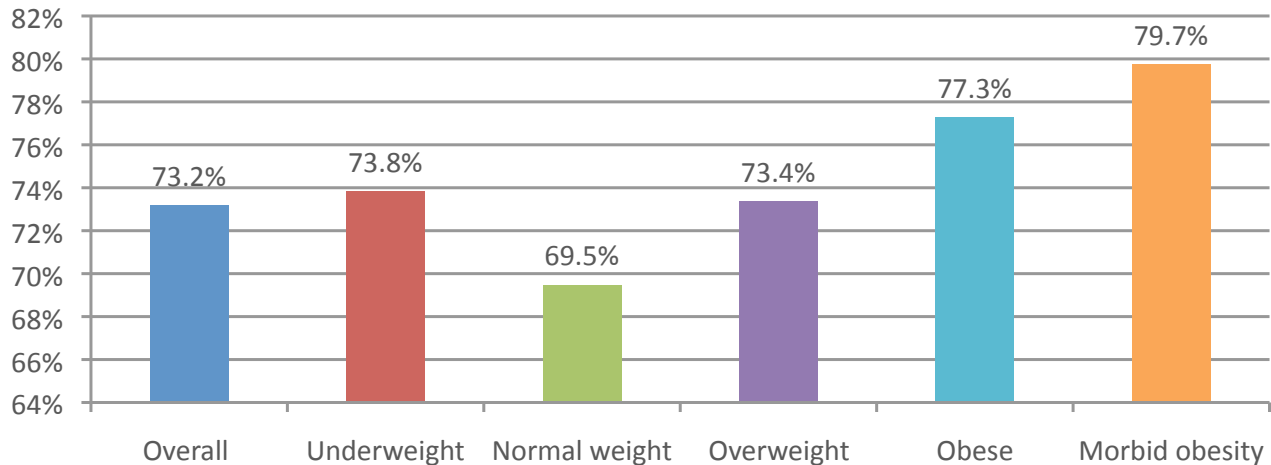




# Use of prenatal services

## Special Supplemental Nutrition Program for Women, Infants, and Children (WIC)

Figure 5. Maternal WIC use by pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012

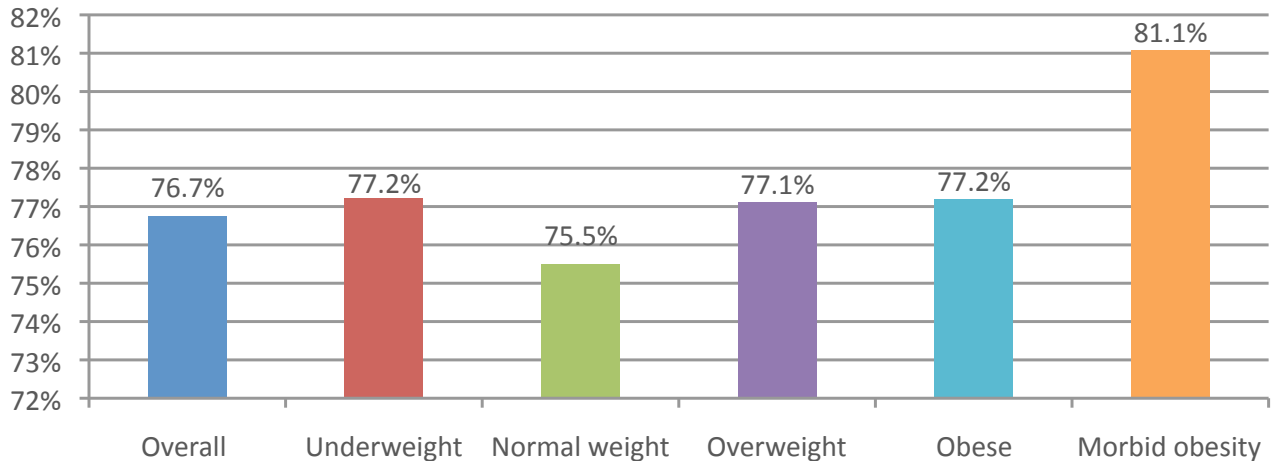


Income and family size criteria for WIC are more generous than the criteria for Medicaid. Therefore, women may qualify for WIC and not qualify for Medicaid. Overall, seventy-three percent (73.2%; n=11,345) of mothers with Medicaid reimbursed births in 2012 reported that they received WIC for themselves during their pregnancy (Figure 5). The lowest percentage of women who reported that they received WIC during their pregnancy was among women of a normal weight (69.5%; n=4,308). This percentage was significantly lower than the overall percentage of seventy-three percent. Both women with morbid obesity (79.7%; n=799) and obese women (77.3%; n=2,841) obtained WIC at a significantly higher percentage than the overall percentage of seventy-three percent.



# Prenatal care initiation

Figure 6. First trimester prenatal care initiation by pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012



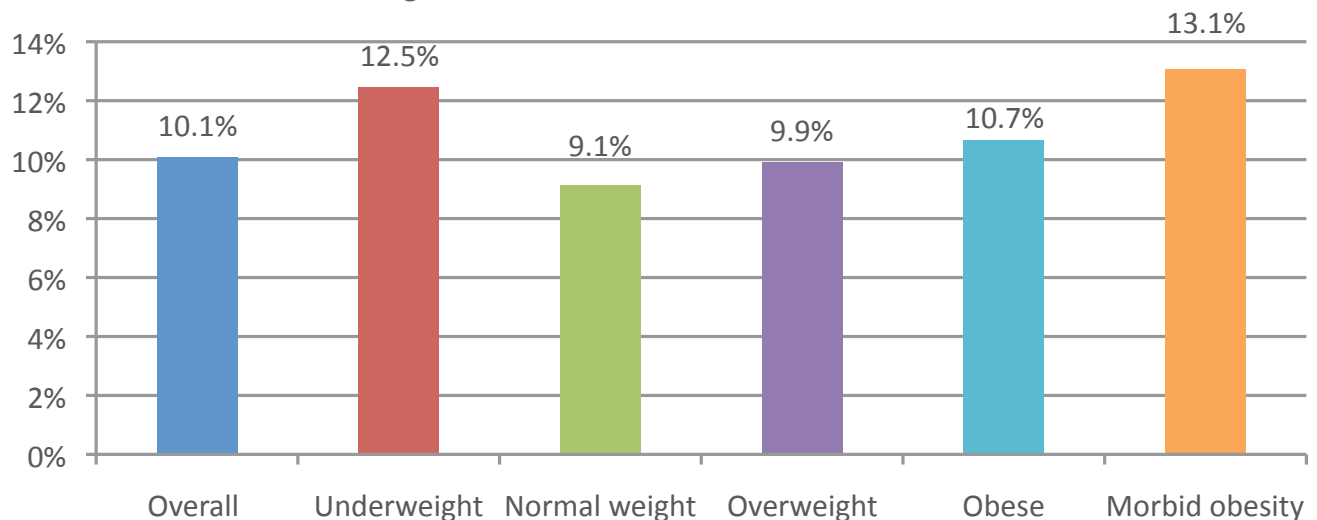
Overall, seventy-six percent (76.7%; n=11,827) of mothers with Medicaid reimbursed births in 2012 initiated prenatal care within their first trimester (Figure 6). Women with morbid obesity initiated prenatal care within their first trimester at a significantly greater percentage (81.1%; n=806) than the overall percentage of seventy-six percent. Normal weight women (75.5%; n=4,655) initiated first trimester prenatal care at a percentage significantly less than the overall percentage. The percentage of women who started prenatal care in the first trimester was not significantly different than the overall percentage, among underweight women (77.2%; n=498), overweight women (77.1%; n=3,044) and obese women (77.2%; n=2,824).



# Newborn outcomes

## NICU admission

Figure 7. Newborn NICU admission by maternal pre-pregnancy BMI among Medicaid reimbursed births, Iowa 2012

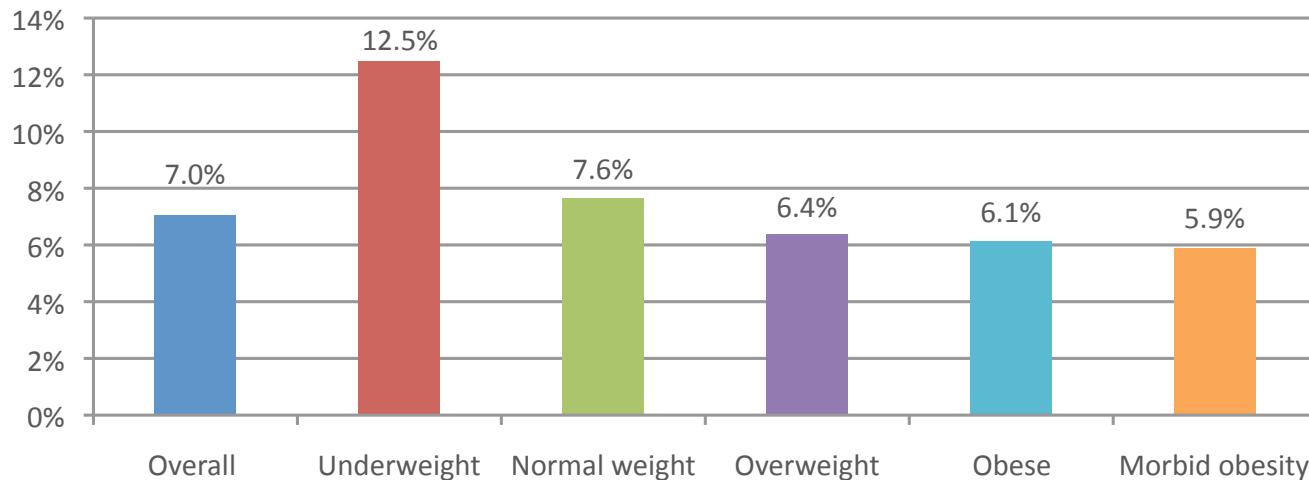


Overall, ten percent (10.1%; n=1,564) of newborns with Medicaid reimbursed births in 2012 were admitted to the NICU (Figure 7). Significantly higher percentages of newborns admitted to the NICU were born to women at the opposite ends of the BMI categories. Specifically, thirteen percent (13.1%; n=131) of infants born to women with morbid obesity and twelve percent (12.5%; n=81) of infants born to underweight women were more likely to be admitted to the NICU. A significantly lower percentage of infants born to normal weight women (9.1%; n=566) were admitted to the NICU. The percent differences among infants born to obese women (10.7%; n=392) and overweight women (9.9%; n=394) were not significantly different from the overall percentage.



# Low birth weight

Figure 8. Low birth weight infants by maternal pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012

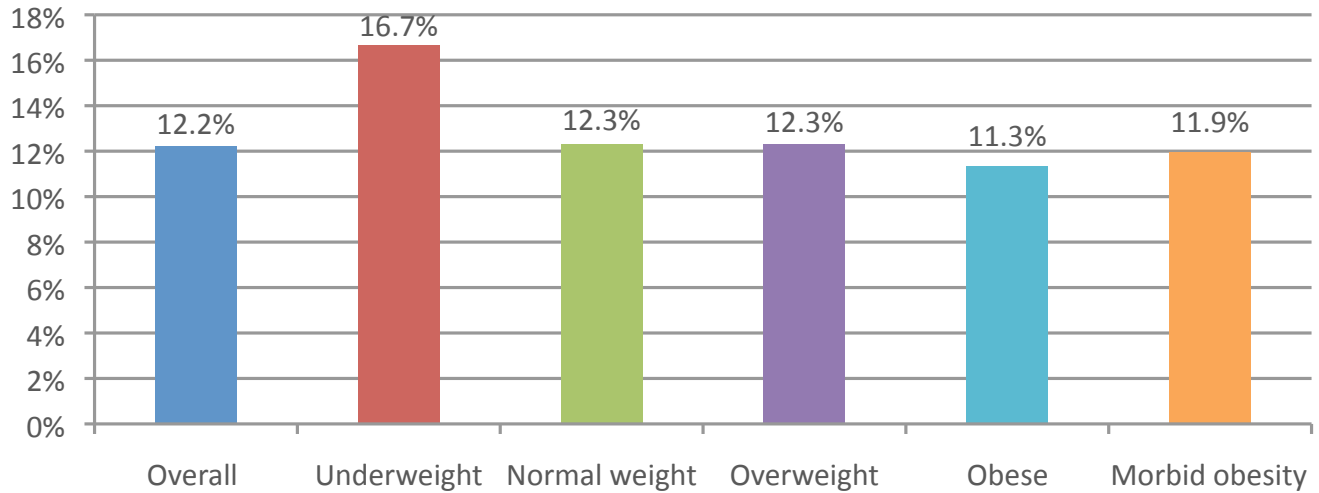


Overall, seven percent (7.0%; n=1,092) of infants with Medicaid reimbursed births in 2012 were born at a low birth weight (LBW) (Figure 8). In contrast to other outcomes, a significantly higher percentage of LBW infants were born to underweight women (12.5%; n=81). The percentage of LBW infants born to normal weight women (7.6%; n=473), overweight women (6.4%; n=254), obese women (6.1%; n=225), and women with morbid obesity (5.9%; n=59), was not significantly different from the overall percentage of seven percent.



# Pre-term birth

Figure 9. Pre-term births by maternal pre-pregnancy BMI, among Medicaid reimbursed births, Iowa 2012

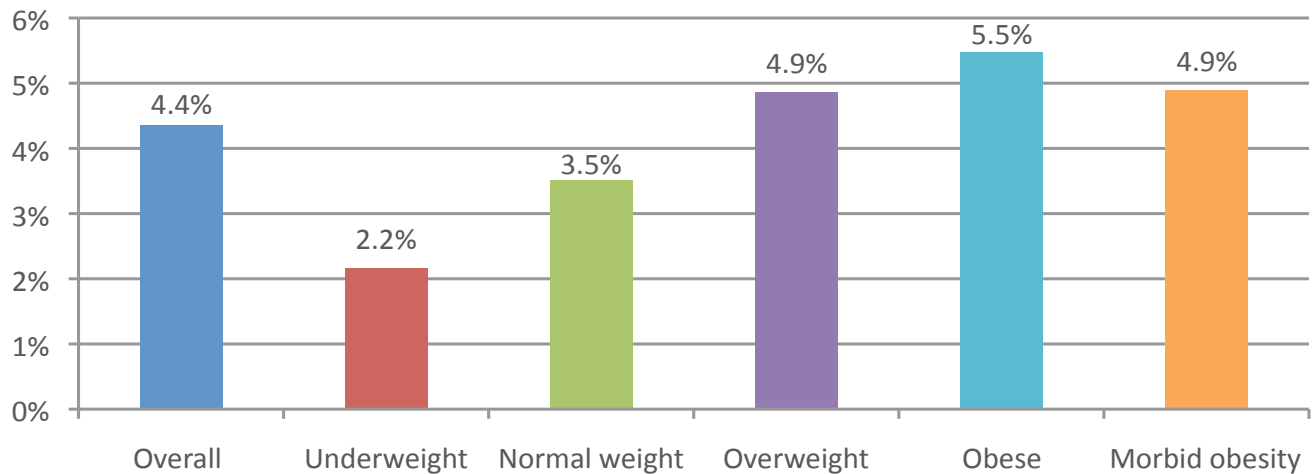


Overall, twelve percent (12.2%; n=1,807) of infants with Medicaid reimbursed births in 2012 were born pre-term (Figure 9). Like LBW, a significantly higher percentage of pre-term infants were born to underweight women (16.7%; n=103). Also like LBW, the percentage of preterm infants born to normal weight women (12.3%; n=725), overweight women (6.4%; n=254), obese women (12.3%; n=465), and women with morbid obesity (11.3%; n=398), was not significantly different from the overall percentage of twelve percent.



# Large for gestational age<sup>1</sup>

Figure 10. Large for gestational age infants by maternal pre-pregnancy BMI, Medicaid reimbursed births, Iowa 2012



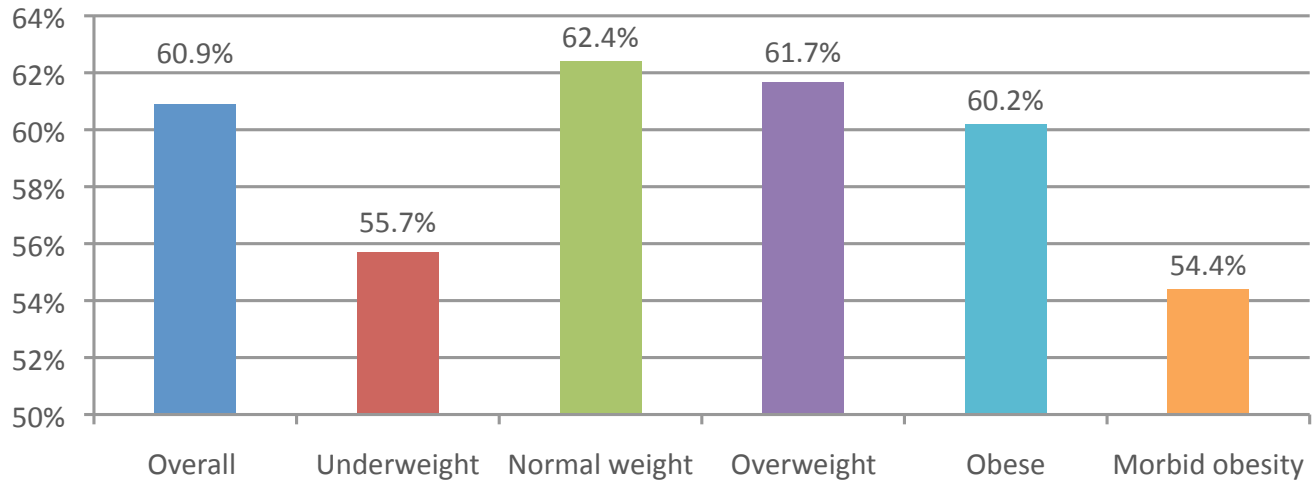
Overall, four percent (4.4%; n=675) of infants with Medicaid reimbursed births in 2012 were large for gestational age (LGA) (Figure 10). The highest percentage of LGA infants were born to obese mothers (5.5%; n=201). This result was significantly higher than the overall percentage of four percent. The percentage of LGA infants born to underweight women (2.2%; n=14) and normal weight women (3.5%; n=218) was significantly lower than the overall percentage of four percent. Four percent of the infants born to overweight women (4.9%; n=193) and morbidly obese women (4.9%; n=49) were LGA. These percentages were not significantly different than the overall percent.



<sup>1</sup> LGA infants were those greater than or equal to 40 weeks gestations and with a birth weight of greater than or equal to 4000 grams.

# Breastfeeding

Figure 11. Breastfeeding at hospital discharge, by maternal pre-pregnancy BMI, Medicaid reimbursed births, Iowa 2012

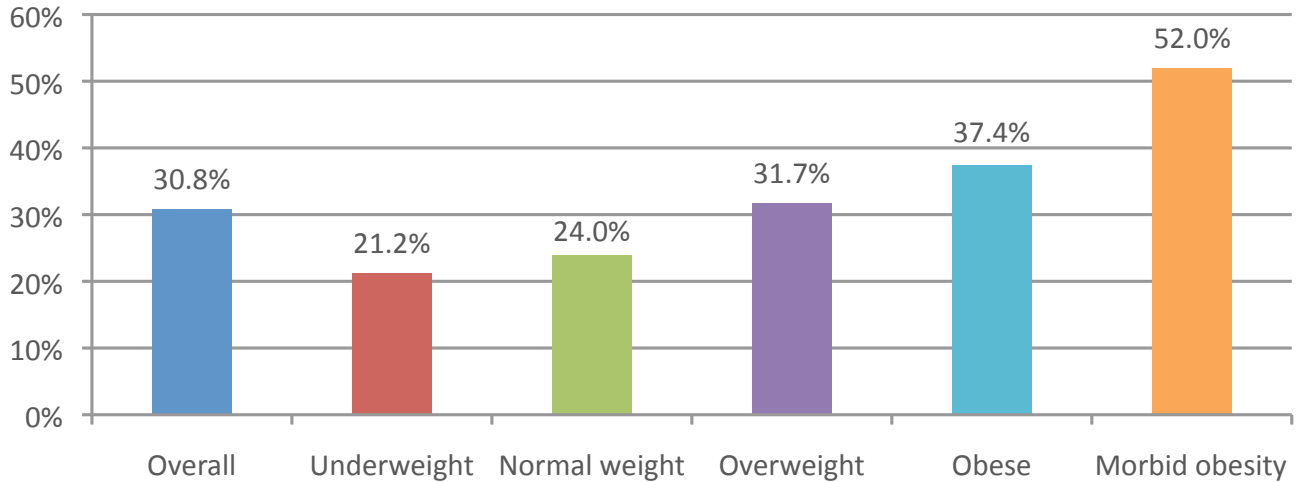


Overall, sixty percent (60.9%; n=9,442) of mothers with Medicaid reimbursed births in 2012 reported that they were breastfeeding their infants at hospital discharge (Figure 11). Both the percentage of underweight women (55.7%; 362) and that of women with morbid obesity (54.4%; n=545) who reported breastfeeding their infants at discharge were significantly lower than the overall percentage of sixty percent. The percent of normal weight women (62.4%; n=3,870) who reported breastfeeding their infants at hospital discharge was significantly higher than the overall percentage of sixty percent. The percentages of overweight women (61.7%; n=2,452) and obese women (60.2%; n=2,213) who reported breastfeeding their infants at hospital discharge were not significantly different than the overall percent of sixty percent.



# Method of delivery

Figure 12. Cesarean deliveries by maternal pre-pregnancy BMI, Medicaid reimbursed births, Iowa 2012



Overall, thirty percent of Medicaid reimbursed deliveries were delivered via cesarean (30.8%; n=4,778) (Figure 12). The percentage of cesarean deliveries was significantly higher than the overall percentage among women with morbid obesity (52.0%; n=521) and obese women (37.4%; n=1,374). The percentage of cesarean deliveries was significantly lower than the overall percentage among underweight mothers (21.2%; n=138) and normal weight mothers (24.0%; n=1,485). Overweight women (31.7%; n=1,260) delivered via cesarean at a percentage statistically equal to that of the overall percentage.





## Discussion

Over fifty-five percent of mothers with a Medicaid reimbursed delivery in 2012 were overweight, obese, or morbidly obese. Four percent of mothers were underweight based on their pre-pregnancy BMI. Pre-pregnancy BMI varied by race and ethnicity. For example, the lowest percentage of overweight and obese women was among non-Hispanic women of other races. Whereas the highest percentages of women determined to be morbidly obese were among non-Hispanic white women (7.1%; n=785) and non-Hispanic Black women (7.2%; n=116). The lowest percentage of women determined to be morbidly obese was among non-Hispanic women of other races (2.6%; n=16). Pre-pregnancy BMI was inversely related to age such that BMI increased with maternal age.

Mothers categorized as morbidly obese initiated prenatal care in the first trimester at a higher percentage than mothers of other BMI categories, as well as received WIC at a higher percentage than other women.

Newborn outcomes, such as NICU admissions, low birth weight and pre-term birth, differed by maternal pre-pregnancy BMI. Specifically, newborn NICU admissions were higher among morbidly obese women and women who were underweight. Underweight mothers were over-represented among those who delivered low birth weight infants or pre-term infants.

Morbidly obese mothers delivered via cesarean at a percentage over one and one-half times that of the average percent of cesarean deliveries (30.8% vs. 52.0%). Morbidly obese mothers also initiated breastfeeding at the lowest percentage (54.4%) compared to mothers at other pre-pregnancy BMIs.



## Recommendations for women

- Try to achieve a healthy weight prior to conception and/or beginning fertility treatments
- Have chronic conditions managed prior to conception
- Schedule a preconception visit with your health care provider
- Eat a healthy diet and be physically active
- Educate yourself about the risks of a high BMI pregnancy for yourself and your baby
- Seek nutritional advice if needed to prevent excessive weight gain before and during pregnancy

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## Recommendations for providers

- Work with women to develop a reproductive life plan prior to pregnancy which includes a discussion of the importance of a healthy pre-pregnancy weight
- Morbidly obese women seem to obtain prenatal care early and more often than their counterparts. This offers providers the opportunity to provide support and education.
- Provide extra breastfeeding support to women with morbid obesity and those who are underweight, as they appear to be less likely to breastfeed
- Conduct a thorough preconception assessment and provide/suggest counseling about the risks and complications of high BMI pregnancies
- Encourage overweight and obese women to undertake a weight reduction program
- Offer nutritional consultation to assist women in appropriate pregnancy weight gain

# What is the Iowa Medicaid – Birth Certificate Match Project?

The Iowa Medicaid - Birth Certificate Match Project is supported by an inter-departmental agreement between the Iowa Department of Human Services and the Iowa Department of Public Health/Bureaus of Family Health and Health Statistics. The purpose of the project is to describe the characteristics of pregnant Medicaid recipients, their behaviors during pregnancy and at hospital discharge, their receipt of pregnancy related services, and their birth outcomes. This information can be used to improve programs and policies to benefit Medicaid recipients.

## Acknowledgements

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## ADDITIONAL INFORMATION

For additional information or to obtain copies of this fact sheet, write or call:

**Iowa Department of Public Health  
Bureau of Family Health  
321 E. 12th Street  
Des Moines, IA 50309**

**Toll-free at 1-800-383-3826**



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