

Rates of C-Section More Than Double for Patients with BMI Over 40

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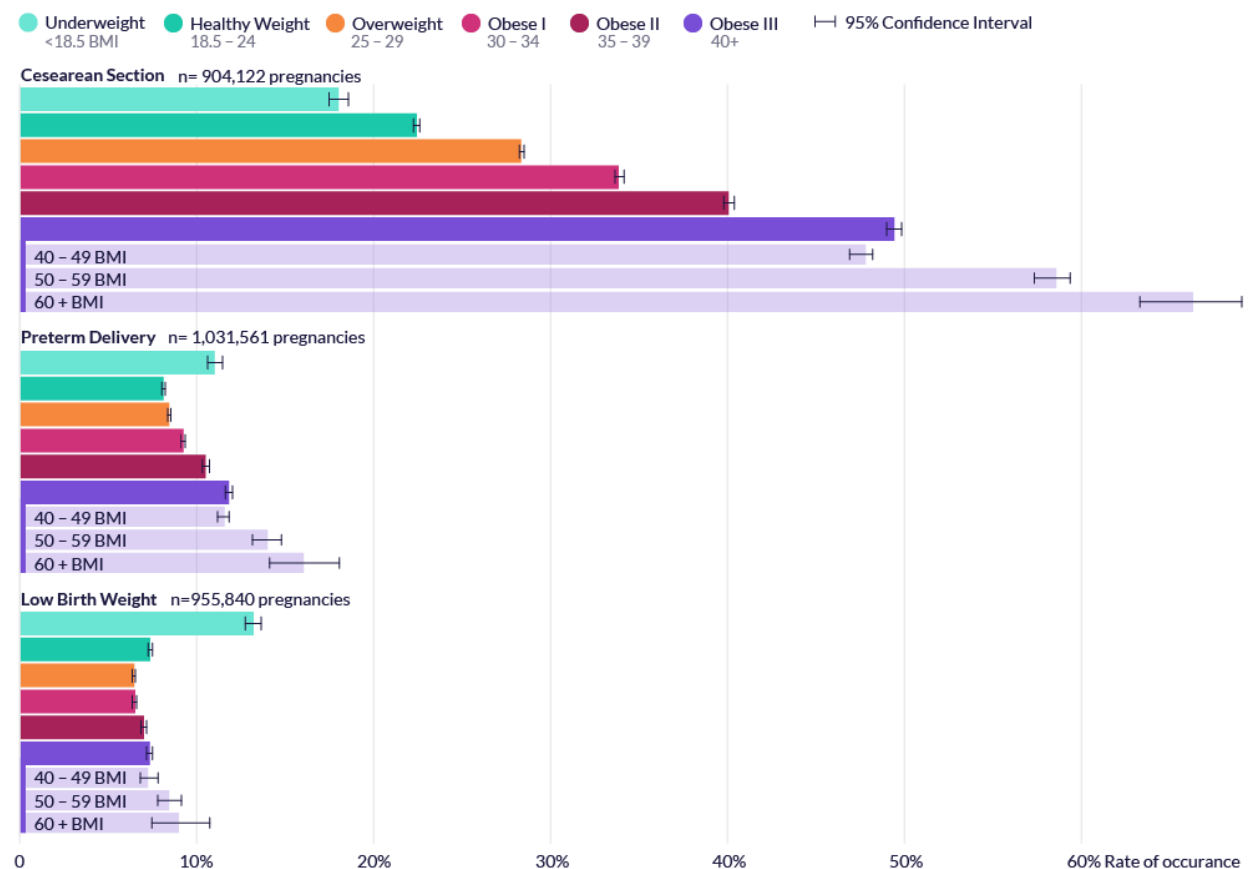
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Abstract: Patients with higher BMIs have higher rates of several pregnancy complications. Lower BMIs are associated with higher rates of placental abruption.

A pregnant patient's body mass index (BMI) can affect the risk of complications for both the patient and the baby.¹ We reviewed EHR data for more than 900,000 pregnancies that had pre-pregnancy BMI data to identify rates of certain delivery, prenatal, and postpartum complications.

Figure 1 shows rates of cesarean section, preterm delivery, and low birth weight. Rates of cesarean section increase steadily as maternal BMI increases, while rates of preterm delivery and low birth weight are more variable across different BMI groups. Compared to patients with a healthy BMI (18.5-24.9), patients with a BMI of 40 or greater have more than double (120%) the rate of cesarean section, a 45% increase in the rate of preterm delivery, and a 0.3% decrease in the rate of low birth weight.

Rates of Cesarean Section, Preterm Delivery, and Low Birth Weight by Maternal BMI



"Rates of Cesarean Section, Preterm Delivery, and Low Birth Weight by Maternal BMI," Epic Health Research Network 2021.

Figure 1. Percentage of pregnancies by maternal BMI that were delivered by cesarean section or resulted in low birth weight or preterm delivery. The black lines indicate the 95% confidence interval.

Figure 2 shows rates of placental abruption, venous thromboembolism (VTE) or pulmonary embolism, and sepsis. Rates of placental abruption decrease as BMI increases while rates of venous thromboembolism (VTE) or pulmonary embolism and sepsis increase as BMI increases. Compared to patients with a healthy BMI (18.5-24.9), patients with a BMI of 40 or greater have a 17% decrease in the rate of placental abruption, a 131% increase in the rate of VTE or pulmonary embolism, and a 121% increase in the rate of sepsis.

Rates of Placental Abruption, VTE/Pulmonary Embolism, and Sepsis by Maternal BMI

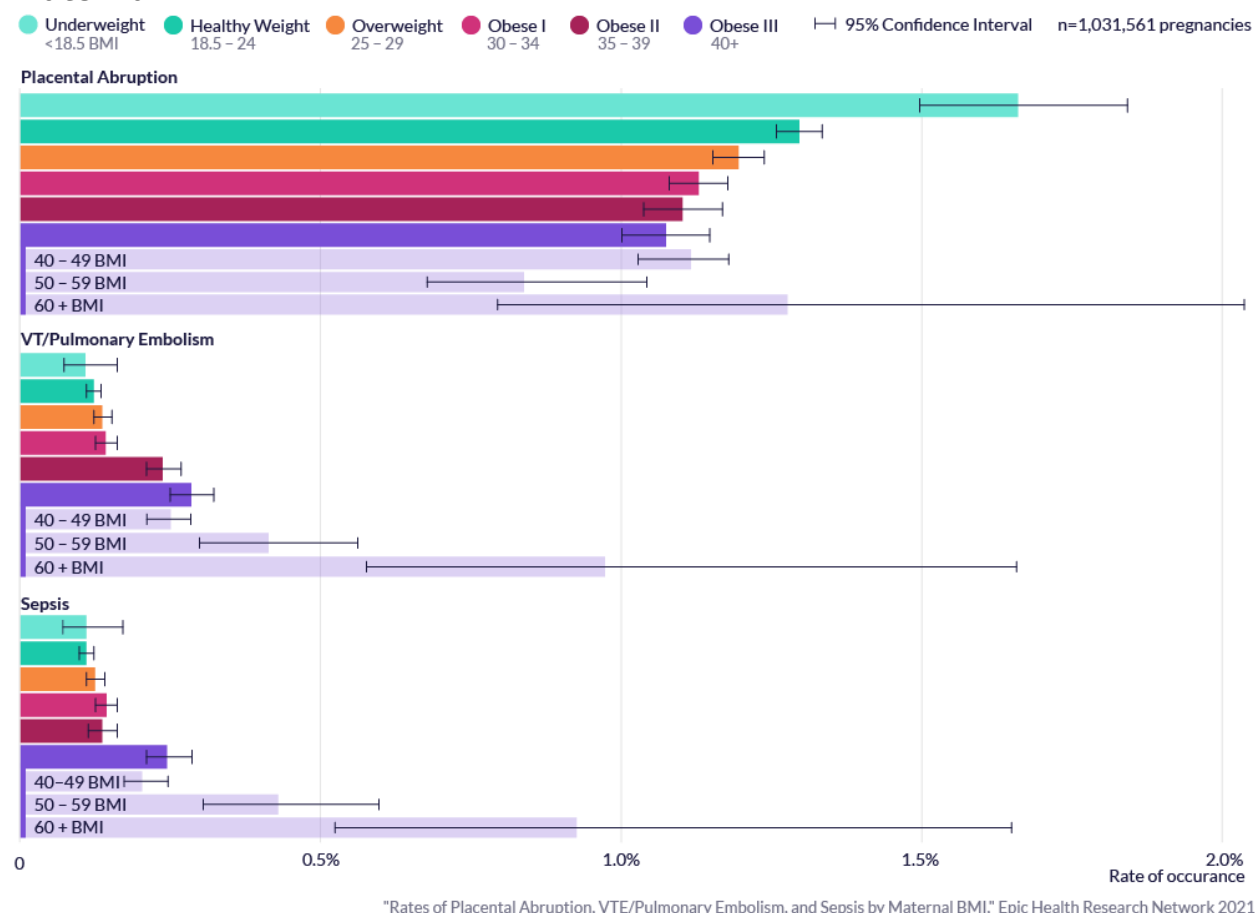


Figure 2. Percentage of pregnancies by maternal BMI where the pregnant patient experienced VTE or pulmonary embolism, placental abruption, or sepsis. The black lines indicate the 95% confidence interval.

Rates of chronic hypertension diagnosed during pregnancy and pregnancy-associated hypertension (gestational hypertension, preeclampsia, HELLP syndrome, or eclampsia) also increase as BMI increases, as shown in Figure 3. Compared to patients with a healthy BMI (18.5-24.9), patients with a BMI of 40 or greater have more than 10 times (1,012% increase) the rate of chronic hypertension and a 258% increase in the rate of pregnancy-associated hypertension.

Rates of Chronic and Pregnancy-Associated Hypertension by Maternal BMI

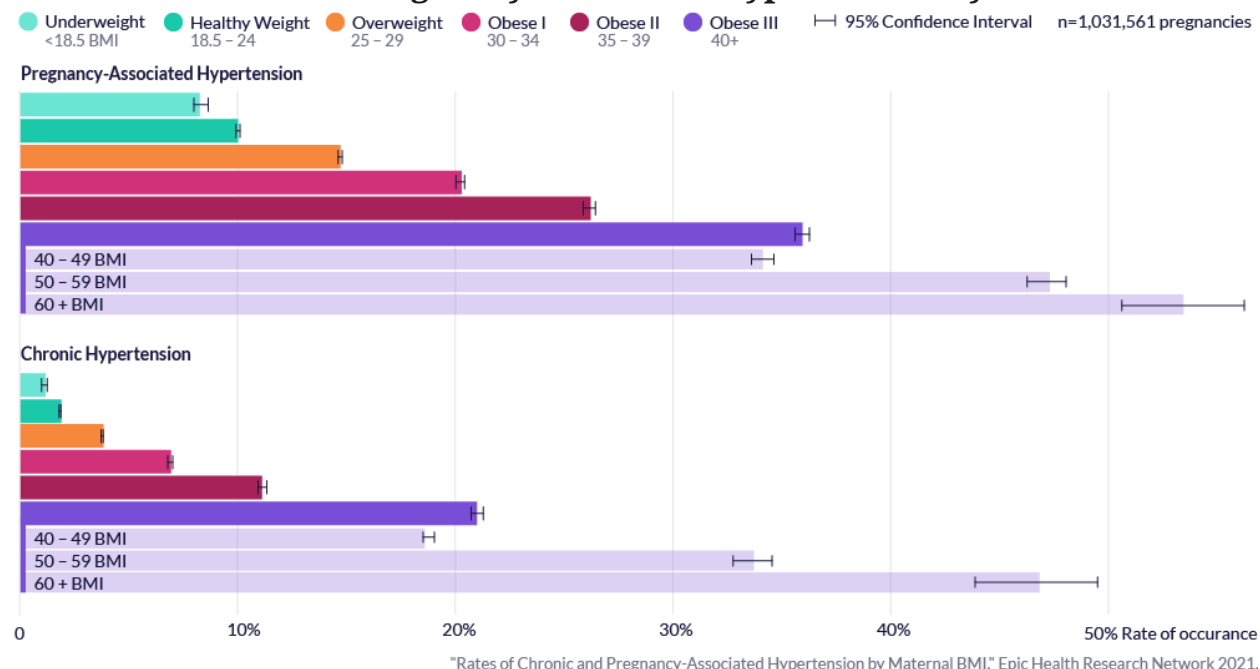


Figure 3. Percentage of pregnancies by maternal BMI where the pregnant patient experienced chronic or pregnancy-associated hypertension. The black lines indicate the 95% confidence interval.

Finally, Figure 4 shows the rates of patients who had an ED visit or were readmitted to the hospital up to six weeks after they were discharged from the hospital for their delivery admission. Compared to patients with a healthy BMI (18.5-24.9), patients with a BMI of 40 or greater have a 103% increase in the rate of ED visits and a 187% increase in the rate of readmissions. We recognize that there can be confounding factors, such as previous pregnancies, that result in a patient's ED visit or readmission that are not related to their recent pregnancy and are not accounted for in these data.

Rates of ED Visits and Readmissions Within Six Weeks of Delivery by Maternal BMI

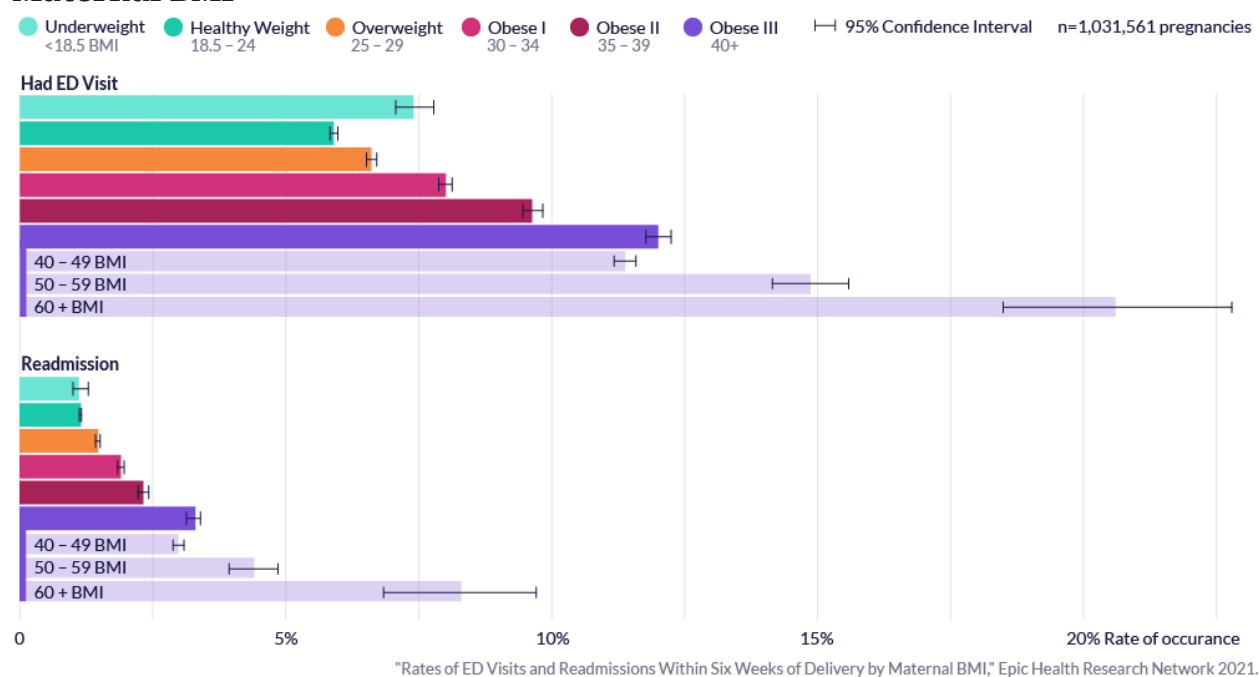


Figure 4. Percentage of patients by maternal BMI who had an ED visit or were readmitted to the hospital up to six weeks after they were discharged from the hospital for their delivery admission.

These data come from Cosmos, a HIPAA-defined Limited Data Set of more than 120 million patients from 141 Epic organizations including 832 hospitals and 13,421 clinics, serving patients in all 50 states. This study was completed by two teams, each comprised of a clinician and research scientists who worked independently. The two teams came to similar conclusions.

References

1. Machado LSM. Cesarean section in morbidly obese parturients: Practical implications and complications. North American Journal of Medical Sciences. 2012;4(1):13. doi:10.4103/1947-2714.92895

Data Definitions

Term	Definition
Pre-Pregnancy BMI	A pregnant patient's BMI must have been documented between one year before gestation day 0 and the first day of the second trimester.
Venous Thromboembolism (VTE) or Pulmonary Embolism	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on the delivery admission that was mapped to one or more of the following ICD-10-CM codes: I82, I82.290, I82.401, I82.402, I82.403, I82.409, I82.411, I82.412, I82.413, I82.419, I82.421, I82.422, I82.423, I82.429, I82.431, I82.432, I82.433, I82.439, I82.441, I82.442, I82.443, I82.449, I82.451, I82.452,

	I82.453, I82.459, I82.461, I82.462, I82.463, I82.469, I82.491, I82.492, I82.493, I82.499, I82.4Y1, I82.4Y2, I82.4Y3, I82.4Y9, I82.4Z1, I82.4Z2, I82.4Z3, I82.4Z9, I82.501, I82.502, I82.503, I82.509, I82.51, I82.511, I82.512, I82.513, I82.519, I82.521, I82.522, I82.523, I82.529, I82.53, I82.531, I82.532, I82.533, I82.539, I82.54, I82.541, I82.542, I82.543, I82.549, I82.551, I82.552, I82.553, I82.559, I82.561, I82.562, I82.563, I82.569, I82.591, I82.592, I82.593, I82.599, I82.5Y1, I82.5Y2, I82.5Y3, I82.5Y9, I82.5Z1, I82.5Z2, I82.5Z3, I82.5Z9, I82.611, I82.612, I82.613, I82.619, I82.621, I82.622, I82.623, I82.629, I82.711, I82.712, I82.713, I82.719, I82.721, I82.722, I82.723, I82.729, I82.8, I82.89, I82.890, I82.90, I82.A1, I82.A11, I82.A12, I82.A13, I82.A19, I82.A29, I82.B1, I82.B11, I82.B12, I82.B13, I82.B19, I82.B19, I82.B21, I82.B22, I82.B23, I82.C1, I82.C11, I82.C12, I82.C13, I82.C19, I82.C21, I82.C22, I26, I26.0, I26.01, I26.02, I26.09, I26.9, I26.90, I26.92, I26.93, I26.94, I26.99, I27.82, O03.7, O88.211, O88.212, O88.213, O88.219, O88.22, O88.23, O88.3, O88.311, O88.312, O88.313, O88.319, O88.32, O88.33, O88.811, O88.812, O88.813, O88.819, O88.83
Postpartum Hemorrhage	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on the delivery admission that was mapped to one or more of the following ICD-10-CM codes: O72, O72.1, O72.2, O72.3
Low Birth Weight	A birth with a weight less than 2,500 grams.
Preterm Delivery	A birth with a gestational age less than 259 days.
Pregnancy Associated Hypertension	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on any encounter during the pregnancy or on the delivery admission that was mapped to one or more of the following ICD-10-CM codes: O13, O13.1, O13.2, O13.3, O13.4, O13.5, O13.9, O14, O14.0, O14.00, O14.02, O14.03, O14.1, O14.10, O14.12, O14.13, O14.2, O14.20, O14.22, O14.23, O14.24, O14.9, O14.90, O14.92, O14.93, O14.95, O15, O15.00, O15.02, O15.03, O15.1, O15.2, O15.9, O16, O16.1, O16.2, O16.3, O16.9
Chronic Hypertension	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on any encounter during the pregnancy or on the delivery admission that was mapped to one or more of the following ICD-10-CM codes: O10, O10.0, O10.01, O10.011, O10.012, O10.013, O10.019, O10.02, O10.03, O10.1, O10.11, O10.111, O10.112, O10.113, O10.119, O10.12, O10.13, O10.2, O10.21, O10.211, O10.212, O10.213, O10.219, O10.22, O10.23, O10.3, O10.31, O10.311, O10.312, O10.313, O10.319, O10.32, O10.33, O10.4, O10.41, O10.411, O10.412, O10.413, O10.419, O10.42, O10.43, O10.9, O10.91, O10.911, O10.912, O10.913, O10.919, O10.92, O10.93, O11, O11.1, O11.2, O11.3, O11.4, O11.5, O11.9
Placental Abruption	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on any encounter during the pregnancy or on the delivery admission that was mapped to one or more of the following ICD-10-CM codes: O45, O45.0, O45.001, O45.002, O45.003, O45.009, O45.01, O45.011, O45.012, O45.013, O45.019, O45.02, O45.021, O45.022, O45.023,

	O45.029, O45.09, O45.91, O45.92, O45.93, O45.99, O45.8, O45.8X, O45.8X1, O45.8X2, O45.8X3, O45.8X9, O45.9, O45.90, O45.91, O45.92, O45.93
Cesarean Section	A birth with a delivery method containing the text “cesarean.”
Sepsis	A diagnosis documented as an encounter diagnosis, final billing diagnosis, or problem list entry on the delivery admission or on any encounter up to six weeks after the delivery admission that was mapped to one or more of the following ICD-10-CM codes: O85, O86.04, T81.44