

Reduction in Mother's BMI After Pregnancy Linked to Lower Likelihood of Obesity for Her Child

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Key Findings:

- Children born to mothers who were obese or overweight before pregnancy and who maintain that BMI category after pregnancy have a significantly higher likelihood of being obese compared with children born to mothers who were not overweight both before and after pregnancy. Children born to mothers who were obese and remain obese are 146% more likely to become obese and 83% more likely to be obese if they were born to mothers who were overweight and remain overweight.
- However, if the child's mother decreases her BMI category from obese before pregnancy to overweight after pregnancy, the likelihood of the child being obese is reduced by 51 percentage points. Similarly, if the child's mother decreases her BMI category from overweight before pregnancy to not overweight after pregnancy, the likelihood of the child being obese is reduced by 8 percentage points.
- While BMI reduction after pregnancy is correlated with a reduced likelihood of obesity in the child, the mother's BMI before pregnancy is still more closely correlated with the child's likelihood of being obese.

Childhood obesity is correlated with an increased risk of chronic conditions later in life such as hypertension, hyperlipidemia, diabetes, and others.¹ Previous studies have established a correlation between maternal BMI before pregnancy and the child's risk of obesity, but less is known about whether postpartum BMI changes can influence that risk.^{2,3,4}

To assess whether a change in maternal BMI influences the likelihood of obesity in her child, we studied the change in maternal BMI category from before pregnancy to at least six months after pregnancy and whether the child reached an obese BMI category after the age of two. We adjusted for the mother's history of type 2 diabetes, age, race, BMI category before pregnancy, and social vulnerability. We also adjusted for gestational age at birth and sex of the child. Childhood obesity was defined as a BMI greater than the 95th percentile for the child's sex and age. Maternal obesity was defined as a BMI greater than 30, overweight was defined as a BMI between 25 and 30, and not overweight was defined as a BMI under 25.

We found that children born to mothers classified as obese both before and after pregnancy have a 146% increased likelihood of being obese compared to children born to mothers classified as not overweight both before and after pregnancy. However, for children born to mothers who are obese before pregnancy and overweight after pregnancy, the likelihood is reduced by 51 percentage points, to 95%. Similarly, children born to mothers classified as overweight before and after pregnancy have a 53% increased likelihood of being obese, but if the mother is not overweight after pregnancy, the child's likelihood of obesity is reduced by eight percentage points, to 45%.

Relative Change in Likelihood of Childhood Obesity by Change in Maternal BMI After Pregnancy

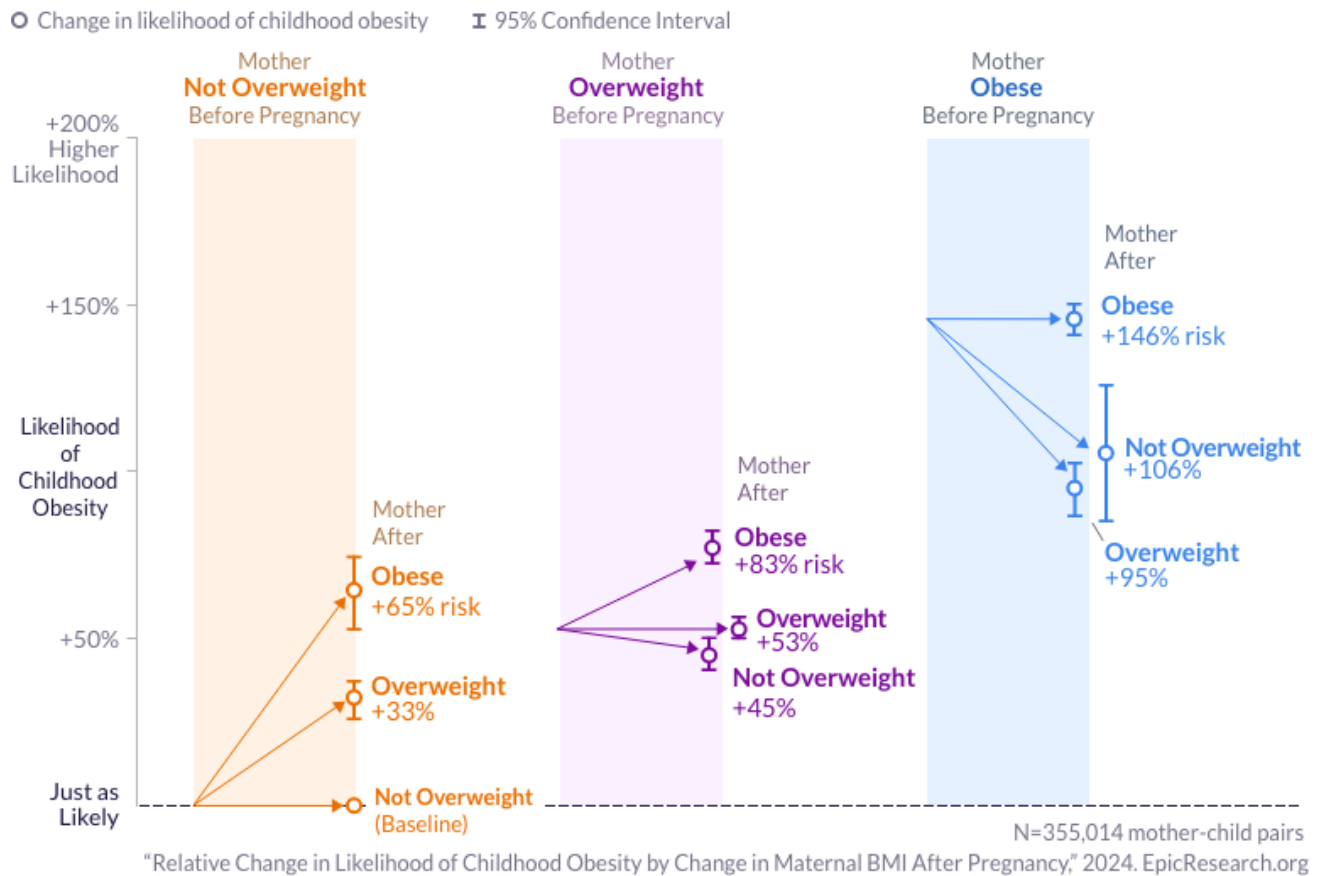


Figure 1. The relative likelihood of a child being classified as obese by change in maternal post-pregnancy BMI category.

We also looked at the relationship between childhood obesity and a mother gaining weight at least six months after pregnancy, leading to an increased BMI category. We found that the child's likelihood of being obese increased by 33 and 30 percentage points when their mother went from not overweight to overweight or from overweight to obese, respectively.

Although there is a correlation between BMI reduction after pregnancy and a decreased risk of obesity in the child, it is important to note that the mother's BMI prior to pregnancy remains a stronger predictor of the child's likelihood of obesity.

These data come from Cosmos, a collaboration of 239 Epic health systems representing more than 238 million patient records from 1,345 hospitals and more than 28,000 clinics from all 50 states and Lebanon. This study was completed by two teams that worked independently, each composed of a clinician and research scientists. The two teams came to similar conclusions. Graphics by Mark LeBay.

References

1. Reduce the proportion of children and adolescents with obesity – NWS-04. Health.gov. [Reduce the proportion of children and adolescents with obesity – NWS-04 - Healthy People 2030 | health.gov](#). Accessed February 28, 2024.
2. Voerman E, Santos S, Patro Golab B, Amiano P, Ballester F, Barros H, et al. (2019) Maternal body mass index, gestational weight gain, and the risk of overweight and obesity across childhood: An individual

participant data meta-analysis. PLoS Med 16(2): e1002744.

<https://doi.org/10.1371/journal.pmed.1002744>

3. Liao XP, Yu Y, Marc I, et al. Prenatal determinants of childhood obesity: a review of risk factors. Can J Physiol Pharmacol. 2019;97(3):147-154. doi:10.1139/cjpp-2018-0403
4. Mannino A, Sarapis K, Moschonis G. The Effect of Maternal Overweight and Obesity Pre-Pregnancy and During Childhood in the Development of Obesity in Children and Adolescents: A Systematic Literature Review. Nutrients. 2022; 14(23):5125. <https://doi.org/10.3390/nu14235125>

Data Definitions

Term	Definition
Study period	1/1/2016 to 12/31/2023
Study population	<p>Inclusion criteria: Mother age: 18 to 45. Mothers with pre-pregnancy BMI from 16 to 65. Gestations that started between 1/1/2016 and 4/12/2021. Child at least two years of age.</p> <p>Exclusion criteria: Gestation shorter than 36 weeks Multiple births Births after the first in the study period</p>
Maternal pre-pregnancy BMI	The most recently recorded BMI for the mother between 365 days before and 30 days after gestational start date.
Maternal post-pregnancy BMI	The lowest recorded BMI for the mother measured between 182 and 730 days after birth.
Maternal BMI category	Not overweight: BMI <25 Overweight: BMI 25-30 Obese: BMI >30
Child BMI category	Overweight: BMI above 85th percentile for the child's age (in months) and sex. Obese: BMI above 95th percentile for the child's age (in months) and sex.

Table 1: Characteristics of the Study Population

		All		Mother Pre-Pregnancy - Overweight		Mother Pre-Pregnancy - Obese		Mother Pre-Pregnancy - Not Overweight		Baby Obese - True	
		Count	%	Count	%	Count	%	Count	%	Count	%
All	All	355,014	100	94,163	100	125,394	100	135,457	100	275,744	100
Race	American Indian or Alaska Native	3,849	1	1,076	1	1,551	1	1,222	1	2,795	1
	Asian	11,898	3	3,193	3	1,883	2	6,822	5	10,124	2
	Black or African American	69,552	20	17,446	19	31,330	25	20,776	15	52,533	21
	Native Hawaiian or Other Pacific Islander	1,213	0	311	0	462	0	440	0	912	0

	Other Race	13,292	4	4,080	4	4,836	4	4,376	3	9,473	5
	White	255,210	72	68,057	72	85,332	68	101,821	75	199,907	70
Ethnicity	Hispanic or Latino	37,660	11	11,510	12	14,801	12	11,349	8	26,738	14
	Not Hispanic or Latino	317,354	89	82,653	88	110,593	88	124,108	92	249,006	86
Mother Age In Years	(17, 25]	113,650	32	28,966	31	38,451	31	46,233	34	84,909	36
	(25, 30]	111,543	31	29,809	32	39,558	32	42,176	31	87,714	30
	(30, 35]	88,278	25	23,836	25	30,939	25	33,503	25	70,658	22
	(35, 40]	35,731	10	9,887	10	14,040	11	11,804	9	27,985	10
	(40, 45]	5,812	2	1,665	2	2,406	2	1,741	1	4,478	2
Sex Of Baby	Female	171,817	48	45,578	48	60,909	49	65,330	48	135,241	46
	Male	183,197	52	48,585	52	64,485	51	70,127	52	140,503	54
Type II Diabetes	-	348,575	98	93,051	99	120,689	96	134,835	100	271,632	97
	1	6,439	2	1,112	1	4,705	4	622	0	4,112	3
SVI quartile	SVI_Q1	61,319	17	16,566	18	16,689	13	28,064	21	50,611	14
	SVI_Q2	64,843	18	17,704	19	19,901	16	27,238	20	52,242	16
	SVI_Q3	65,468	18	17,551	19	22,895	18	25,022	18	51,057	18
	SVI_Q4	74,592	21	19,421	21	28,737	23	26,434	20	56,445	23
	SVI_Q5	88,792	25	22,921	24	37,172	30	28,699	21	65,389	30
Mother Pre Pregnancy BMI Category	Not Overweight	135,457	38	-	-	-	-	135,457	100	115,081	26
	Obese	125,394	35	-	-	125,394	100	-	-	86,702	49
	Overweight	94,163	27	94,163	100	-	-	-	-	73,961	25
Mother Post Pregnancy BMI Category	Not Overweight	122,222	34	15,388	16	1,569	1	105,265	78	104,041	23
	Obese	139,405	39	25,229	27	110,764	88	3,412	3	97,582	53
	Overweight	93,387	26	53,546	57	13,061	10	26,780	20	74,121	24
Mother Pre Post Pregnancy BMI Category	Not Overweight -> Not Overweight	105,265	30	-	-	-	-	105,265	78	90,577	19
	Not Overweight -> Obese	3,412	1	-	-	-	-	3,412	3	2,625	1
	Not Overweight -> Overweight	26,780	8	-	-	-	-	26,780	20	21,879	6
	Obese -> Not Overweight	1,569	0	-	-	1,569	1	-	-	1,148	1
	Obese -> Obese	110,764	31	-	-	110,764	88	-	-	75,882	44
	Obese -> Overweight	13,061	4	-	-	13,061	10	-	-	9,672	4
	Overweight -> Not Overweight	-	-	-	-	-	-	-	-	-	-
	Overweight	15,388	4	15,388	16	-	-	-	-	12,316	4

	Overweight -> Obese	25,229	7	25,229	27	-	-	-	-	19,075	8
	Overweight -> Overweight	53,546	15	53,546	57	-	-	-	-	42,570	14
Baby Obese	No	275,744	78	73,961	79	86,702	69	115,081	85	275,744	-
	Yes	79,270	22	20,202	21	38,692	31	20,376	15	-	100

Table 2: Relative Change in Likelihood of Childhood Obesity by Change in Maternal BMI After Pregnancy

Mother Pre Pregnancy	Mother Post Pregnancy	Hazard Ratio Initial	Hazard Ratio Post	Low 95% CI	High 95% CI
Not Overweight	Not Overweight	1.00	1.00		
Not Overweight	Obese	1.00	1.65	1.54	1.77
Not Overweight	Overweight	1.00	1.33	1.28	1.37
Obese	Not Overweight	2.46	2.06	1.87	2.27
Obese	Obese	2.46	2.46	2.41	2.51
Obese	Overweight	2.46	1.95	1.88	2.03
Overweight	Not Overweight	1.53	1.45	1.40	1.51
Overweight	Obese	1.53	1.83	1.77	1.88
Overweight	Overweight	1.53	1.53	1.50	1.57