

# Bigger isn't Better: Weight gain between pregnancies increases the risk of Cesarean delivery in women with a history of gestational diabetes

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## Purpose

To determine whether change in weight between pregnancies (interpregnancy weight change) among women with gestational diabetes mellitus (GDM) who deliver vaginally at the index pregnancy influences the risk of cesarean delivery in the subsequent pregnancy.

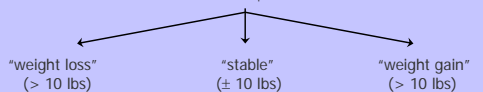
## MCH Concern

- GDM complicates between 2-5% of all pregnancies<sup>1</sup>, while the rates of obesity, a major risk factor for GDM, have risen over 20% among reproductive age women
- GDM and obesity are risk factors for cesarean delivery<sup>1</sup>
- The rate of cesarean delivery increased from 5.5% in 1970 to 29.1% in 2004<sup>2</sup>, resulting in \$15 billion dollars in excess health care cost<sup>3</sup>
- Cesarean delivery is associated with significant risks:
  - Maternal: increased surgical risks such as complications from anesthesia, bleeding, wound infection and mortality
  - Infant: iatrogenic prematurity, birth trauma, and respiratory distress
- Women with GDM are at greater risk for subsequent weight gain
- Excessive weight gain in women with a history of GDM might place them at increased risk for cesarean delivery

## Approach

- Study Design:** Population-based, retrospective cohort study of women with two consecutive live births between 1992 and 2004, diagnosis of GDM and a vaginal delivery at the index pregnancy (first pregnancy on record) using Washington State Longitudinal Births Database. The Institutional Review Board of the Washington State Department of Health approved use of these data.
- Exclusions:**
  - Twins or multiples
  - At index pregnancy: established diabetes, cesarean delivery, non-live birth
  - At subsequent pregnancy: medical indication for cesarean delivery (genital herpes, non-vertex or breech presentations, and placenta previa)
- After exclusions, 2,264 eligible women were included in the analysis
- Exposure:**

$$\Delta \text{weight} = [\text{prepregnancy wt}]_{\text{subsequent}} - [\text{prepregnancy weight}]_{\text{index}}$$



- Outcome:** Cesarean delivery at subsequent pregnancy
- Analysis:** Stratified analysis and Mantel-Haenszel methods to calculate relative risks (RRs) and 95% confidence intervals (CIs) for cesarean delivery separately comparing the weight loss and weight gain groups to the weight stable group
- Factors considered for their possible effects in these relationships:** maternal age, maternal race/ethnicity, maternal education, income, marital status, parity at index pregnancy, weight gain during index pregnancy, smoking, diabetes, interbirth interval
- RR estimates were adjusted** for weight gain during index pregnancy

Table 1: Characteristics of women with GDM and vaginal delivery at index pregnancy presented by categories of interpregnancy weight change from the Washington State longitudinal birth records (1992 -2004)<sup>1</sup>

	Weight loss (> 10 lbs) N = 225 %	Stable (± 10 lbs) N = 1240 %	Weight gain (> 10 lbs) N = 799 %
<b>Age (years)</b>			
< 25	18	12	22
25-34	59	63	57
≥ 35	23	26	21
<b>Race/Ethnicity</b>			
White	78	70	72
Black	2	2	4
Hispanic	8	12	14
Asian	9	14	7
Other	4	2	3
<b>Maternal Education (years)</b>			
< 12	11	14	18
12-16	62	55	63
≥ 16	28	31	19
<b>Unmarried</b>	17	11	18
<b>Prenatal smoker</b>	17	11	13
<b>Chronic Hypertension</b>	2	2	3
<b>Diabetes</b>			
None	65	61	51
Established	7	3	4
Gestational	28	36	45
<b>Interbirth Interval (months)</b>			
< 12	3	1	2
12 - 36	66	66	49
≥ 36	31	34	49
<b>Weight gain during index pregnancy (lbs)</b>			
loss	3	0	0
0-14	24	13	8
15-24	34	28	17
25-34	20	34	30
≥ 35	19	25	45

<sup>1</sup> Measured at the second pregnancy unless otherwise noted

Table 2. Effect of interpregnancy weight change on the risk of subsequent cesarean delivery

Interpregnancy weight	Number of Deliveries (%)			Relative Risk of Cesarean Delivery at Subsequent Birth			
	Total	Cesarean	Vaginal	RR <sup>1</sup>	95% CI	Adjusted RR <sup>2</sup>	95% CI
Stable weight	1240	62 (5)	1178 (95)	1.00		1.00	
Weight loss (> 10 lbs)	225	11 (5)	214 (95)	1.01	0.51-1.89	0.77	0.38-1.57
Weight gain (> 10 lbs)	799	75 (9)	724 (91)	2.04	1.39-2.79	2.04	1.40-2.98

<sup>1</sup> unadjusted

<sup>2</sup> adjusted for weight gain during the index pregnancy

## Findings

- Women who gain or lose weight between pregnancies were younger than women with stable weight (Table 1)
- Women who gain weight were more likely to have longer interbirth intervals (Table 1)
- Adjusted RR of cesarean delivery (Table 2):
  - 2.04 (95% CI: 1.40-2.98) for women who **gained weight** compared to women with stable weight
  - 0.77 (95% CI: 0.38-1.57) for women who **lost weight** compared to women with stable weight

## Limitations

- Incomplete ascertainment of births occurring out of state
- Lack of data describing how GDM was treated during the index pregnancy which can affect weight gain
- Overweight women tend to underestimate their weight to a greater degree than normal weight women. This underestimation could result in differential misclassification.

## Implications

- Gaining > 10 lbs between pregnancies in women with GDM increases the risk of subsequent cesarean delivery
- This study further supports recommendations for weight control/weight loss in women who have a history of GDM
- Weight gain is modifiable and appropriate weight management in women with a history of GDM may result in decreased need for cesarean delivery and the associated excess risks and costs

## References

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