



Understanding Variation in Spending on Childbirth Among the Commercially Insured

Data and Methods

Sample Construction

The Health Care Cost Institute's dataset of 2.5 billion medical and prescription drug claims for approximately 40 million individuals enrolled in employer-sponsored health insurance across the country offers a unique perspective on maternal health care costs and the drivers of those costs among the ESI population.¹ In each year, the HCCI dataset contains between 250,000-350,000 people who had a claim for a delivery.

Using diagnostic information, we pooled 2016 and 2017 inpatient delivery claims (and their associated professional claims) resulting in a sample of 351,272 births across 35 states. Claims had to be associated with a female member between the ages of 18 and 55 with standard, continuous insurance converge one month prior to and three months following delivery. After aggregating claims to the provider level, we limited the sample to only those general acute care hospitals that performed at least 100 deliveries in a year as documented by the American Hospital Association and performed at least 50 deliveries as documented by our claims data. We aggregated one final time to the state level and only reported on states that had data on deliveries from at least five providers from 2016 to 2017 and performed at least 400 vaginal birth deliveries and 400 C-section deliveries from 2016 to 2017.

Constructing Outcome Measures: Spending per Birth, C-section Rate, Spending per Procedure

We defined a delivery admission by the unique combination of individual, diagnostic related group (DRG), and admission and discharge dates. We used DRGs 767, 768, 774, and 775 to indicate a vaginal birth and DRGs 765 and 766 to indicate a C-section. For each admission, we associated all facility claims with professional claims which occurred during admission and discharge dates.

We measured the cost per admissions as the sum of allowed amounts associated with each admission – the sum of all insurer and patient out-of-pocket spending. Because we pooled 2016 and 2017 deliveries, spending on 2016 observations were inflated to 2017 dollars. We measured the cost per birth as total spending divided by a count of births, and the cost per procedure as total spending by procedure divided by a count per procedure. We also calculated 25th, 50th, and 75th percentiles of spending across providers within states. To calculate C-section rates at the state level, we divided the count of C-section deliveries by the count of all deliveries. Note that by measuring the average cost of childbirth (and by procedure) in this fashion, the variation in the cost of childbirth reported in this analysis incorporates variation in the intensity of cases across states.

¹ Our dataset does not include data on Medicaid, which finances 43% of births in the US. See MACPAC's Fact Sheet: Medicaid's Role in Financing Maternity Care. <https://www.macpac.gov/wp-content/uploads/2020/01/Medicaid%E2%80%99s-Role-in-Financing-Maternity-Care.pdf>



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Decomposing variation in cost per childbirth admission

Based on our above definitions we can rewrite the cost per childbirth as a function of the cost per procedure and the ratio of procedure types:

$$\frac{Spend_{gt}}{Admits_{gt}} = \frac{Spend\ on\ CS_{gt}}{Admits_{gt}} + \frac{Spend\ on\ VB_{gt}}{Admits_{gt}}$$

$$\frac{Spend_{gt}}{Admits_{gt}} = \left[\frac{Spend\ on\ CS_{gt}}{CS\ Admits_{gt}} * \frac{CS\ Admits_{gt}}{Admits_{gt}} \right] + \left[\frac{Spend\ on\ VB_{gt}}{VB\ Admits_{gt}} * \frac{VB\ Admits_{gt}}{Admits_{gt}} \right]$$

$$\frac{Spend_{gt}}{Admits_{gt}} = \underbrace{\theta_{gt}}_{C-Section\ Rate} * \underbrace{p_{gt}^{CS}}_{Spending\ per\ C-Section} + (1 - \theta_{gt}) * \underbrace{p_{gt}^{VB}}_{Spending\ per\ Vaginal\ Birth}$$

$$\frac{Spend_{gt}}{Admits_{gt}} = p_{gt}^{VB} + \theta_{gt} * (p_{gt}^{CS} - p_{gt}^{VB})$$

This allows us to re-write the difference in cost per childbirth between each state in year t from the national average as follows:

$$\begin{aligned} \frac{Spend_{gt}}{Admits_{gt}} - \frac{Spend_t}{Admits_t} &= [p_{gt}^{VB} + \theta_{gt} * \Delta p_{gt}] - [p_t^{VB} + \theta_t * \Delta p_t] \\ &= [(p_{gt}^{VB} - p_t^{VB}) + \theta_{gt} * \Delta p_{gt} - \theta_t * \Delta p_t] + [\theta_t * \Delta p_{gt} + \theta_t * \Delta p_{gt}] \\ &= \underbrace{(p_{gt}^{VB} - p_t^{VB})}_{Avg.\ Price\ Component} + \underbrace{\Delta p_{gt} * (\theta_{gt} - \theta_t)}_{CS\ Rate\ Component} + \underbrace{\theta_t * (\Delta p_{gt} - \Delta p_t)}_{Relative\ Procedure\ Cost\ Component} \end{aligned}$$

Limitations

Our study is limited to describing the average cost of childbirth among individuals with employer sponsored insurance. In particular, these results do not speak to the childbirth experiences of those on Medicaid or the uninsured. We are also limited to reporting in areas with large volumes of births and at facilities with large volumes of births. Therefore, our results may also not generalize to more rural regions where births are less frequent.