Impacts of the ACA Medicaid expansion on pregnancy health and outcomes in the U.S.

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Short Abstract

Preconception (*vs.* prenatal) healthcare has been heralded as an essential method of identifying and managing risk factors of poor pregnancy health and outcomes. However, as of 2012, over one-third of low-income women of reproductive age lacked health insurance, limiting access to preconception care. The 2014 Medicaid expansion resulted in a natural experiment offering an opportunity to examine effects of this policy. The objective of our study is to test the hypothesis that increasing Medicaid eligibility for low-income, non-pregnant women of reproductive age improved measures of pre-pregnancy and pregnancy health and reduced the prevalence of adverse birth outcomes. In our extended abstract, we provide descriptive analyses of our data, the U.S. natality data 2010-2016 and our two methodological approaches: a difference-in-difference analysis and an approach that constructs a simulated measure of Medicaid eligibility taking advantage of variation in eligibility by state and time prior to and after the Medicaid expansion.

Introduction

Over the past several decades, many public health, public policy, and clinical efforts have sought to reduce rates of adverse birth outcomes such as low birth weight (LBW) and preterm delivery (PTD) by improving women's access to care and health behaviors during the prenatal period. Yet, the U.S.'s high rates of LBW and PTD, as well as stark racial and socioeconomic disparities in these outcomes, have persisted[1, 2]. Indeed, even the expansion of Medicaid in the 1980s and 1990s to cover low-income pregnant women failed to substantially reduce rates of adverse birth outcomes[3, 4].

Lack of progress in reducing adverse birth outcomes likely stems from the fact that prenatal care has small effects on birth outcomes[5, 6] and is, in many cases, "too little, too late" to address risk factors for adverse outcomes. First, efforts to mitigate risks from smoking, alcohol consumption, poor nutrition, obesity, or other chronic disease as a part of prenatal care are likely to miss the early critical window during which essential fetal development occurs[7-9]. Moreover, treatments such as nicotine replacement for smoking cessation, anti-hypertensive medication for high blood pressure, and behavioral interventions for weight loss may confer risks to fetal development[8-12]. Initiation of such treatments should, therefore, begin months or years prior to conception to avoid these risks and be most effective.

Preconception healthcare has thus been heralded—by the Centers for Disease Control and Prevention (CDC)[7], the American College of Obstetrics and Gynecology (ACOG)[12] and the March of Dimes Foundation[8]—as an essential method of identifying, managing, and treating risk factors of poor infant health prior to pregnancy and for reducing unintended or mistimed pregnancies. However, as of 2012, about one-fifth of all women of reproductive age and over one-third of low-income women of reproductive age were without health insurance, which limits access to preconception health care[13].

The Affordable Care Act of 2010 expanded Medicaid eligibility to all non-elderly Americans with incomes up to 138% of the federal poverty level (FPL). A 2012 US Supreme Court ruling allowed states to opt out of the ACA Medicaid expansion; thus, by January 1, 2014 only 20 states plus the District of Columbia (DC) expanded Medicaid. This state variation in the expansion of Medicaid has resulted in a natural experiment that offers a unique opportunity to examine the effects of this policy on low-income women's pre-pregnancy and pregnancy health and outcomes. The objective of our study is to test the hypothesis that increasing Medicaid eligibility for low-income, non-pregnant women of reproductive age improved measures of pre-pregnancy and pregnancy health and reduced the prevalence of adverse birth outcomes.

Methods

Data. We used data from the National Center for Health Statistics (NCHS) vital statistics natality all-county files 2010-2016, which include data on all live births in the U.S. (n=27,812,905). Our analytic sample included singleton births to U.S. resident women ages 15-44 in the 50 U.S. states or Washington D.C. (n=26,721,381). We excluded records missing length of gestation or birth weight and those with implausible combinations of birth weight and gestational age[14] (n= 351,081) as well as records missing maternal marital status, parity, or education (n= 2,795,110) leading to a sample of 23,575,190 births.

Study design. We will use a quasi-experimental, difference-in-differences (DID) study design to compare the change from pre- to post-Medicaid expansion in prevalence of self-reported outcomes between low-income women of reproductive age living in states that expanded Medicaid (expansion states) and similar women in states that did not expand Medicaid (control states).

Measures. We considered 2010-2013 the pre-Medicaid expansion period and 2015-2016 the post-expansion period. We excluded data from 2014 (n = 3,597,120) from this analysis because women giving birth in 2014 would not have had adequate pre-conception exposure to the Medicaid expansion. We defined expansion states as those that expanded Medicaid by January 1, 2014 (Wehby & Lyu, 2017): AR, CO, IL, KY, MD, NJ, NV, NM, ND, OH, OR, RI, WV. We excluded from the DID analysis births in states that expanded Medicaid after January 1, 2014: MI, NH, AK, IL, PA (n=19,978,070) for an analytic sample of 18,675,339. Our primary outcomes included measures of pre-pregnancy health, pregnancy health, and birth outcomes, listed in Table 1.

Next Steps

We are currently conducting the adjusted DID analysis. We will first test the parallel trends assumption upon which DID depends, by graphically examining the prevalence of each outcome during the pre-expansion period separately among expansion and control states, and then by fitting a series of regression models where the null hypothesis of parallel trends is accepted if coefficients on all pre-expansion year interactions between expansion and year indicator variables are zero.

We will then fit a series of multivariable DID models with robust standard errors clustered by state using data from both the pre- and post-expansion periods. The DID model is as follows:

$$Y_{ist} = \beta_0 + \beta_1(Expansion_s \times Post) + \boldsymbol{Year}'_t\boldsymbol{\beta}_2 + \boldsymbol{State}'_s\boldsymbol{\beta}_3 + \boldsymbol{X}'_{ist}\boldsymbol{\beta}_4 + \beta_5 Z_{st} + \varepsilon_{ist} \quad [2]$$

where Y_{ist} represents the outcome of interest for woman *i* in state *s* and year *t*. *Expansion* is a 0/1 indicator of whether the woman lived in an expansion or control state; *post*, a 0/1 indicator for whether the outcome is measured pre- or post-expansion; $\boldsymbol{Year}_t$ and $\boldsymbol{State}_s$ are vectors of year and state fixed effects; $\boldsymbol{X}_{ist}$ is a vector of individual covariates (age, race/ethnicity, parity, marital status, educational attainment, and payment source); and Z_{st} is the quarterly average state unemployment rate. Our parameter of interest (i.e., the DID estimator) is β_1. We will also stratify our analyses by parity, marital status, and education.

We will also explore the use of a second analytic approach that constructs a simulated measure of treatment, or exposure to Medicaid, taking advantage of the variation in eligibility for Medicaid by state and time in the U.S. prior to and after the Medicaid expansion. To do this, we will use a sample of women of reproductive age (18-44) from the ACS 2008-2010 (prior to the ACA Medicaid expansion) to create demographic subgroups defined by the combination of: state of residence, race/ethnicity (non-Hispanic white, non-Hispanic black, Hispanic), age (18-24, 25-34, 35-44), marital status (married, unmarried), and educational attainment (<high school, high school, some college, college graduate). We will then use these women's income in the 2008-2010 data to calculate their eligibility for Medicaid each year from 2010-2018 based on income, family size, parental status, and the Medicaid eligibility regulations for that year in their state. Next, we will average across the demographic (i.e., state-race/ethnicity-age-marital status-educational attainment) subgroups to calculate a simulated probability that a woman in a given subgroup would be eligible for Medicaid in a given year from 2010-2018. Finally, we will merge these simulated probabilities onto our data by demographic subgroup and year. This eligibility approach also uses a difference-in-differences methodology, but it uses the simulated eligibility variable as a continuous measure of treatment in the regression model.

Table 1a. Pre-pregnancy health, pregnancy health, and pregnancy outcomes among singleton births to US resident women aged 15-44 over the entire study period as well as pre- and post-Medicaid expansion

	All 2010-2016	**Pre-Medicaid expansion 2010-2013**	**Post-Medicaid expansion 2015-2016**
Sample size	18,675,339	11,769,887	6,905,452
		(%)	
Pre-pregnancy health			
Interval since last birth (Mean [SD])	39.4 [40.9]	39.9 [41.0]	38.4 [40.7]
Smoked before pregnancy	9.8	10.0	9.3
Pre-pregnancy BMI			
Underweight	3.7	3.8	3.5
Normal weight	44.7	45.3	43.7
Overweight	24.8	24.4	25.3
Obese	23.4	22.5	24.9
Pre-pregnancy diabetes	0.8	0.7	0.8
Chronic hypertension	1.5	1.4	1.7
Pregnancy health			
Trimester initiated prenatal care			
No prenatal care	1.4	1.4	1.5
First trimester	73.0	71.8	75.1
Second trimester	18.0	19.0	16.2
Third trimester	4.3	4.3	4.4
Number prenatal visits (Mean [SD])	11.3 [4.0]	11.3 [3.9]	11.3 [4.0]
Smoked in first trimester	7.3	7.5	7.0
Smoked ever during pregnancy	7.5	7.7	7.1
Pregnancy weight gain			
<11 pounds	8.5	8.2	8.9
11-20 pounds	15.9	15.6	16.6
21-30 pounds	27.4	27.3	27.7
31-40 pounds	24.2	24.3	23.9
41-98 pounds	19.8	19.9	19.6
Gestational diabetes	5.2	4.8	5.8
Pregnancy hypertension	4.8	4.4	5.6
Eclampsia	0.2	0.2	0.2
Outcomes			
Cesarean delivery	31.0	31.3	30.6
Preterm delivery (<37 weeks)	9.5	9.6	9.4
Birth weight for gestational age			
SGA	10.7	10.7	10.7
Normal	78.3	78.2	78.3
LGA	11.1	11.1	11.0

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