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State And Federal Coverage For Pregnant Immigrants: Prenatal Care Increased, No Change Detected For Infant Health

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ABSTRACT **Expanded health insurance coverage for pregnant immigrant women who are in the United States lawfully as well as those who are in the country without documentation may address barriers in access to pregnancy-related care. We present new evidence on the impact of states' public health insurance expansions for pregnant immigrant women (both state-funded and expansions under the Children's Health Insurance Program) on their prenatal care use, mode of delivery, and infant health. Our quasi-experimental design compared changes in immigrant women's outcomes in states expanding coverage to changes in outcomes for nonimmigrant women in the same state and to women in nonexpanding states. We found that prenatal care use increased among all immigrant women following coverage expansion and that cesarean section increased among immigrant women with less than a high school diploma. We found no effects on the incidence of low birthweight, preterm birth, being small for gestational age, or infant death. State public insurance programs that cover pregnant immigrant women appear to have improved prenatal care utilization without observable changes in infant health or mortality.**

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About one-quarter of newborns in the United States have mothers who are immigrants.[1] Immigrant women experience barriers in access to prenatal care[2–4] that could put their labor and delivery outcomes and infants' health at increased risk.[5–9] Expanding health insurance coverage for pregnant immigrant women could facilitate their access to care.

While most US-born low-income women are eligible for Medicaid or the Children's Health Insurance Program (CHIP) during pregnancy, these programs are more restrictive for immigrant women, particularly recent migrants and the undocumented. Undocumented immigrants, who account for 26 percent of the overall immigrant population, are ineligible for federal assistance, including Medicaid.[10] Immigrants who are lawfully present in the United States can gain eligibility for Medicaid and CHIP, but since the implementation of federal welfare reform in 1996, most of them have been subject to a five-year waiting period after establishing legal US residence. However, after welfare reform, sixteen states and the District of Columbia continued to provide public coverage for pregnant immigrant women who were subject to the five-year waiting period using state funds only (Exhibit 1). Seven of those states and the District of Columbia provided coverage for undocumented immigrant women who were pregnant.

In more recent years, two new federal policy options have greatly expanded access to public health insurance among pregnant immigrant women. First, the 2002 CHIP unborn child option allowed states to use federal funding to des-

EXHIBIT 1

Post-welfare reform public insurance policies affecting immigrant pregnant women, by type of policy, 1997–2015

	State-funded coverage		Year of implementation	
	Years in effect	Included undocumented immigrants	CHIP unborn child option	CHIPRA option
Arkansas	—[a]	—[a]	2004	—[a]
California	1997–2015	Yes (1997 and 1999–2005)	2005	2010
Colorado[b]	1997–2003 and 2005–09	—[a]	—[a]	2010
Connecticut	1997–2009	—[a]	—[a]	2010
Delaware	1998–2010	—[a]	—[a]	2010
D.C.	2001–15	Yes	—[a]	2010
Hawaii	1997–2009	—[a]	—[a]	2010
Illinois	1997–2002	Yes	2003	—[a]
Louisiana	—[a]	—[a]	2007	—[a]
Maine	1997–2011	—[a]	—[a]	2010
Maryland[b]	1997–2005 and 2008–09	—[a]	—[a]	2010
Massachusetts[c]	1997–2003	—[a]	2003	2010
Michigan	—[a]	—[a]	2003	—[a]
Minnesota	1997–2004	Yes	2003	2010
Missouri[d]	—[a]	—[a]	2015	—[a]
Nebraska[e]	1997–2010	Yes	2012	2010
New Jersey[f]	1999–2015	Yes (2002–15)	—[a]	2010
New Mexico	—[a]	—[a]	—[a]	2010
New York[e]	1997–2015	Yes	—[a]	2010
North Carolina	—[a]	—[a]	—[a]	2010
Ohio	—[a]	—[a]	—[a]	2013
Oklahoma	—[a]	—[a]	2009	—[a]
Oregon	—[a]	—[a]	2009	—[a]
Pennsylvania	1997–2011	—[a]	—[a]	2012
Rhode Island	1997–2002	—[a]	2003	—[a]
Tennessee	—[a]	—[a]	2007	—[a]
Texas	—[a]	—[a]	2006	—[a]
Vermont	—[a]	—[a]	—[a]	2012
Virginia	—[a]	—[a]	—[a]	2012
Washington	1997–2003	Yes	2003	2010
West Virginia	—[a]	—[a]	—[a]	2014
Wisconsin	—[a]	—[a]	2007	2010
Wyoming	—[a]	—[a]	—[a]	2013

SOURCE Authors' analysis of state policies, using a combination of an in-depth legislative history review and annual policy briefs issued by the Henry J. Kaiser Family Foundation, the Congressional Research Service, and other policy research institutions. Additional details are provided in the Appendix (see Note 25 in text). **NOTE** CHIPRA is Children's Health Insurance Program Reauthorization Act of 2009. [a]Not applicable; state did not have specified program. [b]There were lapses in Colorado's and Maryland's state-funded programs because of state funding cuts. [c]Since 2014 Massachusetts has supplemented the Children's Health Insurance Program (CHIP) unborn child coverage with state funds to provide the full scope of Medicaid services. [d]Missouri implemented CHIP unborn child coverage for dates of service on or after January 1, 2016. [e]Nebraska's and New York's state programs used a combination of state and federal Medicaid funds. [f]In 2009 New Jersey discontinued state-funded prenatal care coverage for legal immigrants, although it continued coverage for undocumented immigrants. Funding for undocumented immigrants is capped and ran out before the end of the year in 2009–12 and 2014.

ignate a fetus as a "targeted low-income child" and provide health services on its behalf. This option covers a woman's pregnancy- and delivery-related care regardless of her immigration or legal status. By 2015 sixteen states had adopted the option. The CHIP Reauthorization Act (CHIPRA) of 2009 created a second federal policy option that allowed states to eliminate the five-year waiting period and to provide comprehensive Medicaid or CHIP coverage to pregnant women during their first years of legal residency. As of 2015, twenty-two states and the District of Columbia had adopted the CHIPRA option (Exhibit 1). States' adoption of these pro-

grams has the potential to increase access to pregnancy-related medical care among immigrant women, influence their pregnancy outcomes, and improve their infants' health.

In this study we evaluated the effects of states' adoption of coverage policies for pregnant immigrant women. We considered all three types of programs that were adopted after the reform of 1996: state-funded programs, the CHIP unborn child option, and the CHIPRA option. We examined the effects on receipt of prenatal care, differences in obstetric care by type of delivery (cesarean section versus vaginal birth), and birth outcomes among immigrant women.

Our study built on previous research showing that public insurance expansions benefit maternal and child health. Medicaid expansions for pregnant women during the 1980s and 1990s (which did not target immigrants) were associated with increased insurance coverage for pregnant women,[11–13] more timely prenatal care,[11,12] and greater use of medical technology and obstetric procedures during childbirth.[11,12,14] For children, these expansions were associated with birth outcome improvements of varying magnitudes,[11,12,15,16] benefits in academic performance,[15] and improved health and achievement through early adulthood.[17]

There has been less examination of the role of public health insurance coverage for pregnant immigrant women, a population with historically restricted access to care. Two studies that considered the contraction in Medicaid coverage for pregnant immigrant women that followed the 1996 welfare reform provide mixed evidence regarding the impact of this contraction on receipt of prenatal care. Heather Royer found a temporary drop in rates of prenatal care use among Hispanic women of low socioeconomic status in states that opted not to use state funds to continue providing public coverage for immigrant populations.[18] By contrast, Ted Joyce and coauthors found evidence of earlier initiation of prenatal care use in California, New York City, and Texas among immigrant Latinas following welfare reform—although eligibility for publicly funded prenatal care for immigrant women did not change in two of these three locations.[19]

Two published studies have examined subsequent expansions of coverage for immigrant women, both focusing on the CHIP unborn child option. Jonathan Drewry and colleagues used natality data and a difference-in-differences design to compare prenatal care use and subsequent birth outcomes among immigrant Latinas in six states that implemented the option before 2004.[20] The authors found an increase in the adequacy of prenatal care use among single women with less than a high school education, but no significant changes among the overall sample. They did not detect changes in birth outcomes such as birthweight and preterm birth associated with the expansions. Marian Jarlenski and colleagues analyzed data from the Pregnancy Risk Assessment Monitoring System (PRAMS) from thirty-two states in the period 2004–10, examining the association between residing in a state that had implemented the unborn child option, having insurance coverage during pregnancy, and prenatal care use.[21] The authors found that residing in states with the option was associated with a greater probability of being enrolled in public health insurance during pregnancy among women who had been uninsured before pregnancy, but they did not find differences in the adequacy of prenatal care use. Notably, this study was unable to examine outcomes for immigrant women specifically, since PRAMS does not contain data about immigration status.

In this study we extended the literature first by documenting state-funded insurance policies for pregnant immigrant women that were adopted after welfare reform and by separately considering the effects of state-funded programs and the more recent federal policy options, including the new CHIPRA option that has yet to be evaluated. Second, we examined whether under these policies there were changes in obstetric care (such as rates of cesarean delivery) and infant mortality—clinical measures with population health implications that previously had not been examined in this context. Third, we employed a triple-difference quasi-experimental design that used multiple comparison groups to control for changes in outcomes over our study period that were not related to the state policy options, so that we could more credibly estimate these options' effects on immigrant women.

The Institutional Research Board at the University of California, Los Angeles, deemed this study exempt from review.

Study Data And Methods

DATA AND OUTCOME MEASURES We used the 1998–2013 natality and period linked birth-infant death data files with restricted geographic information from the National Center for Health Statistics.[22] These files provide individual-level birth certificate data for all births in the United States and linked death records for all deaths occurring within the first year of life.

Our outcomes of interest were use of prenatal care, cesarean section delivery, and four indicators of infant health. We constructed measures of any prenatal care use and use in the first trimester, as well as the number of prenatal care visits.

We also examined a binary measure of the adequacy of prenatal care use based on the Adequacy of Prenatal Care Utilization Index,[23] which characterizes prenatal care use based on the month of initiation and the adequacy of the number of visits based on gestation length. We considered prenatal care utilization to be adequate with index scores of "adequate" or "adequate plus" and to be inadequate otherwise. To examine changes in the method of delivery, we examined the frequency of cesarean delivery.

The four measures of infant health were low birthweight (less than 2,500 grams), preterm birth (less than thirty-seven weeks of gestation), small for gestational age (birthweight below the tenth percentile), and infant mortality. Supplemental analyses examined more detailed infant gestational age ranges.

We aggregated individual observations in the data files to create state-level measures for immigrant and US-born mothers (the data do not identify the mother's legal status) for each year. We excluded birth and death records associated with nonsingleton births. When calculating infant mortality rates for a given state and year, we used weights supplied by the National Center for Health Statistics to account for the small number of infant death records that could not be linked to their corresponding birth certificates.

STATISTICAL ANALYSIS To estimate the effect of insurance coverage policies on prenatal care use among immigrant women and the health of their infants, we used a differences-in-differences-in-differences design.[24] This approach used data from the periods before and after the implementation of each coverage policy to compare changes in outcomes among immigrant women relative to those among US-born women in states with and without the policy change. Under this design, states not enacting immigrant coverage policies served as controls to account for any secular trends in outcomes for immigrant mothers that were unrelated to the policy change. We included US-born mothers as an additional comparison group to account for any time-varying state characteristics.

We used three different regression models to estimate policy impacts. In the first, the independent variable of interest indicated the presence of any immigrant coverage policy (a state-funded program, the CHIP unborn child option, or the CHIPRA option) in a given state and year, interacted with a binary variable for immigrant women. In the second model, we estimated the effects of each of the three coverage policies separately by including variables for each of them in a given state and year, each interacted with a binary variable for immigrant women. In the third model, we examined policies separately depending on whether they included coverage for undocumented immigrants by interacting two different policy variables (coverage included undocumented immigrants versus coverage for documented immigrants only) with a binary variable for immigrant women. State policies were coded for 1997–2012 using a combination of an in-depth legislative history review and annual policy briefs issued by the Henry J. Kaiser Family Foundation, the Congressional Research Service, and other policy research institutions. Additional details are provided in the online Appendix.[25]

For each policy mentioned above, we considered the policy to "turn on" for births in the year following implementation, accounting for the nine-month gestation period. Each regression also included state and year fixed effects and their interaction; an indicator of immigrant status and its interactions with state and year fixed effects; and demographic variables that captured the average characteristics for each group of women giving birth (immigrant and US-born) for each state and year, including age, marital status, education, and race/ethnicity. In a supplemental analysis, we adjusted for prenatal care initiation and the mean number of prenatal care visits to determine whether changes in prenatal care mediated infant health outcomes.

In addition to our main study population, we estimated the same models for the subset of women with low educational attainment (less than twelve years of completed education, or no high school diploma). We hypothesized that women in this group would be more likely to meet income eligibility criteria for Medicaid and CHIP and to be affected by changes in state coverage policies. In a supplemental analysis, we stratified women by number of deliveries to examine any differential effects for first-time mothers compared to those with previous births.

All regressions were weighted by the respective number of births in each state-year cell for either immigrant or US-born women. Robust standard errors were clustered by state. Additional details on the statistical analysis can be found in the Appendix.[25]

LIMITATIONS Several study limitations should be considered. First, we lacked individual-level measures of insurance enrollment. While our study data permitted us to estimate the average effect of Medicaid expansion on immigrant women, we could not separately consider effects of eligibility expansions on those who actually enrolled in Medicaid, for whom effects were likely to be larger.

Second, although we separated policies according to whether they targeted only documented immigrants versus all immigrants, our

data did not identify women's legal status. In addition, unmeasured local factors such as stigma and outreach policies could have important effects on engagement with services among undocumented immigrants. Third, for the CHIPRA option specifically, we had fewer years of available data after implementation that could enable us to detect effects of the policy on service use and outcomes.

Fourth, our estimates of the impacts of expanded insurance policies were based on the experiences of only those states that implemented programs or policies (or continued previous federal policies using state funds) during our study period and may not reflect the experiences of other states. Lastly, we estimated the average effect of the state coverage options and were unable to measure changes in the quality or structure of prenatal care (for example, group-based models) covered by states.

Study Results

Exhibit 2 presents the characteristics of women giving birth during the study period, by immigrant status. Immigrant women were slightly older than US-born women and more likely to be married. They were also more likely than US-born women to be of Hispanic origin and have had less education, on average. Immigrant women used less prenatal care and were less likely to have a cesarean section, but their infants had slightly better health. Among immigrant women with less than a high school education, prenatal care use was similar to that of their US-born counterparts, and their infants also had better health.

EFFECTS FOR ALL IMMIGRANT WOMEN Model 1 in Exhibit 3 presents the estimated impacts of coverage policies for immigrant women. These impacts were estimated by comparing the changes in outcomes for immigrant women and those for US-born women before and after implementation in states with and without the policies. States' adoption of coverage policies for immigrant women increased the mean number of prenatal visits for immigrant women by 0.2 visits (a 1.9 percent increase relative to the baseline mean of 10.4 visits). There was no evidence of significant changes in other measures of prenatal care use, type of delivery, or measures of infant health.

Model 2 in Exhibit 3 presents the estimated effects for each of the three types of policy options. We found no significant evidence that one of the options drove the increase in the number of prenatal visits. We detected a significant decrease of 0.5 percentage points in the incidence of preterm births among immigrant women that was associated with state adoption of expanded coverage under CHIPRA (a 4.7 percent decrease relative to the baseline mean of 10.7 percent).

Model 3 in Exhibit 3 presents the estimated effects for policy options that cover undocumented immigrants versus those that do not. Although both groups of policies had positive effects on the number of prenatal visits, the effect was significant only for policies that covered the undocumented.

EFFECTS FOR LOW-EDUCATION IMMIGRANT WOMEN Exhibit 4 presents results from analyses

EXHIBIT 2

Characteristics of immigrant and US-born women giving birth during the study period

	All women		Women with less than high school diploma	
	Immigrant	US born	Immigrant	US born
DEMOGRAPHIC CHARACTERISTICS				
Age range (years)[a]				
15–19	6.6%	11.3%	12.5%	39.6%
20–24	20.6	26.2	26.2	33.5
25–29	28.7	27.3	27.7	15.5
30–34	26.6	22.3	20.3	6.7
35–39	14.1	10.4	10.3	2.8
40 and older	3.4	2.3	2.7	0.7
Race[a]				
White	73.3%	75.5%	89.3%	62.6%
Black	9.7	17.1	5.4	26.0
Other race	17.0	7.4	5.3	11.4
Ethnicity[a]				
Hispanic	58.9%	12.1%	88.3%	22.3%
Marital status				
Currently married	66.3%	61.3%	51.5%	26.6%
Education[a]				
Less than high school	50.9%	35.0%	100.0%	100.0%
High school graduate	24.5	30.1	0.0	0.0
Some college	8.8	15.1	0.0	0.0
College graduate	15.8	19.8	0.0	0.0
DEPENDENT VARIABLES				
Use of prenatal care				
Any	98.3%	98.8%	97.3%	97.1%
In first trimester	73.7	80.5	65.0	64.0
Adequate prenatal care utilization	67.3	75.6	60.8	60.3
Mean number of prenatal care visits	10.8	11.5	10.2	10.2
Delivery type				
Cesarean section	12.8%	13.8%	11.6%	12.5%
Infant health				
Low birthweight[b]	5.4%	6.5%	5.3%	9.5%
Small for gestational age[c]	9.0	9.1	8.7	13.5
Preterm birth[d]	9.8	10.6	10.8	14.0
Infant death rate (per 1,000 births)	4.0	5.6	6.3	18.9

SOURCE Authors' analysis of data for 1998–2013 from the Vital Statistics natality data files and period-linked birth-infant death data files (see Note 22 in text). **NOTES** The data consist of 1,632 state-year observations for immigrant- and US-born women in the fifty states and the District of Columbia for the study period. Means were weighted with the population of births for each state, year, and immigrant status group. [a]Percentages may not sum to 100 because of rounding. [b]Less than 2,500 grams. [c]Birthweight below the 10th percentile. [d]Less than thirty-seven weeks of gestation.

EXHIBIT 3

Difference-in-differences-in-differences estimates of effects of public health insurance coverage of immigrant women, 1997–2012

	Use of prenatal care					Infant health			
	Any[a]	In first trimester[a]	Mean no. of visits	Adequate[a]	Cesarean delivery[a]	Low birthweight[a,b]	Small for gestational age[a,b]	Preterm birth[a,b]	Infant death rate (per 1,000 births)
MODEL 1									
Coverage of immigrants	0.3	–1.8	0.2**	1.5	–0.5	0.0	0.1	0.1	0.2
Standard error	(0.3)	(1.2)	(0.1)	(0.8)	(2.9)	(0.1)	(0.1)	(0.1)	(0.1)
MODEL 2									
State-funded program	0.4	–0.7	0.0	0.4	–2.2	0.0	0.1	–0.2	0.2
Standard error	(0.2)	(1.2)	(0.1)	(0.9)	(2.6)	(0.1)	(0.1)	(0.1)	(0.2)
CHIP unborn child option	0.5	–1.4	0.1	1.3	2.6	–0.0	0.1	–0.2	0.0
Standard error	(0.3)	(1.0)	(0.1)	(0.8)	(1.8)	(0.1)	(0.1)	(0.2)	(0.1)
CHIPRA option	–0.2	–0.7	–0.0	1.4	–0.6	–0.0	–0.1	–0.5***	–0.2
Standard error	(0.3)	(1.4)	(0.1)	(1.7)	(1.0)	(0.1)	(0.1)	(0.1)	(0.2)
MODEL 3									
Coverage for undocumented immigrants	0.4	–1.9	0.2**	1.6	0.1	–0.0	0.0	0.1	0.1
Standard error	(0.3)	(1.3)	(0.1)	(0.9)	(2.2)	(0.1)	(0.1)	(0.2)	(0.1)
Coverage for documented immigrants only	0.2	–1.4	0.2	1.3	–2.2	0.1	0.2	0.1	0.2
Standard error	(0.3)	(1.3)	(0.9)	(1.1)	(4.8)	(0.1)	(0.1)	(0.2)	(0.2)
Baseline pre-policy mean for immigrant women	97.3	71.1	10.4	62.5	19.5	5.4	9.0	10.7	4.4

SOURCE Authors' analysis of data for 1998–2013 from the Vital Statistics natality data files and period-linked birth-infant death data files (see Note 22 in text) **NOTES** The exhibit shows estimated changes in outcomes for immigrant women compared to US-born women after implementation of public health insurance coverage of pregnant immigrant women in states with and without such coverage. Changes shown are the estimated coefficients from an interaction between the specified policy indicator and a foreign-born status indicator in the triple-difference model described in the text and the Appendix (see Note 25 in text). The reference group for each model was US-born women in states without the specified policy. Regressions were weighted with the population of births for each state, year, and immigrant status group. Specifications included controls for demographic characteristics (age distribution, marital status, education, and race/ethnicity); state, year, and immigrant fixed effects; and interactions between state and year fixed effects, state and immigrant fixed effects, and year and immigrant fixed effects. Standard errors are heteroskedasticity robust and clustered by state. Baseline means are weighted and calculated using pre-policy observations in states adopting public health insurance coverage of pregnant immigrant women. The data consist of 1,632 state-year observations for immigrant and US-born women in the fifty states and the District of Columbia for the study period. CHIP is Children's Health Insurance Program. CHIPRA is Children's Health Insurance Program Reauthorization Act of 2009. [a]Percent. [b]Defined in the Notes to Exhibit 2. **$p < 0.05$ ***$p < 0.01$

focusing on immigrant women with less than a high school diploma, a group that included approximately half of all immigrant women in our study (Exhibit 2). We found that states' adoption of an expanded public insurance policy covering immigrant women was associated with a 1.4-percentage-point-increase in any prenatal care use (Exhibit 4, Model 1). Relative to the baseline mean of 95.7 percent, this represents an increase of 1.5 percent. This is equivalent to a 32.6 percent decrease in the share of immigrant women with low education going without prenatal care (that is, relative to the baseline mean of 4.3 percent of women who lacked prenatal care).

We also found a 2.5-percentage-point-increase in adequate prenatal care utilization among immigrant women with less than a high school diploma (a 4.7 percent increase relative to the baseline mean of 53.1 percent) (Exhibit 4). And we found a significant increase of 0.4 visits in the mean number of prenatal visits (a 4.2 percent increase relative to the baseline mean of 9.5 visits).

Furthermore, we found a significant increase of 2.2 percentage points in the likelihood of having a cesarean delivery among immigrant women with low education under expanded coverage policies (Exhibit 4). This represented a relative increase of 13.2 percent over the baseline mean of 16.7 percent. As with the full sample, we found no significant evidence of changes in infant health associated with these policies.

When we examined the impact of each policy option separately, we found significant increases

EXHIBIT 4

Difference-in-differences-in-differences estimates of effects of public health insurance coverage of immigrant women with less than a high-school diploma, 1997–2012

	Use of prenatal care					Infant health			
	Any[a]	In first trimester[a]	Mean no. of visits	Adequate[a]	Cesarean delivery[a]	Low birthweight[a,b]	Small for gestational age[a,b]	Preterm birth[a,b]	Infant death rate (per 1,000 births)
MODEL 1									
Coverage of immigrants	1.4***	−1.9	0.4***	2.5***	2.2**	−0.1	−0.1	0.0	0.0
Standard error	(0.4)	(1.7)	(0.1)	(0.8)	(1.0)	(0.2)	(0.2)	(0.2)	(0.9)
MODEL 2									
State-funded program	0.7	−1.2	0.1	1.0	0.8	0.0	−0.2	−0.2	1.4
Standard error	(0.3)	(2.1)	(0.2)	(1.4)	(1.1)	(0.3)	(0.2)	(0.4)	(1.0)
CHIP unborn child option	1.1	−0.6	0.2	2.4**	2.9**	0.1	0.1	−0.1	1.0
Standard error	(0.6)	(1.5)	(0.2)	(1.1)	(1.3)	(0.1)	(0.2)	(0.2)	(1.4)
CHIPRA option	−0.4	1.2	0.1	1.0	−0.6	0.1	−0.1	−0.5	0.3
Standard error	(0.5)	(1.1)	(0.2)	(1.5)	(1.2)	(0.2)	(0.2)	(0.3)	(1.2)
MODEL 3									
Coverage for undocumented immigrants	1.5***	−1.9	0.4***	2.7***	2.0	−0.1	−0.1	−0.0	−0.4
Standard error	(0.4)	(1.7)	(0.1)	(0.9)	(1.1)	(1.6)	(0.2)	(0.2)	(0.8)
Coverage for documented immigrants only	1.1***	−1.9	0.3**	1.8	2.7**	0.0	0.0	0.2	1.4
Standard error	(0.4)	(1.8)	(0.1)	(1.2)	(1.2)	(0.2)	(0.2)	(0.4)	(1.2)
Baseline pre-policy mean for immigrant women	95.7	61.3	9.5	53.1	16.7	5.2	8.8	11.1	6.5

SOURCE Authors' analysis of data for 1998–2013 from the Vital Statistics natality data files and period-linked birth-infant death data files (see Note 22 in text). **NOTES** The exhibit shows changes in outcomes for immigrant women compared to US-born women after implementation of public health insurance coverage of pregnant immigrant women in states with and without such coverage. Changes shown are the estimated coefficients from an interaction between the specified policy indicator and an immigrant status indicator in the triple-difference model described in the text and the Appendix (see Note 25 in text). Details about the analysis are in the Notes to Exhibit 3. [a]Percent. [b]Defined in the Notes to Exhibit 2. **$p < 0.05$ ***$p < 0.01$

in adequate prenatal care utilization and cesarean sections associated with the CHIP unborn child option (Exhibit 4, Model 2). We also found that state coverage for undocumented immigrants, which includes that option, led to a significant increase in adequate prenatal care utilization (Model 3). Furthermore, we found evidence of increased prenatal care use and intensity among immigrant women with low education associated with policies that covered only documented immigrants and with those that also covered undocumented immigrants. Both types of policies were also associated with an increase in cesarean sections, although only the increase for policies that covered only documented immigrants was significant.

ADDITIONAL ANALYSES An examination of more detailed categories of infant gestational age did not significantly affect the results of our infant health analyses, nor did adjustment for receipt of prenatal care. A stratified analysis by number of deliveries revealed improvements in prenatal care use after coverage expansions for both first-time mothers and women with previous births. The results of these analyses are found in the Appendix.[25]

Discussion

State programs and policy options adopted over the past twenty years have improved prenatal care use among immigrant women overall, and particularly among immigrant women with less than a high school education. These are the women whom we expect to be more likely to meet the income eligibility criteria to benefit from state coverage expansions. We found a 33 percent decrease in the share of immigrant women with low education who received no prenatal care, relative to the baseline mean, after states' adoption of public insurance coverage of immigrant women. We also found a significant increase in the num-

ber of prenatal visits and the adequacy of prenatal care utilization for this population, as measured by the Adequacy of Prenatal Care Utilization Index.[23] In particular, the CHIP unborn child option—which covers pregnant immigrant women regardless of their legal status—led to a significant increase in adequate prenatal care utilization for immigrant women with low education. Both state coverage policies that covered only documented immigrants and those that also covered undocumented immigrants led to improvements in prenatal care utilization for this group.

We also found an increase in cesarean deliveries among immigrant women with less than a high school education to be associated with coverage expansions. Given the low baseline frequency of such deliveries among immigrant women, this may represent an increase in access to standard obstetric care. Alternatively, there is evidence that links high provider reimbursement rates for cesarean sections under Medicaid to an increase in the rates of these deliveries.[26,27] Whether or not the change we observed was primarily driven by an increase in medically indicated cesarean deliveries cannot be determined from the available data.

We did not find strong evidence of improvements in infant health for the children of immigrant women associated with the policy options we investigated. This could be attributed to the so-called epidemiological paradox that immigrant status can protect against low birthweight among certain ethnic groups.[28,29] Another possible explanation from the literature is that prenatal care may be too little and too late to affect the birth outcomes available on birth certificate records and examined in this study, such as low birthweight and preterm birth.[30] Effective interventions to improve these outcomes may require alternative models of prenatal care or may need to start in the period immediately before conception or even earlier: Maternal risk factors associated with preterm delivery and intrauterine growth restriction are often present well before conception[31] and may require a long-term, sustained intervention to resolve.[32]

However, the results presented here do not rule out the possibility that the improved prenatal care use that we observed under these state policies will lead to other improvements in the early-life health and development of unborn children. Interventions related to nutrition and breast-feeding, establishing health-related behaviors, linkage to a medical home, and education regarding pregnancy and parenting may have important consequences for the family environment and the early-life experiences of children[33]—consequences that are not reflected in data available on their birth certificates. Additionally, research has linked other public health insurance expansions for pregnant women to better later-life outcomes for the children of the mothers who benefited from the expansions.[17] Exploring the effects of coverage policy on these later-life outcomes could be a fruitful direction for future research that builds on our findings.

Conclusion

Our results suggest that the policy options available to individual states could help address the persisting disparities between immigrant and US-born women in access to insurance coverage and prenatal care. For states considering the different policy options for expanding coverage, those that allow states to use federal funds (the CHIP unborn child option and the 2009 CHIPRA option) may be the most cost-effective. In addition, programs that cover undocumented immigrants, such as the CHIP unborn child option, seem particularly likely to have an impact on women with low education.

We did not find evidence that state expansions in coverage for immigrant women affected measures of health at birth or infant mortality. Lack of improvement on these outcomes is consistent with previous research that examined a subset of these state policy options,[20] as well as the findings of reviews on the effectiveness of prenatal care.[30,31,33] We did find evidence of an increase in cesarean deliveries among immigrant women with low education that was associated with the coverage expansions, but it is unclear whether this change is ultimately beneficial or harmful for mothers and infants. However, the results presented here do not rule out the possibility that increased access to prenatal care may lead to longer-term improvements in the health and well-being of the families who benefit from that access. Achieving sustained health improvements may require changes in the design of insurance programs that target these populations, including stronger linkages to community resources and sustained coverage for children early in life. ■

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