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The Effect of Health Insurance Expansion under the Affordable Care Act on Maternal Mortality Rates

Helen Schneider PhD*

Department of Economics, The University of Texas at Austin, Austin, TX 78712, USA

Correspondence Author: Helen Schneider PhD, Department of Economics, Mail code C3100, The University of Texas at Austin, Austin, TX 78712, USA, Tel: +1 5124711734; **E-mail:** h.schneider@eco.utexas.edu

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Abstract

Although the risk of death from complications of pregnancy in the last century has decreased dramatically, maternal mortality rates are rising in the United States. A significant proportion of these events are preventable with a timely access to medical care. This study estimates the effect of insurance access and Medicaid expansion under the Affordable Care Act on the variance in maternal mortality rates across states. We use maternal mortality data as estimated by the Centers for Disease Control and Prevention (CDC) and multivariate regression analysis to explain the wide variation in maternal mortality across states. Regression results indicate that insurance has a significant impact on state maternal mortality rates ($p<0.05$). Medicaid expansion does not affect mortality rates but is effective at decreasing maternal mortality in states with higher poverty rates ($p<0.1$). This study finds that access to insurance and early medical interventions as measured by a prenatal care visit before the third trimester can have a statistically significant effect on decreasing maternal mortality in the United States.

Introduction

The Word Health Organization defines maternal death as: "The death of a woman while pregnant or within 42 days of termination of pregnancy, irrespective of the duration and the site of the pregnancy, from any cause related to or aggravated by the pregnancy or its management, but not from accidental or incidental causes" [1]. Worldwide between 1990 and 2013 maternal mortality rates decreased in nearly every country, except the United States where it increased [2]. Data from the Centers for Disease Control and Prevention's (CDC) Pregnancy Mortality Surveillance System show that maternal mortality increased from about 10 deaths per 100,000 live births in the early 1990s to 16 deaths per 100,000 live births by 2010 [3]. Overall, 40% of pregnancy-related deaths are potentially preventable with improved use of medical care being the most important factor in decreasing maternal mortality statistics [4]. Previous research shows that in the United States maternity rates and trends vary widely by state. While California is showing a declining MMR trend, Texas MMR is increasing over time, doubling between 2011 and 2012 [5]. Overall, MMR for 48 states and Washington DC is increasing and this trend places the United States far behind other developed nations [5]. This study attempts to isolate the role of health insurance in explaining the variance in MMR across states.

When the Affordable Care Act (ACA) was passed in 2010, it mandated the expansion of Medicaid (effective January 1, 2014), increasing eligibility for nearly all US residents with household incomes up to 138% of the federal poverty level. However, the US Supreme Court struck down the mandatory expansion of Medicaid in 2012 and ruled that each state could choose whether to expand this state program. In 2016 (the year of the data in this study), 30 states and Washington, DC, have elected to expand Medicaid, whereas 20 states have not. Yet evidence regarding the effects of Medicaid on health outcomes remains unclear. On one hand, randomized Medicaid trial in Oregon showed no significant effect of Medicaid expansion on mortality rates despite higher medical care utilization rates [6]. On the other hand, Sommers et al. [7] find that state Medicaid expansions were associated with a significant reduction in adjusted all-cause mortality that benefited older adults, minorities and the poor the most. Since 40 percent of maternity-related deaths are potentially preventable with improved quality of medical care [4] we hypothesize that insurance will play a greater role in decreasing MMR than overall mortality rates.

Empirical Model

This study attempts to explain the variance in MMR rates across states in the United States. Empirical model below shows the estimating equation:

$$MMR = \alpha + \beta_0\,(Medicaid\ Expansion) + \beta_2\,(Uninsured) + \beta_3\,(Poverty) + \beta_4\,(Poverty{*}Medicaid\ Expansion) + \beta_5\,(Median\ Income) + \beta_6\,(Food\ Stamps) + \beta_7\,(Teen\ Births) + \beta_8\,(Dedicated\ Health\ Provider) + \beta_9(Physical\ Inactivity) + \beta_{10}\,(Obesity) + \beta_{11}\,(Smoking) + \beta_{12}\,(Prenatal\ Visit)$$

Our dependent variable (MMR) measures maternal mortality rates across states. Our independent variables of interest are percent uninsured, Medicaid expansion and interaction variable between Medicaid expansion and poverty rates. Medicaid expansion equals 1 for all states that expanded Medicaid under the Affordable Care Act and 0 for states that did not expand. Since Medicaid expansion benefits states with higher poverty rates the most, interaction between

Medicaid expansion and Poverty rate will capture this effect. We hypothesize that Medicaid expansion may not affect all states but rather states with higher proportion of lower income households. We run the model above with and without the interaction variable.

Data

This study uses 2015-2017 publicly available state-level data. Our dependent variable is measured as the number of deaths from any cause related to or aggravated by pregnancy or its management (excluding accidental or incidental causes) during pregnancy and childbirth or within 42 days of termination of pregnancy, irrespective of the duration and site of the pregnancy, per 100,000 births. The data source is CDC WONDER Mortality Files, 2011-2015; it is available at: https://wonder.cdc.gov. CDC WONDER reports maternal mortality for all states except Vermont and Alaska.

Data sources for state female obesity rates, proportion of women with a dedicated health care provider, female inactivity rates, and female smoking rates are based on the Behavioral Risk Factor Surveillance System (BRFSS), an ongoing, state-based, random-digit-dialed telephone survey of non-institutionalized civilian adults aged 18 years and older. Information about the BRFSS is available at http://www.cdc.gov/brfss/index.html.

Dedicated health care provider variable measures percentage of women aged 18 to 44 who reported having one or more people they think of as their personal doctor or health care provider. Female obesity rate is defined as percentage of adult women in a state who are either overweight or obese. An adult who has a BMI between 25 and 29.9 is considered overweight. An adult who has a BMI of 30 or higher is considered obese. In this study we use state obesity rates for women only as reported by the CDC. State characteristics include poverty rate (percent of the population at or below poverty) and average annual median income. All state characteristics were obtained for 2016 from the Kaiser Family Foundation. Finally, data on the proportion of uninsured women at the state level was obtained from the U.S. Census Bureau, American Community Survey, 2016. Table 1 below presents descriptive statistics **(Table 1)**.

Table 1 above shows that MMR varied widely across states from low 4.5 per 100,000 births in California to high 46.2 per 100,000 births in Georgia with a mean value of 20.88 per 100,000 live births. At the same time, uninsurance rates among women varied from 2.8% in Massachusetts (the first state to expand Medicaid and adopt health insurance mandate) to 25.1% in Texas.

Empirical Results

Table 2 presents regression results with and without our interaction variable. Both models show that states with higher proportion of uninsured women have higher MMR ($p = 0.05$). Medicaid expansion results in lower MMR but results are only statistically significant in our second specification ($p < 0.1$). At the same time, states with higher poverty rates benefited more from Medicaid expansion where additional coverage did translate into lower mortality rates. Therefore, insurance is an important determinant of MMR rates across all states **(Table 2)**.

Table 1. Descriptive Statistics.

Variable	Mean (standard deviation)	Minimum value	Maximum value
MMR	20.88 (9.56)	4.5	46.2
Medicaid Expansion	0.647 (0.483)	0	1
% Below poverty line	12.607 (3.047)	7	21
% Uninsured women	11.027 (4.78)	2.8	25.1
Interaction (Poverty * Medicaid Expansion)	7.94 (6.404)	0	20
Median income, $1000's	59.34 (9.087)	41.09	76.26
Average food stamps benefits per month	124.4 (18.48)	102.03	228.33
Teen birth rate	22.72 (7.34)	9.4	38
% Women with a dedicated healthcare provider	75.34 (6.91)	59.6	88.3
% Women who are physically inactive	21.092 (4.183)	13.9	30.4
% Obese women	27.20 (4.86)	17.9	38
% Women smoking	17.808 (5.19)	7.8	32.2
% Women who made prenatal care visit before third trimester	94.22 (1.97)	90.1	98.4
% Minority population	28.68 (15.37)	5.6	77.3

Table 2. Regression Results. Dependent Variable: State Maternal Mortality Rates.

Regressor	Model 1	Model 2
Medicaid Expansion	-0.824 (3.623)	-21.525* (12.454)
% Below poverty line	1.473** (0.736)	0.530 (0.898)
% Uninsured women	1.024** (0.5057)	1.372** (0.531)
Interaction (Poverty * Medicaid Expansion)		-1.657* (0.956)
Median income, $1000's	0.416 (0.314)	0.523 (0.311)
Average food stamps benefits per month	0.107 (0.126)	0.134 (0.123)
Teen birth rate	0.396 (0.515)	0.191 (0.612)
% Women with a dedicated healthcare provider	0.402 (0.374)	0.516 (0.421)
% Women who are physically inactive	0.531 (0.433)	0.571 (0.422)

Regressor	Model 1	Model 2
% Obese women	0.385 (0.619)	0.191 (0.612)
% Women smoking	0.285 (0.530)	0.183 (0.519)
% Women who made prenatal care visit before third trimester	-2.088** (1.039)	-0.234** (1.014)
% Minority population	0.387* (0.211)	0.371* (0.206)
R-squared N F statistic	0.493 48 2.84***	0.534 48 3.00***
Notes: standard errors are in parenthesis; * indicates significance at 10%; ** indicates significance at 5% and *** indicates significance at 1%.		

Other important determinants of state MMR are percent of women who made a prenatal visit before their third trimester and minority population. We find that states with higher minority population have higher MMR even after we control for insurance, income and poverty rates. This result is consistent with previous literature that shows that minority women have higher MMR. Finally, early access to prenatal care leads to significantly lower MMR ($p < 0.05$). Therefore, early interventions can have a significant impact on decreasing state MMR.

Conclusions and Policy Implications

Empirical results show that insurance expansions can improve mortality statistics for causes of mortality that are amenable to medical care, such as maternal mortality. States with high MMR tend to have lower insurance rates and Medicaid insurance rates. While uninsurance tends to correlate with low income and poverty status that lead to poor health outcomes, state Medicaid expansion can decrease negative effects of poverty on health outcomes.

Results of this study are not without limitations. First, we collect data at the state level rather than individual data and cannot control for individual risk factors, such as preeclampsia. Second, data sources for state female obesity rates, proportion of women with a dedicated health care provider, female inactivity rates, and female smoking rates are based on the Behavioral Risk Factor Surveillance System (BRFSS) and were self-reported. Finally, collecting data overtime and looking at changes in MMR as states expand Medicaid would provide better estimates of the effects of this program on health outcomes. Unfortunately, accurate and consistent MMR statistics are not available before the Affordable Care Act. As our ability to measure MMR consistently across states improves, further research is necessary to determine the best ways to decrease MMR in the United States.

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