

# The Association Between State-Level Prenatal Substance Use Policies and Rates of Maternal Mortality in the United States: A Legal Epidemiology Study

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**Abstract:** Little research has explored relationships between prenatal substance use policies and rates of maternal mortality across all 50 states, despite evidence that prenatal substance use elevates risk of maternal death. This study, utilizing publicly available data, revealed that state-level mandated testing laws predicted maternal mortality after controlling for population characteristics.

**M**aternal mortality, defined as the death of a woman while pregnant or within 42 days of termination of pregnancy, has more than tripled in the past three decades in the United States despite declining rates worldwide.<sup>1</sup> Maternal mortality involves a complex interplay of many contributing factors. Substance use during pregnancy is a major risk factor for maternal mortality.<sup>2</sup> In fact, fatal maternal overdose rates more than doubled in the US from 2007 to 2017.<sup>3</sup>

Though researchers have suggested that substance use is a surrogate for other factors that influence mortality (e.g. reduced healthcare utilization, poor nutri-

tion, unstable housing, and exposure to violence), states continue to develop policies to combat substance use during pregnancy.<sup>4</sup> The number of states that have enacted policies considering prenatal substance use as a form of child abuse rose from 12 states in 2000 to 24 states in 2020.<sup>5</sup> It has recently been posited that punitive laws regarding substance use during pregnancy might contribute to increased rates of maternal mortality.<sup>6</sup> Fear of seeking care due to social stigma and legal ramifications are common barriers to prenatal care for pregnant women with substance use disorders.<sup>7</sup> Laws punishing prenatal substance use are often disproportionately applied, such that low income Black women who live in Southern states are more likely to be reported by hospital staff, subjected to drug testing, charged with a felony, and arrested.<sup>8</sup> Research has begun to explore the impacts of punitive prenatal substance use laws on infant outcomes.<sup>9</sup> For instance, one study found that enactment of punitive policies across eight states was associated with greater rates of neonatal abstinence syndrome (NAS), caused when an infant withdraws from certain drugs after prenatal exposure.<sup>10</sup>

To our knowledge, no studies have examined the impact of state-level policies regarding substance use during pregnancy on maternal mortality across all 50 states. This study utilizes a legal epidemiological approach, which is an emerging area of literature that provides a method to study the effects of laws on health-related outcomes.<sup>11</sup> This study examined the impact of state-level policies on rates of maternal mortality, including: (a) whether substance use during pregnancy is considered child abuse; (b) whether substance use during pregnancy requires mandated testing; (c) whether suspected substance use dur-

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Table 1

**State laws on substance use during pregnancy in 2018.**

Type of Law	States with Law
Maternal Substance Use as Child Abuse Laws	AL, AZ, AR, CO, FL, HI, ID, IL, IN, IA, KY, LA, MN, MS, MO, NV, ND, NH, NM, OH, RI, SC, SD, TX, UT, VA, VT, WA, WI, WY
Suspected Maternal Substance Use Requires Mandated Reporting Laws	AK, AZ, AR, CA, IL, IA, KY, LA, ME, MA, MI, MN, MT, NV, NH, NJ, ND, OH, OK, PA, RI, SD, VT, VA, WI
Suspected Maternal Substance Use Requires Mandated Testing Laws	IN, IA, KY, LA, MN, ND, RI, SD
Civil Commitment Laws	MN, SD, WI

Table 2

**All sources of data included in regression models.**

Data Source
Guttmacher Institute state-level coding of whether states require mandated testing when pregnant women are suspected of using substances in 2018
United Health Foundation’s state-level data on maternal mortality rates per 100,000 live births in the United States in 2018
Healthcare Cost and Utilization Project data on state-level rates of Neonatal Abstinence Syndrome (NAS) among newborn hospitalizations in 2018
Centers for Disease Control and Prevention data on state-level rates of prenatal care in the first trimester in 2018
U.S. Census state-level estimates of race, poverty levels, percent of state that is rural, and health insurance rates from 2010 to 2019
U.S. Bureau of Labor Statistics state-level rates of unemployment in 2018
National Academy for State Health Policy’s coding of whether states have expanded Medicaid
National Child Abuse and Neglect Data System’s data on infants born with exposure to substances in 2018
National Survey on Drug Use and Health (NSDUH) data on substance use during pregnancy in 2018

ing pregnancy requires mandated reporting; and (d) whether substance use during pregnancy is grounds for civil commitment (see Table 1 for a complete list). We hypothesized that states that enacted each of these punitive laws would demonstrate higher rates of maternal mortality while controlling for correlates that have been shown in prior research to increase risk of maternal mortality, including: race, poverty, and rates of neonatal abstinence syndrome, prenatal care utilization, substance use in pregnant women, and health insurance.

**Methods**

*Procedure*

Publicly available state-level data from 2018 were combined from several sources including: (1) the Guttmacher Institute state-level coding prenatal substance use laws;<sup>6</sup> (2) United Health Foundation’s data on rates

of maternal mortality;<sup>12</sup> (3) Healthcare Cost and Utilization Project data on rates of NAS among newborn hospitalizations;<sup>13</sup> (4) Centers for Disease Control and Prevention data on rates of prenatal care in the first trimester;<sup>14</sup> (5) U.S. Census estimates of race, poverty levels, and health insurance (2010 to 2019);<sup>15</sup> and (6) the National Survey on Drug Use and Health data on estimates of substance use during pregnancy.<sup>16</sup> Data from all 50 states were included in analyses. See Table 2 for a complete list of population characteristics.

*Data Analysis*

Bivariate correlations were examined for all variables (Table 3). Four separate hierarchical multiple regression models were built to examine the impact of each type of state-level law on maternal mortality. A backward stepwise approach was utilized to select salient correlate variables while reducing the likelihood of

Table 3  
**Correlation Matrix for All Variables.**

Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1. Maternal Mortality	—														
2. Infant Mortality	.332*	—													
3. % of Population Identifying as Black	.383**	.533***	—												
4. % of Population with Health Insurance	.009	.214	.125	—											
5. % Below Poverty Line	.333*	.618***	.436**	-.562***	—										
6. % of Neonatal/Abstinence Syndrome	-.206	.097	-.115	.468***	.124	—									
7. % Prenatal Care in First Trimester	-.460***	.464***	-.370**	-.111	-.496***	.198	—								
8. % Pregnant Women who used Illicit Drugs, Tobacco, or Alcohol in Past Month	.077	.272	.052	.288*	.135	.244	-.054	—							
9. % of State that is Rural	.145	.387**	-.033	.210	.263	.386**	.094	.079	—						
10. % Infants Born with Substance Exposure	.121	.182	.196	.138	.261	.014	.153	-.183	-.018	—					
11. Unemployment Rates	.039	.218	.287*	.515***	.589***	.239	-.323*	.087	-.131	.100	—				
12. Mandated Testing Laws	.229	.011	-.077	.013	.006	-.079	.092	.054	.152	.339	-.166	—			
13. Child Abuse Laws	.139	-.073	-.073	-.082	.093	-.249	-.149	-.171	.063	.156	-.220	.356*	—		
14. Civil Commitment Laws	-.054	-.036	-.152	-.165	-.222	-.148	.140	-.065	.120	.201	-.250	.349*	.206	—	
15. Mandated Reporting Laws	-.111	-.124	-.231	.124	-.137	-.007	.245	.200	.137	.291	.005	.327*	.082	.253	—

\*\*\* p < .001, \*\*p < .01, \* p < .05, N = 50.

overfitting with variables that did not contribute to the variance in maternal mortality. The backwards stepwise regression began with a full, saturated model that included all potential population correlates informed by extant literature. Correlates that contributed the least amount of variance were removed one-by-one until a parsimonious model that predicted maternal mortality from population correlates was detected. In the second step of each model, the state-level policy was included.

### Results

The percent of population that identified as Black, percent of population below the federal poverty line, and percent of women receiving prenatal care in the first trimester were significant predictors of maternal mortality, while the percent of infants with NAS and percent of pregnant women who used illicit drugs,

maternal mortality after controlling for state-level population correlates, including race, poverty, NAS, prenatal care, and prenatal substance use. The model accounted for 35.6% of the variance in mortality. The results of this study add to prior work demonstrating that enactment of punitive policies were associated with worsened infant outcome (NAS).<sup>17</sup>

Substance use during pregnancy may increase the odds of receiving inadequate prenatal care, which increases maternal mortality.<sup>18</sup> It is possible that women may avoid prenatal care based on fear of legal consequences, including fear of child protective service involvement or criminal charges. In our mandated testing model, lack of prenatal care was related to higher maternal mortality. This provides preliminary support that reduced rates of prenatal care may be related to greater maternal mortality in light of punitive practices related to substance use. Future

**The percent of population that identified as Black, percent of population below the federal poverty line, and percent of women receiving prenatal care in the first trimester were significant predictors of maternal mortality, while the percent of infants with NAS and percent of pregnant women who used illicit drugs, tobacco, or alcohol in the past month were not significant predictors of maternal mortality.**

tobacco, or alcohol in the past month were not significant predictors of maternal mortality (Table 3).

The backwards stepwise approach resulted in a final regression model which controlled for state-level percent of population that identifies as Black, percent of the population that falls below the poverty line, percent of infants with NAS, percent of women receiving prenatal care in the first trimester, and percent of pregnant women who used illicit drugs, tobacco, or alcohol in the past month. In the first step of the model (excluding state-level policy), no correlates significantly predicted rates of maternal mortality. In the second step of the model, the presence of mandated testing laws significantly predicted higher rates of maternal mortality; additionally, the percent of women receiving prenatal care in the first trimester was a significant predictor of maternal mortality (Table 4). The remaining three types of laws were not significant in separate models controlling for population correlates.

### Discussion

Results revealed that the presence of mandated testing laws significantly predicted increased rates of

research utilizing medical records or Medicaid data could further examine this potential mechanism.

Findings provide preliminary support for the relationships between mandated testing laws, reduced rates of prenatal care, and increased rates of maternal mortality. Healthcare providers should be cognizant of these relationships and enact practices that bolster prenatal care utilization among pregnant women who use substances. Specifically, a multidisciplinary approach, in which clients are referred to providers with expertise in maternal substance use and treatment, has the potential to reduce risk for maternal mortality. Clinicians should engage in collaborative therapeutic discussions with clients to enhance health equity. Still, state-level policy reform, focused on best practices for treatment rather than legal consequences, could potentially reduce maternal mortality.

It is also important to note that race, specifically the percentage of the population that identifies as Black, was positively related to maternal mortality (as has been found in prior work<sup>19</sup>); however, in our final regression model, race was not a significant predictor, suggesting that there is shared variance between race

Table 4

**Regression analysis examining the impact of mandated testing laws on maternal mortality.**

Predictors	B	R <sup>2</sup>
Step 1:		
Percent of Population Identifying as Black	20.076	.288**
Percent of Women Receiving Prenatal Care First Trimester	-.581	
Percent Below Poverty Line	.341	
Percent of Infants with Neonatal Abstinence Syndrome	-.168	
Percent of Pregnant Women who used Illicit Drugs, Tobacco, or Alcohol in the Past Month	.085	
Step 2:		
Percent of Population Identifying as Black	22.694	.356**
Percent of Women Receiving Prenatal Care First Trimester	-.664*	
Percent Below Poverty Line	.221	
Percent of Infants with Neonatal Abstinence Syndrome	-.122	
Percent of Pregnant Women who Used Illicit Drugs, Tobacco, or Alcohol in the Past Month	.058	
Mandated Testing Laws	6.660*	

\*\*  $p < .01$ , \*  $p < .05$ ,  $N = 50$ .

and other correlate and legal variables in the model (i.e., mandated testing laws, poverty, NAS, prenatal care, and prenatal substance use). Bivariate correlations revealed that states with a higher proportion of Black residents tended to have lower levels of prenatal care utilization and higher rates of unemployment and poverty. This finding likely represents structural racism, such that Black people may experience disparities with regards to healthcare access in these states.<sup>20</sup> This is consistent with research demonstrating that Black women are more likely to experience negative pregnancy-related health outcomes and healthcare discrimination, including increased pregnancy-related deaths, discrimination during prenatal care, and decreased access to healthcare.<sup>21</sup> Future research should expand on work examining inequitable implementation of these laws among racial minorities.<sup>22</sup>

The study is not without limitations. First, analyses were conducted with state-level data from several publicly available federal and state datasets. Thus, the results examined trends at the population level rather than the impact of policies at the individual level. Future work in this area should utilize diverse methodology to examine individualized experiences with policies, healthcare, and legal systems to better understand the impact of stigma or legal consequences. Second, the cross-sectional nature of this study does

not allow for causal inference or trends over time. Further research can utilize a longitudinal approach to examine how maternal mortality is impacted by changes in policy. Third, there are inconsistencies in how local jurisdictions document substance use during pregnancy and file petitions for court interventions and child removal.<sup>23</sup> Thus, research accounting for nuances in policy enforcement across states could complement the present findings.

This study is the first known to utilize a legal epidemiological approach to examine the impact of state-level policies punitive of substance use during pregnancy with maternal mortality across all states. Results provide preliminary support for the relationship between mandated testing laws, reduced rates of prenatal care, and increased rates of maternal mortality.

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