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Associations between state-level policies regarding alcohol use among pregnant women, adverse birth outcomes, and prenatal care utilization: Results from 1972–2013 Vital Statistics

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Abstract

Background—Policies regarding alcohol use during pregnancy continue to be enacted and debated in the United States. However, no study to date has examined whether these policies are related to birth outcomes, the outcomes they ultimately aim to improve. Here we assessed whether state-level policies targeting alcohol use during pregnancy are related to birth outcomes, which has not been done comprehensively before.

Methods—Secondary analyses of birth certificate data from N=148,048,208 United States singleton births between 1972–2013. Exposures were indicators of whether the following eight policies were in effect during gestation: Mandatory Warning Signs (MWS), Priority Treatment for Pregnant Women, Priority Treatment for Pregnant Women/Women with Children, Reporting Requirements for Data and Treatment Purposes, Prohibitions on Criminal Prosecution, Civil Commitment, Reporting Requirements for Child Protective Services Purposes, and Child Abuse/Child Neglect. Outcomes were low birthweight (< 2500 g), premature birth (< 37 weeks), any prenatal care utilization (PCU), late PCU, inadequate PCU, and normal (≥ 7) APGAR score. Multivariable fixed effect logistic regressions controlling for both maternal- and state-level covariates were used for statistical analyses.

Results—Of the eight policies, six were significantly related to worse outcomes and two were not significantly related to any outcomes. The policy requiring MWS was related to the most outcomes: specifically, living in a state with MWS was related to 7% higher odds of low birthweight ($P < 0.001$); 4% higher odds of premature birth ($P < 0.004$); 18% lower odds of any

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PCU ($P < 0.001$); 12% higher odds of late PCU ($P < 0.002$); and 10% lower odds of a normal APGAR score ($P < 0.001$) compared to living in a state without MWS.

Conclusions—Most policies targeting alcohol use during pregnancy do not have their intended effects and are related to worse birth outcomes and less prenatal care utilization.

Keywords

alcohol; pregnancy; policy; birth outcomes; Vital Statistics

INTRODUCTION

Alcohol is a known teratogen that causes fetal alcohol syndrome and fetal alcohol spectrum disorders, as well as a range of other harms to fetuses (May et al., 2008; Russell and Skinner, 1988; Sokol et al., 2003; Strandberg-Larsen et al., 2009). Alcohol use during pregnancy is common, with approximately 21% of pregnant women reporting any alcohol use and approximately 3% reporting binge drinking in the United States (Lange et al., 2017). Since 1974, almost all states have enacted policies targeting alcohol use during pregnancy (Roberts et al., 2017a). These include both supportive (e.g., mandating priority access to substance use disorder treatment for pregnant women who misuse alcohol) and punitive (e.g., defining alcohol use during pregnancy as child abuse/neglect) policies. In 2016, Priority Treatment for Pregnant Women and Women with Children was the least common policy and Reporting for Treatment and Data Purposes and Mandatory Warning Signs were the most common. States continue to change their alcohol and pregnancy policies each year (National Institute on Alcohol Abuse and Alcoholism, 2016).

Despite the proliferation of these state-level policies, few studies have assessed what impact, if any, they have (Hankin et al., 1993). While the purpose of these policies is typically unstated, it is reasonable to assume that a primary intended purpose is to reduce alcohol use during pregnancy and thereby improve birth outcomes and longer-term child well-being. For example, a recent study examining the effects of state-level policies that mandate posting of warning signs about harms due to drinking during pregnancy in locations that sell alcohol (Mandatory Warning Signs or MWS policies) finds some support for this assumption. Specifically, this study used data from a variety of sources from 1989–2006 for selected states and found that MWS policies may be associated with less alcohol use during pregnancy, and are associated with fewer very low birthweight and very preterm births (Cil, 2017). However, to our knowledge, this is the only study to have documented a positive effect of a state-level policy targeting alcohol use during pregnancy. Another recent study found that shorter waiting time for substance use disorder treatment is associated with treatment completion for pregnant women (Albrecht et al., 2011), which implies that priority treatment could increase the number of pregnant women in need of treatment that actually receive and complete treatment; this could improve birth outcomes, though this has not yet been studied.

Other research suggests that state-level policies targeting alcohol use during pregnancy might not have the intended effects, and might actually have unintended consequences. A qualitative study about barriers to prenatal care for pregnant women who used alcohol and

drugs found that women who use drugs during pregnancy avoided prenatal care both out of fear that they would discover that their use had already irreversibly damaged their baby, and out of fear that their providers would report them to Child Protective Services (CPS) and they would lose their children or go to jail (Roberts and Pies, 2011). While the women in the qualitative study explicitly described these experiences related to drug and not alcohol use, it is plausible that they apply to alcohol as well. Thus, policies that require informing women that their substance use may have already harmed their fetus, such as MWS policies, could lead women to avoid prenatal care. Policies that mandate reporting to CPS, that define alcohol use during pregnancy as child abuse/neglect, or that allow civil commitment for alcohol use during pregnancy could also lead women to avoid prenatal care. A positive association between prenatal care utilization and birth outcomes has been documented (Alexander and Kotelchuck, 2001), and if pregnant women who drink alcohol avoid prenatal care, prenatal care providers miss opportunities to provide other health promoting interventions that 1) support women to reduce or stop drinking, 2) provide other important components of prenatal care, such as monitoring for pre-eclampsia, and 3) link them to other supportive services. Punitive policies that lead pregnant women who drink to avoid prenatal care could thus increase the chances of adverse birth outcomes.

In addition, policy contexts that allow criminal justice prosecutions or require CPS reporting could also influence effectiveness of alcohol-related interventions such as screening and brief interventions, which are widely recommended for pregnant women, including at-risk drinkers (ACOG, 2011; Roberts and Nuru-Jeter, 2010; USPSTF, 2004). Screening in an environment where being reported to CPS is a possible outcome from disclosing substance use may make women less likely to disclose use to providers and thus less likely to get support and services to help them reduce their use (Roberts and Nuru-Jeter, 2010).

To date, however, there has been no comprehensive research examining whether and how either supportive or punitive state-level policies targeting alcohol use during pregnancy are associated with birth outcomes and prenatal care utilization. Research on this topic is crucial because 1) policies continue to be debated and enacted in individual states (Roberts et al., 2017b), 2) the federal government is now incorporating them in federal legislation (Futures, 2012), and 3) some of these laws are being challenged in state court (Anderson, 2017a). In addition, findings from research examining the effects of policies targeting alcohol use during pregnancy can help inform how state policymakers respond to opioid and cannabis use during pregnancy, which are timely given the opioid crisis and legalization of both recreational and medical cannabis in several states.

This study combines state- and individual-level data to examine associations between state-level policies targeting alcohol use during pregnancy and birth outcomes across 50 states over 42 years. We hypothesize that each supportive policy will be associated with decreased negative birth outcomes (*i.e., low birthweight, preterm birth, APGAR score < 7*) and each punitive policy will be associated with increased negative birth outcomes. We also hypothesize that each individual punitive policy will be associated with decreased prenatal care utilization, while prohibitions against criminal prosecution (a supportive policy) will be associated with increased prenatal care. We do not expect to see associations between mandatory warning signs and prenatal care or between priority treatment and prenatal care

because we do not foresee them contributing to an environment of trust or mistrust between women and providers. If there are associations, we expect associations with increased prenatal care because they may lead women to be more motivated to seek information from providers or more able to get treatment and thus have more support to engage in prenatal care.

MATERIALS AND METHODS

Data sources

Data come from the 1972–2013 United States National Center for Health Statistics (NCHS) Vital Statistics System birth certificates (N = 148,048,208 live singleton births) in conjunction with alcohol and pregnancy policy data obtained from NIAAA's Alcohol Policy Information System (APIS http://alcoholpolicy.niaaa.nih.gov/) and original legal research. From 1972–1984, Vital Statistics records include 50–100% of the births in each state; from 1985–2013, records include 100% of births for all states. Birthweight and gestational age in weeks have been recorded for the entire time period. APGAR scores have been recorded in all states since 1978. Prenatal care utilization has been recorded in 43 states from 1972–1979, and in all states since 1980. In both 1989 and 2003, NCHS revised and updated information collected on birth certificates; these changes were phased across states over several years.

We used Vital Statistics data for all births during the study time period, excluding multiple births as babies born in multiples are known to be at higher risk for adverse birth outcomes such as low birthweight (Powers and Kiely, 1994).

Outcomes

Primary outcomes were low birthweight (< 2500g) and premature birth (< 37 weeks). Secondary outcomes were any prenatal care utilization, late prenatal care utilization (after first trimester), inadequate prenatal care (based on the Kotelchuck index, (Kotelchuck, 1994)), and an APGAR score ≥ 7. All outcome data came from birth certificates. We also took steps to address changes in data collection over time. For example, prior to 1980, NCHS did not impute continuous gestational age when the last menstrual period day was unavailable. After 1980, NCHS began imputing gestational age when the last menstrual period day was unavailable. We applied this imputation method to1972–1980 data to be able to have more complete data to construct the adequacy of prenatal care variable (National Center for Health Statistics et al.). Analyses of APGAR scores were for the years 1978–2013 because APGAR scores were not reported on birth certificates prior. Cases missing outcome data were typically dropped from analyses.

Alcohol & pregnancy policy variables

The main exposure variables were time-varying state-level indicators regarding whether states had particular policies in the month and year of conception. These policies were: Mandatory Warning signs, Priority Treatment for Pregnant Women, Priority Treatment for Pregnant Women and Women with Children, Reporting Requirements for Data and Treatment Purposes, Prohibitions on Criminal Prosecution, Civil Commitment, Reporting

Requirements for Child Protective Services (CPS) Purposes, and Child Abuse/Child Neglect. These policies have been detailed elsewhere (Roberts et al., 2017b) and are briefly described in Table 1. The first policies, Reporting Requirements for CPS and Child Abuse/Child Neglect, went into effect in Massachusetts in 1974. Next, Washington DC adopted Mandatory Warning Signs in 1985 and Kansas adopted Reporting Requirements for Data and Treatment Purposes in 1986. In 1989, California established Priority Treatment for Pregnant Women, and both Florida and Washington established Priority Treatment for Pregnant Women and Women with Children. Kentucky, Missouri, and Virginia put Prohibitions on Criminal Prosecution into effect in 1992. South Dakota and Wisconsin established Civil Commitment in 1998. All policies were still in effect in at least four states in 2013.

Each policy indicator variable is dichotomous, coded as 0 if it was not in effect for that state in the month/year of conception and 1 if it was in effect for the month/year of conception. Linking the policy indicators to the month and year of conception improves the accuracy of exposure timing (Hawkins et al., 2014).

Control variables

Models controlled for both individual-level maternal characteristics and for state-level characteristics and policies in effect during the pregnancy. Individual-level maternal characteristics included maternal age, race, marital status, education, nativity, and parity. If data for individual-level controls were missing, we created a missing category to include all available data. Version of birth certificate was also included as an indicator variable. State-level controls included state- and year- specific poverty, unemployment, per capita cigarette consumption, and per capita total ethanol consumption, as well as indicators for whether government control of wine sales and government control of spirit sales were in effect for that state in that year. Data for state-level controls came from secondary sources, including the U.S. Census, the U.S. Centers for Disease Control and Prevention, APIS, the National Highway Traffic Safety Administration, National Beverage Control Association, and published research (Kerr et al., 2015). State-level per capita cigarette consumption and per capital alcohol consumption were included because these variables could not be controlled at the individual-level due to lack of data documented on birth certificates in the earlier years and concerns with the quality of these data in the later years (Northam and Knapp, 2006).

Statistical analyses

Multivariable logistic regression was used for all outcomes. Regression models included all policy indicators simultaneously, fixed effects for state and year, state-specific cubic time trends, and adjusted for both individual and state-level control variables. Regression models also accounted for clustering of standard errors according to mother’s state of residence. Taking the most conservative approach, analyses included year fixed effects and birth certificate version indicator variables to account for changes in Vital Statistics data gathering over time as well as other relevant events in those states and years. State-specific cubic time trends were added to address possible concerns with endogeneity. All analyses were performed in Stata v14.2.

Sensitivity analyses

We performed a number of sensitivity analyses *post hoc.* First, we assessed each policy individually in multivariable regression models and found no differences compared to models including all policies simultaneously. Second, because information regarding Hispanic ethnicity was not available until 1989, we analyzed data for births for 1989–2013 separately using a combined race/ethnicity variable; results did not change. Finally, we fit both the preliminary and final models using a 10% sample of the full dataset, and compared these results to those from the full dataset; results did not differ between the 10% sample and full datasets.

RESULTS

Table 2 shows multivariable regression results. Mandatory Warning Signs (MWS), legal significance for Child Abuse/Child Neglect (CACN), Civil Commitment (CC), Prohibitions on criminal prosecution (PCP), and Reporting Requirements for Data and Treatment Purposes (RRDATA) were all significantly associated with poorer outcomes, while priority treatment for pregnant women (PTPREG) was related to both better and worse outcomes. Reporting requirements for CPS and Priority Treatment for Pregnant Women and Women with Children were not significantly related to any outcomes.

Compared to living in a state without MWS, living in a state with MWS was related to 1.07 times the odds of low birthweight ($P < 0.001$); 1.05 times the odds of premature birth ($P < 0.005$); 0.82 times the odds of any PCU ($P < 0.001$); 1.12 times the odds of late PCU ($P < 0.002$); and 0.90 times the odds of a normal (≥ 7) APGAR score ($P < 0.001$). Compared to living in a state without CACN, living in a state with CACN was related to 1.06 times the odds of low birthweight ($P < 0.003$); 1.09 times the odds of premature birth ($P < 0.001$); 0.87 times the odds of any PCU ($P < 0.046$); and 0.90 times the odds of a normal (≥ 7) APGAR score ($P <0.005$). Compared to living in a state without CC, living in a state with CC was related to 1.12 times the odds of late PCU ($P < 0.043$). Compared to living in a state without PCP, living in a state with PCP was related to 1.08 times the odds of low birthweight ($P < 0.028$) and1.11 times the odds of premature birth ($P < 0.001$). Compared to living in a state without RRDATA, living in a state with RRDATA was related to 1.06 times the odds of premature birth ($P < 0.009$). Compared to living in a state without PTPREG, living in a state with PTPREG was related to 1.09 times the odds of low birthweight ($P < 0.001$); 1.07 times the odds of premature birth ($P < 0.002$); but 0.66 times the odds of inadequate PCU ($P < 0.012$).

In terms of co-varying state-level policies related to alcohol consumption, living in a state with government controlled wine retail was related to 0.87 times the odds of low birthweight ($P < 0.001$); 0.89 times the odds of premature birth ($P < 0.035$); and 1.66 times the odds of any PCU ($P < 0.001$) compared to living in a state with privatized wine retail. Government control of spirits sales was not significantly related to any outcome. Finally, an increase in consumption by one liter of ethanol per person per year was related to 1.02 times the odds of low birthweight ($P < 0.024$) and 1.04 times the odds of premature birth ($P < 0.001$).

DISCUSSION

This is the first study to comprehensively assess whether state-level policies targeting alcohol use in pregnancy are related to adverse birth outcomes, outcomes that indicate measurable harms due to alcohol use during pregnancy. We find that most policies targeting alcohol use during pregnancy – MWS, CACN, CC, PCP, RRDATA, and PTPREG – appear associated with increased adverse birth outcomes, possibly due to some of these policies (MWS, CACN, CC) leading women to avoid prenatal care. In addition, it appears that generally applicable alcohol policies – specifically retail control of wine sales and any other policies that lead to decreased population-level consumption – are associated with improved birth outcomes. Although the magnitudes of effects are generally small, they are still meaningful in such a large population.

Overall, these findings do support our hypotheses that policies punishing alcohol use during pregnancy are associated with increased adverse birth outcomes and may lead to avoidance of prenatal care. They do not, however, support our hypothesis that the more supportive policies – including Mandatory Warning Signs – are associated with decreased adverse birth outcomes. They also are inconsistent with our expectation that supportive policies would be unlikely to be associated with prenatal care utilization.

With a few exceptions (Oaks, 2001), scholars have consistently distinguished policies targeting substance use during pregnancy as either supportive or punitive; our study findings do not support this distinction. Rather, our findings suggest that state-level policies targeting alcohol use during pregnancy at best do not improve birth outcomes and, at worst, lead to increases in adverse birth outcomes and lead women to avoid prenatal care.

This pattern of findings is not completely surprising for three key reasons. First, qualitative research has found that information that leads women to worry that their substance use has already irreversibly harmed their fetus leads women to avoid prenatal care (Roberts and Pies, 2011). Similarly, our findings suggest that rather than providing women with information that helps them change their behavior and engage with health care services that may support such behavior change, MWS may operate by scaring women and leading women to avoid such help. Second, this same previous qualitative research has found that policies related to CPS and child removal lead women to avoid prenatal care. Our findings related to CACN policies are consistent with this previous research, and extend prior findings by indicating that this avoidance of prenatal care may be linked to worse birth outcomes. This is crucial, as ongoing research on alcohol outcomes has found some associations between states with CACN and less alcohol use during pregnancy (Roberts et al., 2017a). The current analyses show that even though defining alcohol use during pregnancy as child abuse/neglect is associated with decreases in self-reports of binge and heavy alcohol during pregnancy, this does not translate to better birth outcomes. Third, and perhaps most vitally, previous research indicates that policymaking related to alcohol use during pregnancy appears more related to policymaking in the area of reproductive rights than to policymaking that reduces public health harms from alcohol use in the population overall (Roberts et al., 2017b). This means that the problem of alcohol use during pregnancy likely has not benefited from the same public health policy development process used to address public health harms from

alcohol use in the general population. The current results show that reduced population-level alcohol consumption and government control over wine retail sales are associated with improved birth outcomes, which is in line with previous studies (e.g.(Zhang and Caine, 2011)); therefore policymakers and public health professionals who wish to improve birth outcomes through state-level policies targeting substance use should look to the broader alcohol policy field for lessons and approaches, rather than continuing with the types of policies currently in effect.

We do note that some of the patterns of findings are more difficult to understand. For example, the policy that mandates priority treatment for pregnant women was related to lower odds of inadequate PCU, but higher odds of low birthweight, premature birth, and late PCU. These mixed findings could be because the policy indicator does not capture actual treatment availability. States prioritizing treatment for pregnant women might have fewer treatment slots than states without such laws, meaning our finding could be just an indication of lack of treatment availability; future research should examine this. Laws giving pregnant women priority could also prevent women from getting treatment prior to becoming pregnant, especially in states with limited treatment availability. Similarly, laws giving pregnant women priority might prevent other people - including partners of women who become pregnant - from getting treatment, leading to adverse birth outcomes due to harms from others' drinking.

Our findings are inconsistent with the only other published study that examined associations between MWS and adverse birth outcomes across both states and time. In that study, MWS were associated with decreased odds of very low birthweight (< 1500g) and very preterm birth (< 32 weeks) (Cil, 2017). This discrepancy could be because the previous study 1) only examined MWS without accounting for other policies; 2) used data only for the years 1989–2006; 3) examined different outcomes; 4) only used a subset of states; 5) did not link policy data to individual outcomes based on the month of conception; 6) controlled for state-level policies alcohol and tobacco policies and not actual per capita consumption; and/or 7) controlled for individual-level alcohol use data from birth certificates, which are of poor quality (Northam and Knapp, 2006) and which could be more likely to be assessed and documented in cases of adverse birth outcomes. Notably, our *post hoc* sensitivity analyses of race/ethnicity only utilized the years 1989–2013, indicating that the discrepancies between our findings and Cil's probably are not due to the different timeframes.

Strengths and Limitations

This is the first study to examine all policies related to alcohol use in pregnancy simultaneously across all 50 states using a timeframe long enough to capture the period before any laws were enacted (1972–2013). Furthermore, for most of the timeframe (1985–2013) the data include the entire population of singleton births born in the United States and for the years 1972–1984 include a 50% sample, which makes questions regarding inference and generalizability essentially irrelevant. Another major advantage of these data over, for example, survey data regarding alcohol use during pregnancy, is that biases due to self-report are not present here. Finally, our results were robust across various model specifications, further strengthening our conclusions.

The main limitation of this study is that Vital Statistics birth certificate data are not collected for research purposes; therefore, we cannot adjust for maternal-level alcohol or tobacco use. Although maternal alcohol and tobacco use have been recorded on birth certificates since 1989, these data have been shown to be invalid (Northam and Knapp, 2006) We adjusted for state-level alcohol and tobacco consumption instead. Another limitation is that race has been measured inconsistently on birth certificate data over time. Only in 1989 did states begin to document ethnicity as well as race, although this was phased in over the 1990s. Our primary analyses did not account for ethnicity, e.g. White Hispanic and White Non-Hispanic women are in a single group. Such an approach is reasonable because birth outcomes are similar between White non-Hispanic and (all) Hispanic births, both of which differ from Black birth outcomes.(CDC and HRSA, 2000; Martin, 2011) Measurement of key outcome variables – particularly gestational age – changed over time as well. We applied approaches developed later (National Center for Health Statistics et al.) to correct for implausible gestational age values to earlier years of Vital Statistics to improve consistency. Also, for these analyses, we focused specifically on policies targeting alcohol use during pregnancy. Preliminary examinations of these policies suggest that many of them may also address drug use. Future research is needed to explore whether the findings generalize to policies targeting drug use during pregnancy.

Conclusion

We find that most policies aimed at reducing drinking during pregnancy, whether considered supportive or punitive, at best are not associated with birth outcomes and, at worst, are associated with less prenatal care and more adverse birth outcomes. Population-level policies regarding alcohol, on the other hand, appear protective and thus more promising avenues for improving birth outcomes.

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Table 1

State-level policies regarding alcohol use among pregnant women

Policy	Policy description
Mandatory warning signs (MWS)	Notices must be posted in locations where alcoholic beverages are sold, as well as healthcare facilities where pregnant women receive treatment. Policy provisions specify the specific language required on the signs where signs must appear, who must post warning signs, and the specific language.
Priority treatment (PTPREG) (PTPREGWC)	Makes access to substance abuse treatment for pregnant and postpartum women who abuse alcohol priority; in some states this includes women with children.
Prohibitions against criminal prosecution (PCP)	Prohibits use of the results of medical tests, such as prenatal toxicology tests, as evidence in the criminal prosecutions of women who may have caused harm to a fetus or a child.
Reporting requirements (RRCPS) (RRDATA)	Either mandated or discretionary reporting of suspicion of or evidence of alcohol use or abuse by women during pregnancy to either Child Protective Services or health authority. Evidence may consist of screening and/or toxicological testing of pregnant women or toxicological testing of babies after birth and reporting may be either for child abuse/neglect investigation, provision of health services or for data gathering purposes.
Child abuse/child neglect (CACN)	This topic addresses the legal significance of a woman's conduct prior to birth of a child and of damage caused in utero and, in some cases, define alcohol use during pregnancy as child abuse or neglect.
Civil commitment (CC)	Mandatory involuntary commitment of a pregnant woman to either treatment or protective custody of the state for the protection of a fetus from exposure to alcohol.

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Table 2

State-level policies regressed on birth outcomes from 1972–2013 Vital Statistics birth certificate data (N = 148,048,208 singleton births)

	Odds of LBW		Odds of Premature		Odds of Any PCU		Odds of Late PCU		Odds of Inadequate PCU		Odds of 7+ APGAR	
State-level covariates	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**	**OR**	**95% CI**
Mandatory Warning Signs (MWS)	**1.07**	**1.03, 1.10**	**1.05**	**1.01, 1.08**	**0.82**	**0.74, 0.91**	**1.12**	**1.04, 1.19**	1.00	0.81, 1.23	**0.90**	**0.86, 0.94**
Child Abuse and Neglect (CACN)	**1.06**	**1.02, 1.10**	**1.09**	**1.04, 1.14**	**0.87**	**0.76, 1.00**	0.96	0.91, 1.02	0.85	0.64, 1.14	**0.90**	**0.83, 0.97**
Civil Commitment (CC)	1.02	0.91, 1.15	1.00	0.88, 1.13	0.90	0.56, 1.45	**1.12**	**1.00, 1.25**	1.04	0.65, 1.67	1.09	0.90, 1.33
Prohibitions on Criminal Prosecution (PCP)	**1.08**	**1.01, 1.15**	**1.11**	**1.04, 1.17**	0.91	0.77, 1.09	0.96	0.88, 1.06	0.89	0.75, 1.06	0.95	0.85, 1.07
Reporting Requirements for CPS (RRCPS)	1.00	0.95, 1.04	0.96	0.91, 1.02	0.95	0.69, 1.32	1.04	0.94, 1.15	1.24	0.91, 1.69	1.05	0.94, 1.17
Reporting Requirements for Data and Treatment (RRDATA)	1.04	1.00, 1.08	**1.06**	**1.01, 1.10**	0.97	0.74, 1.27	1.00	0.91, 1.10	0.86	0.68, 1.09	0.94	0.87, 1.01
Priority treatment for pregnant women (PTPREG)	**1.09**	**1.05, 1.13**	**1.07**	**1.02, 1.11**	0.91	0.75, 1.09	1.13	1.00, 1.27	**0.66**	**0.48, 0.91**	0.92	0.79, 1.07
Priority treatment for pregnant women & women with children (PTPREGWC)	1.03	0.98, 1.08	1.05	1.00, 1.10	1.02	0.83, 1.24	0.93	0.84, 1.04	1.01	0.91, 1.12	0.94	0.84, 1.05
Wine Retail Control	**0.87**	**0.83, 0.91**	**0.87**	**0.80, 0.99**	**1.66**	**1.22, 2.26**	0.98	0.91, 1.08	0.90	0.71, 1.14	1.06	0.98, 1.14
Spirits Retail Control	0.91	0.82, 1.01	0.94	0.84, 1.01	0.90	0.75, 1.08	1.02	0.93, 1.12	0.95	0.74, 1.22	1.10	0.96, 1.25
Per Capita Alcohol Consumption[a]	**1.02**	**1.00, 1.05**	**1.03**	**1.01, 1.06**	1.04	0.97, 1.13	0.98	0.94, 1.01	0.96	0.83, 1.10	0.97	0.93, 1.00
% Poverty	1.01	1.00, 1.02	1.01	1.00, 1.02	1.03	1.00, 1.05	1.00	0.98, 1.02	0.97	0.91, 1.03	0.97	0.96, 0.99
% Unemployment	1.00	1.00, 1.00	1.00	1.00, 1.01	1.00	1.00, 1.00	1.00	1.00, 1.00	1.00	1.00, 1.00	1.00	0.99, 1.01
Per Capita Cigarette Consumption[b]	0.99	0.99, 0.99	0.99	0.99, 0.99	1.01	1.00, 1.02	1.00	1.00, 1.00	1.00	0.99, 1.00	1.01	1.01, 1.02

Bold indicates $P<0.05$

All models include all policy indicators simultaneously and control for:

1. maternal age, race, marital status, education, nativity, parity, state of residence, version of birth certificate
2. fixed effects for state and year, state-specific cubic time trends

[a] Average annual liters ethanol/person

[b] Average annual number of cigarettes/person