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Legal approaches to advancing population health

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***Evaluating the Effect of Local Smoking Restrictions on
Birth Outcomes and Prenatal Smoking***

ABSTRACT

BACKGROUND: Smoking during pregnancy is a known risk factor for adverse birth outcomes, including low birthweight (LBW) (<2500g) and preterm births (<37 weeks gestation). Growing evidence indicates that exposure to secondhand smoke (SHS) during pregnancy is also associated with an increased risk of LBW and possibly preterm births. Population-based smoking restrictions can potentially reduce prenatal exposure to SHS and decrease active smoking among pregnant women. In recent years, municipalities, counties, and states across the U.S. have enacted smoke-free legislation. West Virginia (WV) has no statewide smoking ban; rather, local Boards of Health set forth county-level smoking restrictions.

REVIEW OF THE LITERATURE: Research analyzing the impact of comprehensive smoking bans on birth outcomes has generally found positive effects on gestational age, though not all studies agree. The research is also mixed regarding the impact of bans on birth weight, LBW, and prenatal smoking. *This study adds to existing research by: assessing differential impacts of varying levels of smoking restrictions, focusing on county regulations, and conducting lead-lag analysis.*

DIFFERENCE-IN-DIFFERENCE ESTIMATE: Using WV Vital Statistics county-month data between 2005-2009 ($N=3298$), we conduct a county-level Difference-in-Difference estimate of the impact of varying levels of local smoking restrictions (*Comprehensive* – ban in workplace/restaurants/bars; *Intermediate* – ban in workplace/restaurants, not bars; *Limited* – ban in workplace, not restaurants/bars) on birth outcomes (1-average birth weight (grams), 2-proportion of LBW infants, 3-proportion of preterm births) and 4-proportion of prenatal smoking (self-reported), while controlling for relevant maternal characteristics. We find that the more restrictive *Comprehensive* ban was associated with statistically significant adverse effects on birth weight: 1.9% decrease in average birth weight and 20.6% increase in proportion of LBW infants. The less restrictive *Limited* ban, however, had mixed – yet significant – effects: 42.1% rise in proportion of LBW infants yet a 10.2% decrease in proportion of preterm births – the only ban with a significant improvement in birth outcomes.

LEAD/LAG ANALYSIS: Given potential anticipatory effects of and/or delayed response to policy change, as well as inherent lags in birth outcomes due to gestational period and concentration of birth weight gains in late pregnancy, we conduct lead and lag analysis. We consider the effects of bans from 6 months prior to through 36 months after implementation. Our findings indicate that over time: *Comprehensive* ban outperforms other bans in increasing average birth weight, *Intermediate* ban decreases LBW infants and is the only ban to reduce prenatal smoking, *Limited* ban increases LBW infants and prenatal smoking, and *All* bans decrease preterm births, most consistently with *Comprehensive* ban.

CONCLUSIONS: *Difference-in-Difference Estimation* finds that more restrictive smoking regulations adversely affect birth weight (decrease average birth weight, increase LBW infants), while less restrictive smoking regulations improve gestational age (decrease preterm births) but also increase LBW infants. *Lead and Lag Analysis*, however, suggests that: 1) smoking regulations have longer-term policy effects not captured by Difference-in-Difference Estimation; 2) over time, more restrictive smoking regulations (*Comprehensive*, *Intermediate*) produce more health benefits than less restrictive smoking regulations; 3) the impact of all smoking regulations is greater on preterm births than on birth weight, consistent with previous studies; and, 4) restrictive bans show promise in improving birth outcomes (increased birth weight, decreased preterm births) and possibly decreasing prenatal smoking over time.

LIMITATIONS AND NEXT STEPS: This study has several limitations and possible next steps. We do not measure SHS, a particular issue with smoking regulations given the risk of “displacement” (shift to smoking in private spaces), or active smoking quantity, frequency, or duration. Also, the model does not include policy implementation, enforcement, or penalties, and does not account for secular trends in birth weight or gestational age, or potential changes in obstetric practice.

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