The Effect of an Increased Minimum Wage on Infant Mortality and Birth Weight

Kelli A. Komro, PhD, MPH, Melvin D. Livingston, PhD, Sara Markowitz, PhD, and Alexander C. Wagenaar, PhD

Objectives. To investigate the effects of state minimum wage laws on low birth weight and infant mortality in the United States.

Methods. We estimated the effects of state-level minimum wage laws using a difference-in-differences approach on rates of low birth weight (< 2500 g) and postneonatal mortality (28–364 days) by state and month from 1980 through 2011. All models included state and year fixed effects as well as state-specific covariates.

Results. Across all models, a dollar increase in the minimum wage above the federal level was associated with a 1% to 2% decrease in low birth weight births and a 4% decrease in postneonatal mortality.

Conclusions. If all states in 2014 had increased their minimum wages by 1 dollar, there would likely have been 2790 fewer low birth weight births and 518 fewer postneonatal deaths for the year. (*Am J Public Health.* 2016;106:1514–1516. doi: 10.2105/AJPH.2016.303268)

Previous research has consistently linked low income with increased risk of premature mortality throughout the life span.[1,2] As a stark example, the US excess infant mortality rate (defined in comparison with 4 peer countries) during the postneonatal period (28–364 days) is driven almost entirely by excess infant deaths among mothers of lower socioeconomic status.[3] Low birth weight is also a sensitive consequence of low income, has been established as one of the most important predictors of infant mortality, and increases the risk of deleterious health and economic effects into adulthood.[4] Alarmingly, more than 1 in 4 women giving birth in the United States are below poverty level.[5]

Minimum wage standards are an important potential contributor to family economic security and, therefore, may influence maternal and infant health outcomes. Women, those with low educational attainment, young workers, and those in the service industry are more likely to be paid the federal minimum wage or less.[6] At present, minimum wage laws are prominent on the public agenda, being debated at city, state, and federal levels as a strategy to reduce growing income inequality and poverty. Economists have described the minimum wage as one of the most studied topics and have long examined potential deleterious market effects related to legislated increases in minimum wage. A recent review found no significant employment loss from modest increases in minimum wage,[7] although scientific debate continues. It is important to note that the current federal minimum wage ($15 080 annual income) is not sufficient to lift a full-time worker with 1 or 2 children above the poverty threshold ($15 930 and $20 090, respectively).

Despite the established link between low income and ill health, few studies have examined how minimum wage policies affect health outcomes.[8,9] We have taken advantage of natural experiments in minimum wage laws across states and time over the past 30 or more years to empirically evaluate the hypothesis that increases in state-level minimum wages are associated with reduced rates of low birth weight infants and infant mortality.[10]

METHODS

The main independent variable is the state-level minimum wage for each of the 50 states by month from 1980 through 2011 on the basis of the effective date (not passage date) of legislative bills passed by legislatures and signed into law by state governors and then codified into statutory records. In cases in which 1 law includes multiple changes in minimum wage (e.g., a phase-in period), we coded each change separately. We completed data collection and coding with extensive quality control procedures, including blinded independent coding of a random sample of items by 2 trained legal researchers, who demonstrated a first-pass agreement score of 86%. A senior attorney closely supervised all legal coders and reviewed protocols with coders for any variable showing a 5% or higher cross-coder disagreement rate. The supervising attorney resolved all divergences between 2 coders after meeting with the 2 coders and examining the original legal text.[10] We integrated the resulting data set after legal research coding into SAS version 9.3 (SAS Institute, Cary, NC) data files for analysis.

Infant Outcomes

The National Vital Statistics System provides extensive, longitudinal, 100% census

ABOUT THE AUTHORS

Kelli A. Komro is with the Department of Behavioral Sciences and Health Education, Rollins School of Public Health, Emory University, Atlanta, GA. Melvin D. Livingston is with the Department of Biostatistics and Epidemiology, Health Sciences Center, University of North Texas, Fort Worth. Sara Markowitz is with the Department of Economics, Emory University. Alexander C. Wagenaar is with the Institute for Child Health Policy, College of Medicine, University of Florida, Gainesville.

Correspondence should be sent to Kelli A. Komro, MPH, PhD, Professor, Rollins School of Public Health, Emory University, 1518 Clifton Road NE, Grace Crum Rollins Building, Room 564, Atlanta, GA 30322 (e-mail: kkomro@emory.edu). Reprints can be ordered at http://www.ajph.org by clicking the "Reprints" link.

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mortality and natality data (i.e., no sampling). They are consistently and comprehensively measured each month, making them ideal for a time-series study lasting several decades. On the basis of these files, we created frequencies and rates of low birth weight (< 2500 g at birth) and postneonatal mortality (28–364 days) by state and month from 1980 through 2011. Postneonatal mortality is largely the result of the conditions in which infants live by contrast to neonatal mortality, which is often the result of a complex mix of genetic and health care delivery factors.[3]

State Minimum Wage and Covariates

To assess effects of state-level minimum wages on infant outcomes, we calculated the difference between state-level minimum wage and the federal minimum wage in each state and month from 1980 to 2011. We adjusted all calculations for inflation by expressing all differences in 2011 dollars.

State-level covariates included percentage African American and mean age of mothers from natality files, poverty rate from census data, and cigarette sales from Orzechowski and Walker.[11]

Statistical Analysis

We estimated the effects of state-level minimum wage using a quasiexperimental difference-in-differences research design. In addition to our state-level minimum wage variable, we included a full set of year and state fixed effects. The year fixed effects account for any changes over time in infant outcomes common across states, whereas the state fixed effects control for any time-invariant differences between states. Thus, this research design efficiently controls for a host of other factors affecting the outcomes, both measured and unmeasured. Remaining covariates that are a potential threat to validity are only those that change close in time to a state wage policy change and only in that particular state.

Almost all the common covariates change quite slowly over time, and trends in these factors are rarely limited to 1 state but reflect broader regional or national trends. For these reasons, even if they are important causal factors driving the outcomes, they are adequately controlled for by counterfactuals in the research design (i.e., other states not changing minimum wage at the same time). However, to be conservative, we included the following covariates in the models in addition to year- and state-level fixed effects: poverty rate, cigarette sales, percentage African American mothers, and mean age of mother. We conducted additional analyses lagging the state minimum wage and covariates by 12 months to account for potential delays in the effect of state minimum wage policy on pregnancy-related outcomes.

We conducted all analyses using generalized estimating equations using PROC GENMOD in SAS. We weighted observations by the number of live births in each state and month in all analyses to accurately reflect the underlying individual-level data. To account for within-state autocorrelation, we used state-clustered SEs when calculating all tests and confidence intervals. We calculated percentage changes using model estimates and the mean infant outcome in state-months that had a minimum wage at the federal level.

RESULTS

There were 206 legal changes in state minimum wage (independent of federal changes), with the value averaging $7.01 (SD = 0.72) and ranging from $5.58 to $10.44 (in 2011 dollars). For state-months in which the state minimum wage differed from the federal standard, the difference averaged $1.03 (SD = 0.68) and ranged from $0.03 to $3.10 (in 2011 dollars).

Our results show a consistent pattern of health improvement associated with a state minimum wage above the federal minimum (Table 1). All models show statistically significant effects, with the sole exception of 1 adjusted lagged model, in which $P = .06$. Across all models, a dollar increase in the minimum wage above the federal level is associated with a 1% to 2% decrease in low birth weight births and a 4% decrease in postneonatal mortality.

DISCUSSION

Our results provide empirical evidence that increased state minimum wages are associated with reduced low birth weight births and reduced postneonatal infant deaths. On the basis of the findings, if all states in 2014 had increased their minimum wages by 1 dollar there would likely have been an estimated 2790 fewer low birth weight births and 518 fewer postneonatal deaths for the year.

The analyses were at the state level; therefore, we were unable to control for potential individual-level covariates or assess multilevel mediators of the effects of minimum wage laws on birth outcomes. However, we designed a strong

TABLE 1—Effects of State-Level Minimum Wages on US Birth Outcomes: 1980–2011

Effects	Change in Rate (SE)	% Change (95% CI)
Low birth weight births, per 100 live births		
Crude[a]	−0.12 (0.04)	−1.9 (−3.1, −0.7)
Adjusted[b]	−0.07 (0.03)	−1.1 (−2.1, −0.1)
Crude,[a] lagged[c]	−0.14 (0.05)	−2.2 (−3.6, −0.8)
Adjusted,[b] lagged[c]	−0.09 (0.04)	−1.3 (−2.7, 0.0)
Postneonatal infant mortality, per 1000 live births[d]		
Crude[a]	−0.16 (0.04)	−4.9 (−7.3, −2.5)
Adjusted[b]	−0.13 (0.04)	−4.0 (−6.4, −1.6)
Crude[a], lagged[c]	−0.15 (0.04)	−4.5 (−6.9, −2.2)
Adjusted[b], lagged[c]	−0.12 (0.04)	−3.6 (−6.0, −1.2)

Note. CI = confidence interval.
[a]Adjusted for state and year fixed effects only.
[b]Adjusted for state and year fixed effects, race, poverty, cigarette sales, and maternal age.
[c]12-month lag.
[d]Excludes infant deaths at younger than 1 mo.

quasiexperiment,[10] analyzing 206 legal changes in minimum wage across 30 years and 50 states, analyzed higher time-resolution monthly (rather than annual) observations, included state and year fixed effects to efficiently control for a host of potential confounders, and replicated the results across 2 distinct infant health indicators.

Our results add to a growing scientific literature on the beneficial effects of various income supports on improved birth outcomes.[12,13]

PUBLIC HEALTH IMPLICATIONS

The implications of these findings for policymakers, advocates, and public health practitioners are noteworthy. The annual social and health cost of preterm or low birth weight births in the United States was at least $26.2 billion in 2005.[14] The pain and suffering from the deaths of so many infants in their first year of life are incalculable. That past modest changes to state minimum wage laws appear to have had such important effects bodes well for possible beneficial effects of a range of minimum wage increases currently under active public discussion and policymaker consideration.

Public health professionals have long studied and long lamented the severe deleterious health effects of poverty. It is now time to move directly into developing, testing, and evaluating the health effects of specific public policies affecting poverty. There are a host of public policies that shape the socioeconomic environment of children and adults. Our study is a small start that we hope will spur many other epidemiologists and related scientists to study specific ways to ameliorate poverty and its deleterious health effects. AJPH

CONTRIBUTORS

K. A. Komro and M. D. Livingston drafted the article. M. D. Livingston analyzed the data. All authors conceptualized and designed the study, interpreted the results, contributed to writing the article, and reviewed and approved the final article.

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HUMAN PARTICIPANT PROTECTION

This research made use of publicly available data sets and was determined to be exempt by the Emory University and University of North Texas institutional review boards.

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