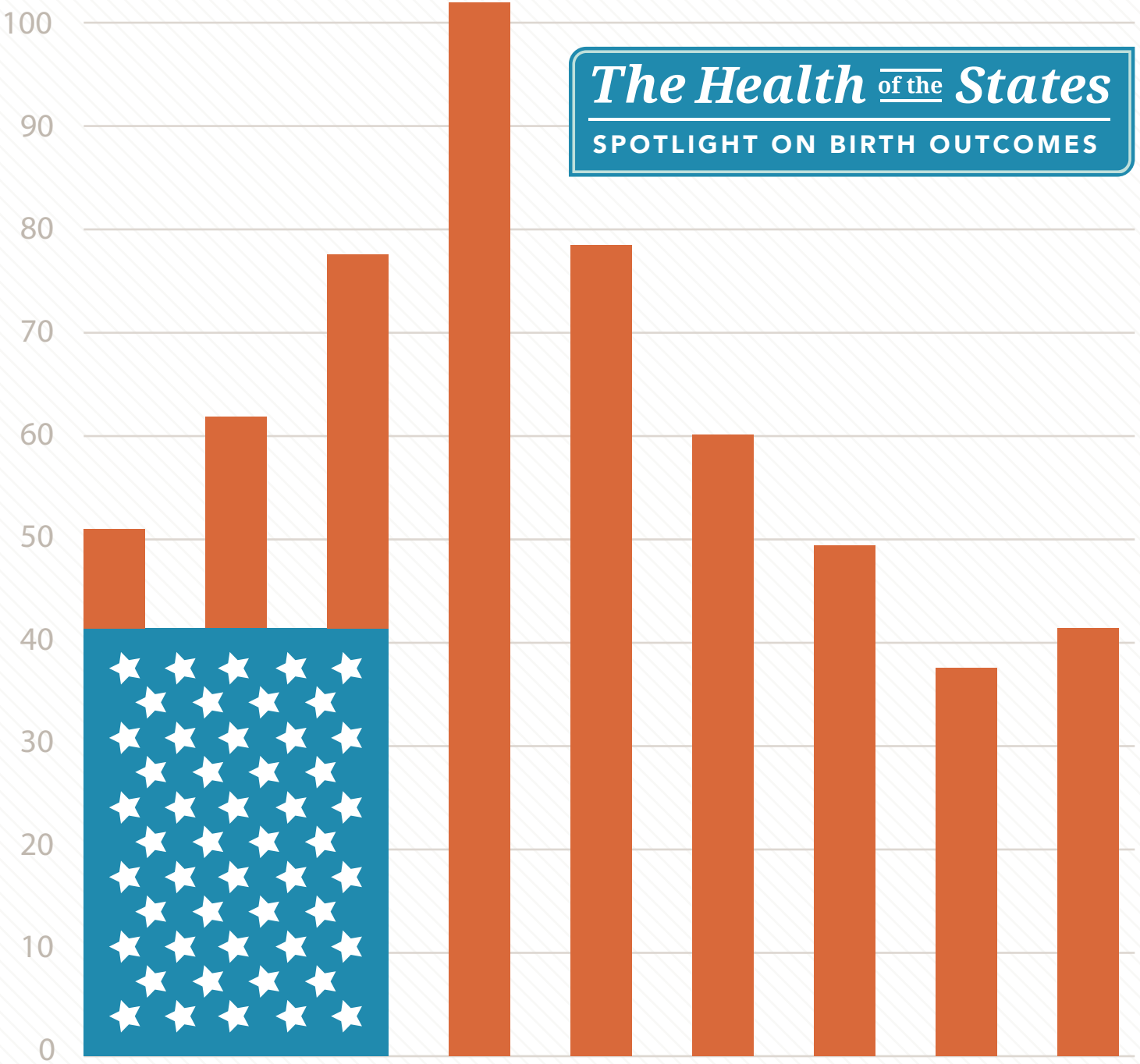


The Health of the States

SPOTLIGHT ON BIRTH OUTCOMES



Steven H. Woolf, MD, MPH*
 Laudan Aron, MA**
 Derek A. Chapman, PhD*
 Lisa Dubay, PhD**
 Emily Zimmerman, PhD*
 Lauren C. Snellings, MPH, CHES*
 Lindsey Hall, MPH*
 Amber D. Haley, MPH*
 Nikhil Holla, BA**
 Kristin Ayers, MPH*
 Christopher Lowenstein, BA**
 Timothy A. Waidmann, PhD**



*Center on Society and Health,
 Virginia Commonwealth
 University, Richmond, Virginia
 **Urban Institute, Washington, DC



The Health of the States study, funded by the Robert Wood Johnson Foundation, was a systematic examination of health disparities in the U.S. across the 50 states and the District of Columbia. The study was conducted in 2014–2016 by the Virginia Commonwealth University Center on Society and Health and the Urban Institute. The goal was to take a “deep dive” into the available data on the health of the states and the factors that shape health. The project examined how 123 potential determinants of health, drawn from five broad domains, correlated with 39 different health outcomes that span mortality and illness/injury across the life course.

The results were issued in a series of reports: a summary report¹ released in October 2016, which was followed by a series of supplements. This report, the third of nine supplements, focuses on how birth outcomes vary across the states. Please refer to the first supplement—*The Health of the States: Spotlight on Methods*²—for details on the data sources and analytic methods used to produce these results.

THE HEALTH OF THE STATES

Supplement 3:

Spotlight on Birth Outcomes

Virginia Commonwealth University
Center on Society and Health
and the Urban Institute

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Spotlight on Birth Outcomes

Low birth weight (less than 2500 g, or 5.5 lbs), which often results from pregnancy complications or preterm delivery, is a risk factor for adverse health outcomes for newborns—during infancy and beyond. Based on 3-year averages reported by the Centers for Disease Control and Prevention in 2012, we found that the percentage of newborns who had a low birth weight differed more than two-fold across the states, from 5.8 percent in Alaska to 11.9 percent in Mississippi. The infant mortality rate varied even more dramatically: 2007-2009 data analyzed by the Kaiser Family Foundation show that the average infant mortality rate ranged from 4.8 per 1,000 live births in New Hampshire to 11.5 per 1,000 live births in the District of Columbia. Figure 1 presents the data for each state.

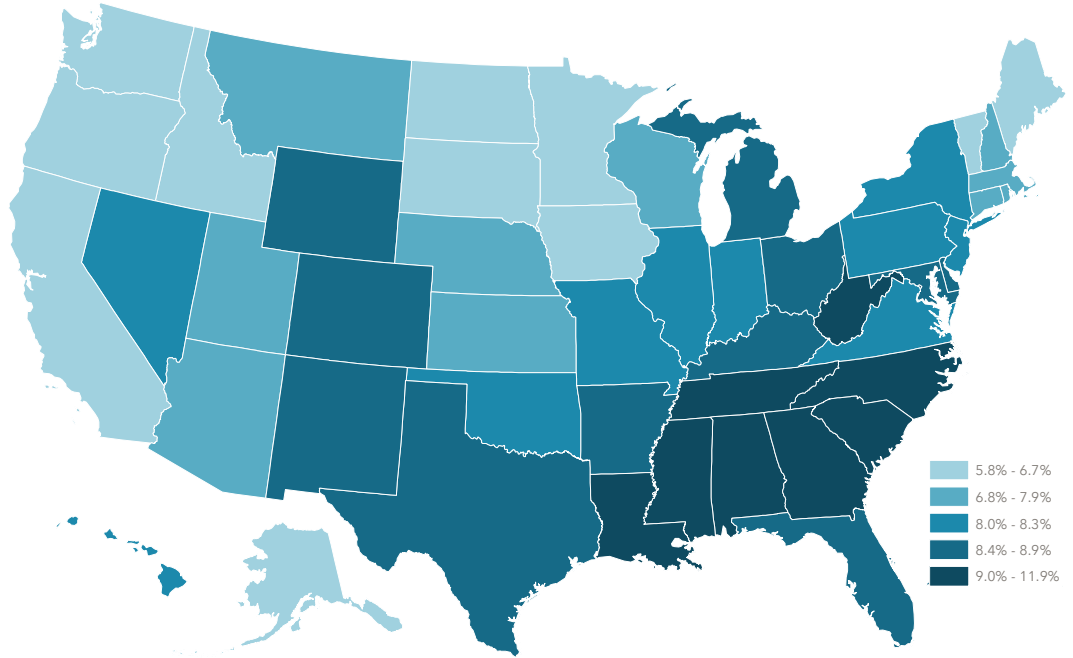
Three Pacific states—California, Oregon, and Washington—ranked in the “Top 10” (best birth outcomes) for both low birth weight (Figure 2) and infant mortality (Figure 3). Alaska had the nation’s lowest incidence of low birth weight. Hawaii, the state with the

FIGURE 1
BIRTH OUTCOMES, BY STATE

Infant mortality (per 1,000 live births)		Low birth weight (%)	
NH	4.8	AK	5.8
MA	5.0	WA	6.2
UT	5.0	OR	6.2
CA	5.1	VT	6.3
WA	5.1	ID	6.4
OR	5.2	SD	6.4
IA	5.3	MN	6.5
NJ	5.3	ME	6.5
VT	5.3	ND	6.5
MN	5.4	CA	6.7
NY	5.5	IA	6.7
NM	5.7	NE	6.8
ME	5.8	UT	6.9
NV	5.8	AZ	7.0
NE	5.9	NH	7.1
ID	6.0	WI	7.1
CT	6.1	KS	7.1
HI	6.1	MT	7.3
CO	6.2	MA	7.6
TX	6.2	RI	7.7
AZ	6.4	CT	7.9
RI	6.4	MO	8.0
WI	6.4	IN	8.0
AK	6.5	NY	8.1
MT	6.6	VA	8.1
ND	6.6	NV	8.2
KY	6.8	HI	8.2
WY	6.8	IL	8.2
IL	7.0	PA	8.2
FL	7.1	NJ	8.3
SD	7.1	OK	8.3
MO	7.2	TX	8.4
PA	7.3	MI	8.4
VA	7.3	WY	8.5
IN	7.4	DE	8.5
KS	7.5	OH	8.6
AR	7.6	FL	8.7
WV	7.6	NM	8.8
MD	7.7	CO	8.8
MI	7.7	MD	8.8
OH	7.7	KY	8.9
GA	7.8	AR	8.9
OK	7.8	NC	9.0
SC	7.9	TN	9.1
DE	8.0	WV	9.3
NC	8.2	GA	9.5
TN	8.2	SC	9.8
LA	9.0	AL	10.1
AL	9.2	DC	10.1
MS	10.0	LA	10.8
DC	11.5	MS	11.9

FIGURE 2
LOW BIRTH WEIGHT (%) BY STATE (2009-2012)

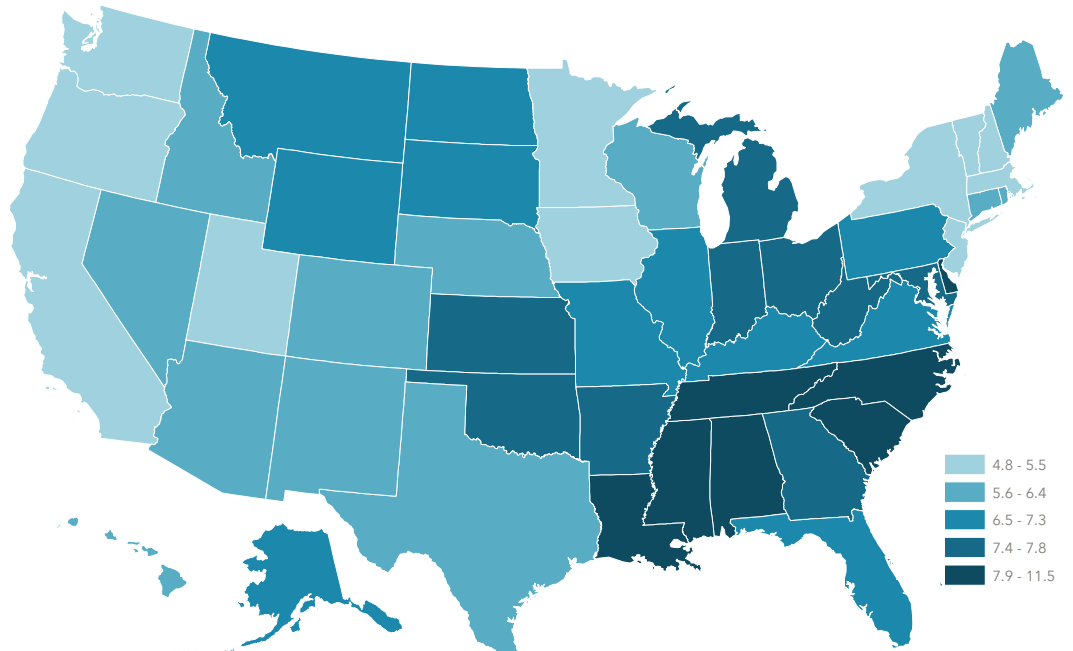
STATE (Rank)	CENSUS REGIONS							
	Pacific	Mountain	W. So. Central	W. No. Central	E. No. Central	New England	Middle Atlantic	South
TOP 10 STATES: LOWEST INCIDENCE OF LBW								
Alaska (1)								
Washington (2)								
Oregon (2)								
Vermont (4)								
Idaho (5)								
South Dakota (5)								
Minnesota (7)								
Maine (7)								
North Dakota (7)								
California (10)								
Iowa (10)								
BOTTOM 10 STATES: HIGHEST INCIDENCE OF LBW								
Mississippi (51)								
Louisiana (50)								
Alabama (48)								
DC (48)								
So. Carolina (47)								
Georgia (46)								
West Virginia (45)								
Tennessee (44)								
No. Carolina (43)								



Top 10 for this outcome includes 11 states, Bottom 10 includes 8 states and DC. See Supplement 1: The Health of the States: Spotlight on Methods for our protocol for handling tied rankings.

FIGURE 3
INFANT MORTALITY (PER 1,000 LIVE BIRTHS) BY STATE (2007-2009)

STATE (Rank)	CENSUS REGIONS							
	Pacific	Mountain	W. So. Central	W. No. Central	E. No. Central	New England	Middle Atlantic	South
TOP 10 STATES: LOWEST INFANT MORTALITY								
N. Hampshire (1)								
Massachusetts (2)								
Utah (2)								
California (4)								
Washington (4)								
Oregon (6)								
New Jersey (7)								
Iowa (7)								
Vermont (7)								
Minnesota (10)								
BOTTOM 10 STATES: HIGHEST INFANT MORTALITY								
DC (51)								
Mississippi (50)								
Alabama (49)								
Louisiana (48)								
Tennessee (46)								
N. Carolina (46)								
Delaware (45)								
South Carolina (44)								
Georgia (42)								
Oklahoma (42)								



See Supplement 1: The Health of the States: Spotlight on Methods for our protocol for handling tied rankings.

highest life expectancy at birth,³ did not rank in the Top 10 for either birth outcome. Birth outcomes were also favorable in Iowa, Minnesota, and Vermont, which ranked in the Top 10 for both low birth weight and low infant mortality. New Hampshire and Massachusetts had the lowest infant mortality rates in the country.

States with poor birth outcomes were concentrated in the South. Six Southern states—Alabama, Georgia, Mississippi, North Carolina, South Carolina, and Tennessee—ranked in the Bottom 10 for both low birth weight and infant mortality, as did the District of Columbia. As shown in Figure 1, the rate of low birth weight in Mississippi (11.9 percent) was notably higher than those of other states, as were the rates in adjacent states (Louisiana and Alabama) and the District of Columbia. Similarly, the infant mortality rate in the District of Columbia (11.5 per 1,000 live births) was distinctly higher than those of peer states in the Bottom 10, and the three adjacent Gulf Coast states with high rates of low birth weight (Louisiana, Mississippi, and Alabama) also had higher infant mortality rates than their peers.

As with most data in this project, the reader should bear in mind that—for reasons discussed in our summary report¹—the results are not broken out by race and ethnicity, which can vary significantly. For example, the infant mortality rate of African American babies has been more than twice that of non-Hispanic whites since the 1960s.^{4,5}

Our results are based on state averages, obscuring important differences that occur within states and at the county and neighborhood levels. Birth outcomes can vary significantly across census tracts with different demographic and socioeconomic characteristics.⁶

We examined how strongly health outcomes correlated with state statistics in five domains that shape health: health behaviors, the physical and social environment, social and economic factors, health care, and public policies and spending. The results, presented in Figures 4–5, are based on Spearman rank-order correlation coefficients (r_s), which measure the degree to which the state ranking for the indicator (e.g., poverty) matches the state ranking for the health outcome (e.g., infant mortality). Zero represents no association between the two rankings, and 1.0 represents an exact match. A positive correlation means that a high rank on the indicator is linked to a high rank on the health outcome, or vice versa; a negative correlation means that a high rank on the indicator is linked to a low rank on the health outcome, or vice versa. See *Supplement 1: The Health of the States: Spotlight on Methods* for more details on data sources and methods and the rationale for omitting certain results from this report.

A WORD ABOUT METHODS

WHAT CORRELATES THE MOST WITH BIRTH OUTCOMES (LOW BIRTH WEIGHT AND INFANT MORTALITY)?

Birth outcomes tend to be better in states with a higher prevalence of healthy behaviors (Figures 4–5). For example, we found that state rankings for low birth weight correlated very highly with rankings for exclusive breastfeeding ($r_s = -0.72$) (Figure 4); the percentage of mothers who reported exclusive breast-feeding (for the first six months of life) was 24.4 percent in the Top 10 states—states with the highest birth weights—but only 10.7 percent in the Bottom 10 states. Rankings for both low birth weight and infant mortality also correlated highly with rankings for smoking, a known cause of poor birth outcomes,⁷ as well as with other unhealthy behaviors.

States with poorer birth outcomes also had higher rates of other unhealthy behaviors, and vice versa, beginning in childhood (Figures 4–5). For example, states with better birth outcomes had higher rates of physical activity among children. These associations do not reflect causal relationships but rather a pattern of *co-occurrence*, where conditions “go together” at the state level. States where people often engage in a behavior that causes one disease may also rank highly on behaviors that cause other diseases or injuries. In the Top 10 states with the best birth weights, 24.6 percent of teens in 9th through 12th grade wore bicycle helmets, compared with 6.3 percent in Bottom 10 states. Conversely,

FIGURE 4

WHAT CORRELATES WITH LOW BIRTH WEIGHT?

THE CORRELATION COEFFICIENTS (r_s)*

HEALTH BEHAVIORS			
Physical inactivity (<i>adult</i>)	0.59	Exclusive breastfeeding	-0.72
Fighting (<i>youth</i>)	0.56	Sexual abstinence before age 18	-0.65
Screen time (<i>youth</i>)	0.52	Current nonsmokers	-0.52
Soda intake (<i>youth</i>)	0.50		
PHYSICAL AND SOCIAL ENVIRONMENT			
Air pollution	0.58	Safe Schools	-0.73
Indoor smoking (<i>child present</i>)	0.56	Commuting by walking/cycling	-0.63
Dating violence (<i>youth</i>)	0.55	Children in supportive neighborhoods	-0.51
Teens who consider school unsafe	0.52		
SOCIAL AND ECONOMIC FACTORS			
Single-parent households	0.65	Proficient in math (<i>grade 8</i>)	-0.55
Poverty (<i>children</i>)	0.64	Employment	-0.55
Poor living in concentrated (>20%) poverty	0.64	Higher educated household head	-0.53
Poverty (<i>adults</i>)	0.58		
Income inequality	0.57		
HEALTH SYSTEM			
Could not afford doctor	0.56	Electronic health record system	-0.60
Avoidable hospitalization	0.56		
Rehospitalization (<i>pneumonia</i>)	0.55		

*Correlation coefficients range from zero to 1.0 and measure how strongly one variable correlates with another. Factors on the left (negative coefficients) are inversely related (e.g., one goes up when the other goes down).

High correlations were noted for other measures of **Health Behaviors**: Any breastfeeding ($r_s = -0.64$), Bicycle helmet use (*youth*) (-0.59); **Physical and Social Environment**: Smoking in home (nonsmokers present) (0.51); **Social and Economic Factors**: Residents in concentrated (>20%) poverty (0.60), Poverty (supplemental def.) (0.57), People living amid racial segregation + concentrated (>20%) poverty (0.53), People living amid racial segregation + very concentrated (>40%) poverty (0.52), and Residents in very concentrated (>40%) poverty (0.51); and **Health Systems**: Rehospitalization (0.53), Rehospitalization (heart failure) (0.53).

FIGURE 5

WHAT CORRELATES WITH INFANT MORTALITY?

THE CORRELATION COEFFICIENTS (r_s)*

HEALTH BEHAVIORS			
Physical inactivity (<i>adult</i>)	0.67	Any breastfeeding	-0.72
Current smokers	0.65	Physical activity (children)	-0.72
Soda intake (<i>youth</i>)	0.57	Sexual abstinence before age 18	-0.60
PHYSICAL AND SOCIAL ENVIRONMENT			
Indoor smoking (<i>child present</i>)	0.70	Neighborhood resources for children	-0.60
Air pollution	0.53	Commuting by walking/cycling	-0.58
		Residents in walkable neighborhoods	-0.53
SOCIAL AND ECONOMIC FACTORS			
Adults in prison	0.63	Proficient in reading (<i>grade 8</i>)	-0.53
Single-parent households	0.63		
Poverty (children)	0.54		
Residents in very concentrated (>40%) poverty	0.53		
Severe housing disrepair	0.50		
HEALTH SYSTEM			
Avoidable hospitalization	0.57	Electronic health record system	-0.52
Primary care shortage	0.53		

*Correlation coefficients range from zero to 1.0 and measure how strongly one variable correlates with another. Factors on the left (negative coefficients) are inversely related (e.g., one goes up when the other goes down).

High correlations were noted for other measures of **Health Behaviors**: Exclusive breastfeeding ($r_s = -0.65$), Bicycle helmet use (*youth*) (-0.58); **Physical and Social Environment**: Smoke-free homes (-0.63), Smokers in household (*child present*) (0.60), Commuting by motor vehicle (0.56), Indoor smoking (*nonsmokers present*) (0.54); and **Social and Economic Factors**: Poverty (*adults*) (0.52).

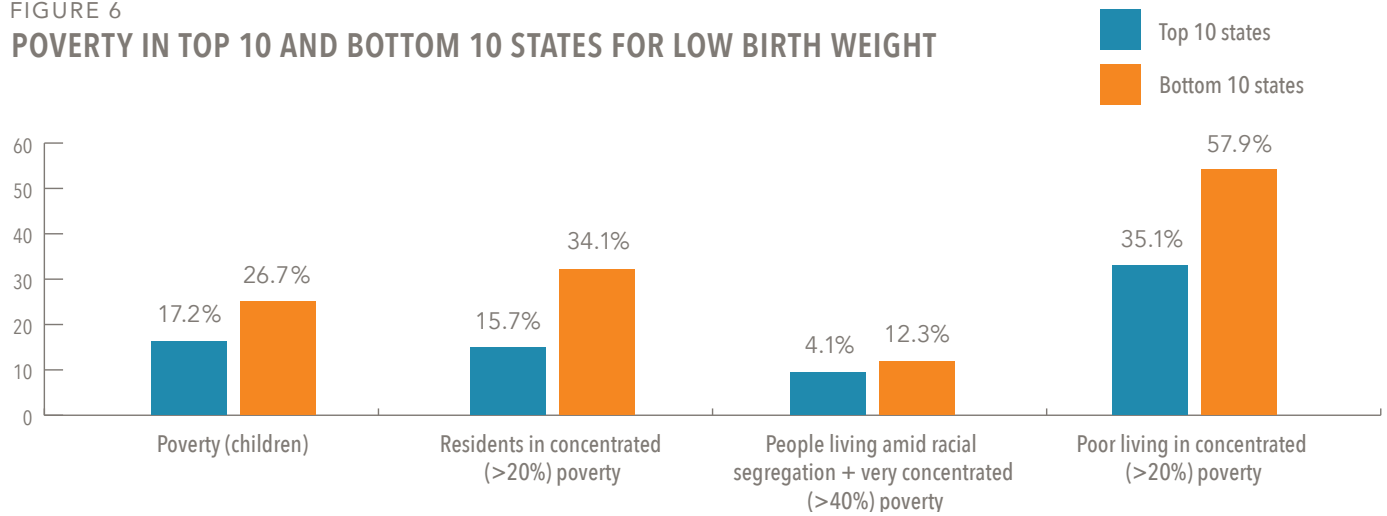
the percentage of children who drank soda at least once a week was 18.9 percent and 30.3 percent, respectively.

Importantly, rankings for birth outcomes also correlated highly with household socioeconomic conditions. As shown in Figure 6, various measures of poverty were higher in the 10 states with the lowest birth weights. In Bottom 10 states for infant mortality, more than one out of three (38.2 percent) households with children were led by single parents, compared with 25.8 percent in Top 10 states, and adult incarceration rates were more than twice as high. Educational attainment also varied: for example, in Bottom 10 states for infant mortality, only 27.5 percent of 8th graders received proficient scores in reading, compared with 40.8 percent in Top 10 states.

Birth outcomes correlated with access to health care as well. For example, 16.9 percent of people in Bottom 10 states for low birth weight could not afford their doctor, compared with 11.7 percent of those in Top 10 states. Infant mortality rates were higher in states with greater shortages in primary care (Figure 5). Rates of avoidable hospitalizations, another marker for inadequate primary care, were 79.5 percent and 52.3 percent, respectively, in Bottom 10 and Top 10 states for birth weight.

Finally, birth outcomes correlated with conditions in the environment (Figures 4–5). Children’s exposure to smoking in the home was more than

FIGURE 6
POVERTY IN TOP 10 AND BOTTOM 10 STATES FOR LOW BIRTH WEIGHT



three times as common in Bottom 10 states (lowest birth weights) as in Top 10 states (highest birth weights). Consistent with other studies,^{8,9} we observed a correlation between birth outcomes and the average concentration of fine particulate matter in the air.

In other examples of co-occurrence, birth outcomes correlated with various neighborhood conditions, such as the built environment and the ability of commuters to walk or cycle to work. In

Top 10 states for low infant mortality, 14.3 percent of census tracts were walkable, compared with 8.8 percent of census tracts in Bottom 10 states. More than any other variable examined in our study, parents' perceptions of school safety—a strong marker of neighborhood conditions—correlated the most with low birth weight ($r_s = -0.73$). Birth weight also correlated with the proportion of teens who felt unsafe at school or who had experienced intimate partner violence.



What The Data Affirm: The Takeaway

Babies get their healthiest start when their mothers can maintain healthy behaviors before, during, and after pregnancy and can access quality prenatal and maternity care. States with poor rankings on smoking, exercise, and breastfeeding often lack conducive environments for parents to live healthy lifestyles. High poverty rates occur in states where limited economic resources prevent families from living in healthy communities and obtaining needed services. Incarceration and unsafe schools signal the kind of social turmoil that disrupts families and neighborhoods and create adverse conditions for both pregnant mothers and their babies. Health care matters, particularly high-quality ambulatory care, but birth outcomes depend even more on the wellbeing of households and neighborhoods.

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Virginia Commonwealth University

VCU Center on Society and Health

societyhealth@vcu.edu

830 East Main Street, Suite 5035

P.O. Box 980212

Richmond, Virginia 23298-0212

(804) 628-2462

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