

# Perinatal Health in the Rural United States, 2005

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## Policy Brief Series

### #138: LOW BIRTH WEIGHT RATES IN THE RURAL UNITED STATES, 2005

#139: LOW BIRTH WEIGHT RATES AMONG RACIAL AND ETHNIC GROUPS IN THE RURAL UNITED STATES, 2005

#140: INADEQUATE PRENATAL CARE IN THE RURAL UNITED STATES, 2005

#141: INADEQUATE PRENATAL CARE AMONG RACIAL AND ETHNIC GROUPS IN THE RURAL UNITED STATES, 2005

These briefs cover the issue of perinatal outcomes in rural areas across the United States in 2005. Low birth weight, a key indicator of the health of the U.S. population, and adequacy of prenatal care, a critical indicator of access and quality of health care, are explored to discover how they are related to rural or urban location, race, and ethnicity.

### Key findings of this brief are:

- Nationally, the rural U.S. low birth weight rate in 2005 was significantly higher than the urban U.S. low birth weight rate.
- Some census divisions and states, such as Louisiana and Mississippi, have particularly high rural low birth weight rates, over 10%. The highest rates exceeded those of Central America (10.1%) and South America (9.6%), and were near those of less-developed countries across the world.



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# Low Birth Weight Rates in the Rural United States, 2005

## BACKGROUND

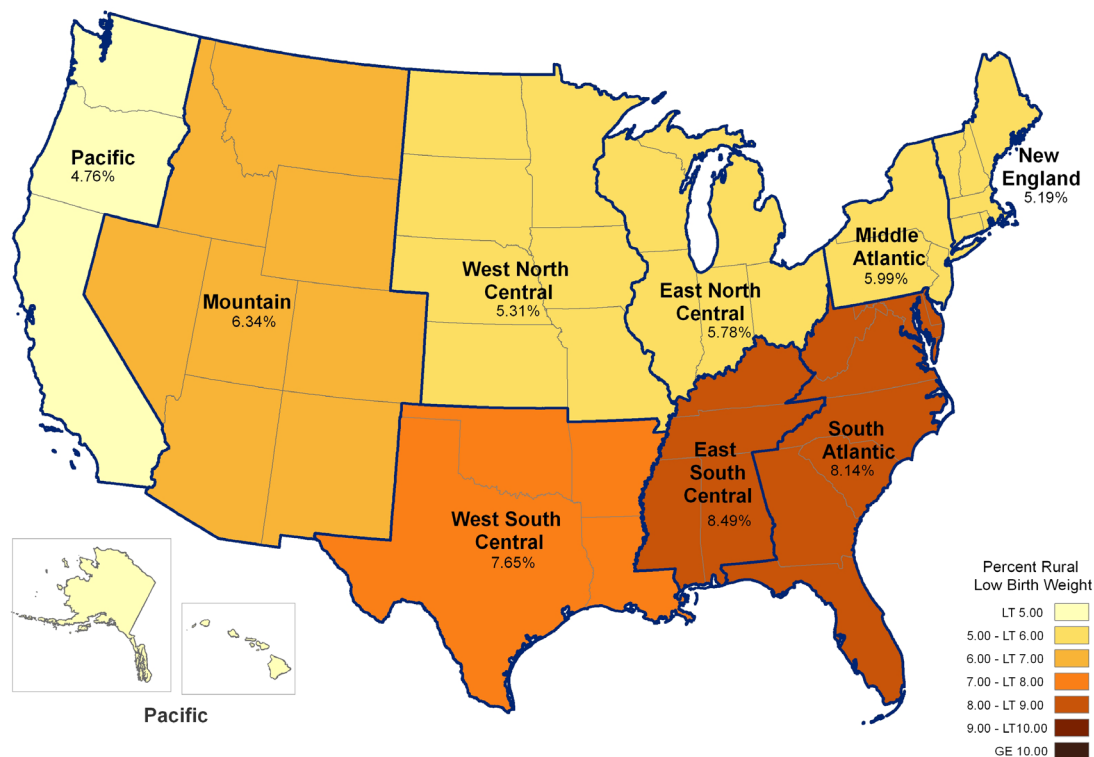
Low birth weight (LBW) has been linked with infant mortality (2/3 of all infant deaths),<sup>1</sup> infant morbidity (e.g., neurodevelopmental impairments, chronic lung disease), and high costs (\$25.2 billion in societal economic burden associated with U.S. preterm births in 2005).<sup>2</sup> LBW rates are used as an important indicator of the health of the U.S. population.<sup>3</sup> However, it is difficult to track U.S. LBW rates among rural residents only, as birth record data usually include only state-level geographic identifiers, and do not differentiate rural and urban births. The WWAMI Rural Health Research Center has studied rural birth outcomes between 1984 and 1997,<sup>4,5</sup> comparing rural to urban rates of low birth weight, mortality, and use of prenatal care. Its most recent study of 1995-1997 births<sup>6</sup> found

that nationally, women living in rural counties had significantly higher odds of having a low birth weight infant than women living in urban counties. These data are now over a decade old. To help state and federal agencies make informed decisions about maternal and child health programs and appropriately target resources in rural areas, this study provides more recent 2005 low birth weight rates for rural births across census divisions and states in the U.S.

## STUDY AIM

To provide LBW rates among rural U.S. residents at the census division and state levels, and among women living in counties closer to (adjacent) and farther from (non-adjacent) urban counties.

**Figure 1: Rural Low Birth Weight by Census Division, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

## STUDY DESIGN

This is a national, cross-sectional analysis of all 3,998,753 singleton U.S. births using a special version of the 2005 Period National Linked Birth/Infant Death Database that included county identifiers. Urban Influence Codes identified births to mothers residing in rural (i.e., non-metropolitan) or urban (i.e., metropolitan) counties, and distinguished rural counties adjacent and non-adjacent to urban counties (see Appendix 1: Technical Documentation). We identified LBW births using the standard definition of less than 2,500 grams.<sup>7</sup>

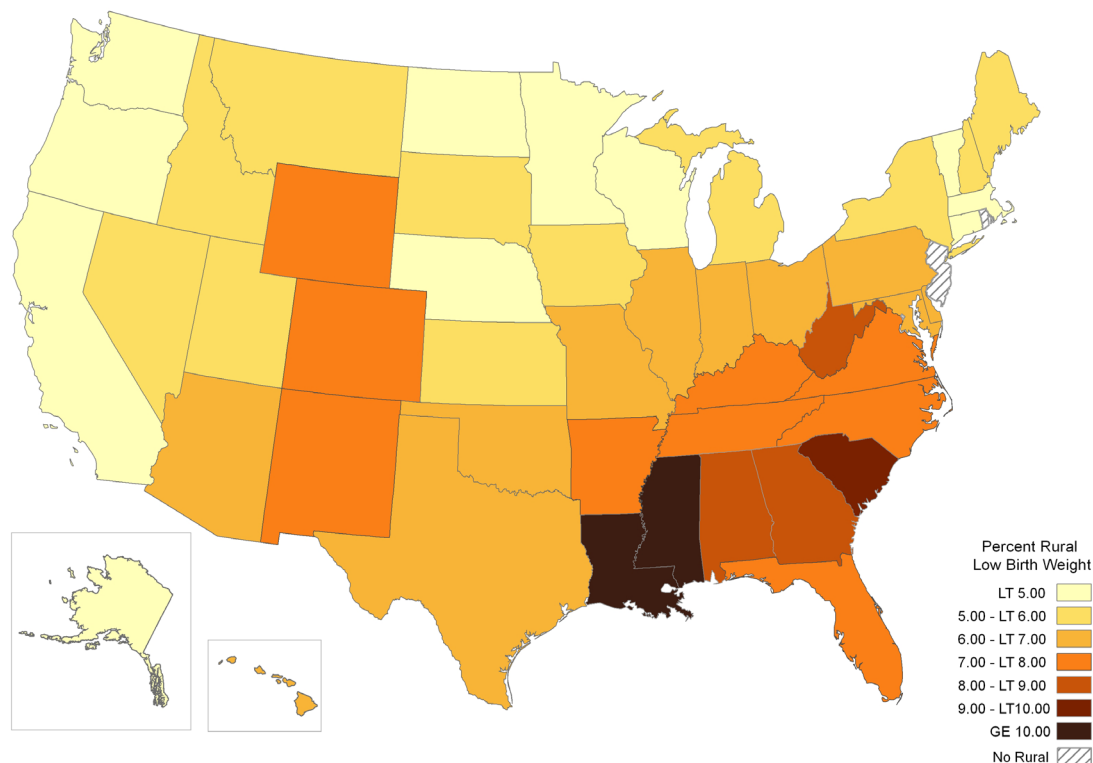
## FINDINGS

- Nationally, the rural U.S. LBW rate in 2005 was significantly higher than the urban U.S. LBW rate (6.76% vs. 6.37%,  $P \leq 0.001$ ).
- Across census divisions, there was a nearly two-fold difference in rural LBW rates, from 4.76% in the Pacific Division to 8.49% in the East South Central Division. The three census divisions with the highest

rural LBW rates were East South Central (8.49%), South Atlantic (8.14%), and West South Central (7.65%). (See Figure 1; see Appendix 2 for rural low birth weight rates by census division.)

- Among states, there was a 2.8-fold difference in rural LBW rates, from 3.69% in Alaska to 10.43% in Louisiana. The six states with the highest rural LBW rates (roughly the 90th percentile and above) were Louisiana (10.43%), Mississippi (10.22%), South Carolina (9.88%), Georgia (8.65%), Alabama (8.32%), and West Virginia (8.28%). (See Figure 2; see Appendix 3 for rural LBW rates by state.)
- Within five census divisions (New England, Mid Atlantic, South Atlantic, East South Central, and Pacific), women living in rural counties adjacent to urban counties had LBW rates significantly lower than those living in non-adjacent counties. In only the West South Central census division was the rural LBW rate significantly higher in rural counties adjacent to urban counties than in non-adjacent counties (Table 1).

**Figure 2: Rural Low Birth Weight by State, 2005**



Map Date: June 2011  
Data Sources: 2003 Urban Influence Codes, ERS, USDA;  
2005 period linked birth/infant death data file, NCHS, CDC

2005 national overall (urban and rural) low birth weight rate was 6.43%.

**Table 1: Rural Low Birth Weight Rates by Census Division and Proximity to Urban Counties, 2005**

| % LBW Among Women Living in Rural Counties |                            |                                |
|--------------------------------------------|----------------------------|--------------------------------|
| Census Division                            | Adjacent to Urban Counties | Not Adjacent to Urban Counties |
| East South Central                         | 8.08***                    | 9.09                           |
| South Atlantic                             | 8.05*                      | 8.52                           |
| West South Central                         | 7.80*                      | 7.36                           |
| Mountain                                   | 6.27                       | 6.41                           |
| Mid Atlantic                               | 5.87*                      | 6.80                           |
| East North Central                         | 5.85                       | 5.58                           |
| West North Central                         | 5.35                       | 5.29                           |
| New England                                | 4.92*                      | 5.81                           |
| Pacific                                    | 4.43***                    | 5.19                           |
| <b>National</b>                            | <b>6.79</b>                | <b>6.69</b>                    |

\*  $P \leq 0.05$ .

\*\*  $P \leq 0.01$ .

\*\*\*  $P \leq 0.001$ .

## CONCLUSIONS

The overall 2005 rural LBW rate was higher than the urban rate, with some census divisions and states having particularly high rates. For example, Louisiana and Mississippi had rural LBW rates over 10%. These extremely high LBW rates exceeded those of Central America (10.1%) and South America (9.6%), and were near those of less-developed countries across the world.<sup>8</sup>

## IMPLICATIONS FOR POLICY, DELIVERY, OR PRACTICE

Significant morbidity and mortality, as well as high costs, are associated with LBW infants. Increasing access to prenatal care services, the most common intervention to prevent LBW, has not succeeded in lowering the U.S. LBW rate. There has been a recent call to revise the current model of prenatal care, tailoring prenatal care to address maternal and fetal risk factors so that high risk patients receive more intensive, and low risk patients less intensive services.<sup>9</sup> As new LBW prevention interventions are implemented, it will be important to target these efforts carefully, including to those rural areas with the highest rates of LBW identified in this study. However, barriers faced in rural areas, such as insufficient provider supply and longer distances to provider offices, will pose additional challenges to implementing new LBW prevention programs.

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## APPENDIX 1: Technical Documentation

### DATA FILE

These studies used the 2005 Period Linked Birth/Infant Death Data Set with county identifiers, obtained from the U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics (NCHS), Hyattsville, Maryland.

### CASE SELECTION

These studies included only the 3,998,753 singleton births to mothers residing in the United States. This represented 96.5% of the 4,145,883 total births in the 2005 Period Linked Birth/Infant Death Data Set.

### DESIGNATION OF RURAL COUNTIES

We used the 2003 Urban Influence Codes (UIC) developed at the Economic Research Service, USDA,\* to distinguish between non-metropolitan (referred to as rural) counties that were adjacent to metropolitan (urban) counties (UIC = 3-7) and rural counties that were not adjacent to urban counties (UIC = 8-12). Rhode Island, New Jersey, and the District of Columbia had no rural counties and therefore have no data represented on the maps.

## APPENDIX 2: Rural Low Birth Weight Rates by Census Division, 2005

| Census Division    | Total Rural Births | % Rural LBW |
|--------------------|--------------------|-------------|
| East South Central | 81,201             | 8.49        |
| South Atlantic     | 110,446            | 8.14        |
| West South Central | 88,881             | 7.65        |
| Mountain           | 54,780             | 6.34        |
| Mid Atlantic       | 36,881             | 5.99        |
| East North Central | 101,511            | 5.78        |
| West North Central | 85,357             | 5.31        |
| New England        | 17,301             | 5.19        |
| Pacific            | 35,574             | 4.76        |
| <b>National</b>    | <b>611,932</b>     | <b>6.76</b> |

Includes only singleton births to U.S. residents.

Geographic location is based on mother's state of residence.

122 rural births were excluded due to missing birth weight information.

\* U.S. Department of Agriculture, Economic Research Service. Briefing rooms: Measuring rurality: Urban Influence Codes. <http://webarchives.cdlib.org/sw15d8pg7m/http://ers.usda.gov/Briefing/Rurality/UrbanInf/>. Accessed October 7, 2013.

## APPENDIX 3: Rural Low Birth Weight Rates by State, 2005

| State                | Total Rural Births | % Rural LBW |
|----------------------|--------------------|-------------|
| Alabama              | 16,518             | 8.32        |
| Alaska               | 3,441              | 3.69        |
| Arizona              | 9,382              | 6.10        |
| Arkansas             | 14,560             | 7.94        |
| California           | 8,822              | 4.56        |
| Colorado             | 7,949              | 7.62        |
| Connecticut          | 2,968              | 4.95        |
| Delaware             | 2,192              | 6.02        |
| District of Columbia | N/A                | N/A         |
| Florida              | 12,434             | 7.23        |
| Georgia              | 24,981             | 8.65        |
| Hawaii               | 4,809              | 6.59        |
| Idaho                | 7,690              | 5.01        |
| Illinois             | 18,628             | 6.02        |
| Indiana              | 18,051             | 6.13        |
| Iowa                 | 15,846             | 5.38        |
| Kansas               | 13,417             | 5.58        |
| Kentucky             | 22,159             | 7.72        |
| Louisiana            | 15,795             | 10.43       |
| Maine                | 5,351              | 5.83        |
| Maryland             | 3,478              | 6.24        |
| Massachusetts        | 322                | 4.35        |
| Michigan             | 20,265             | 5.16        |
| Minnesota            | 17,024             | 4.41        |
| Mississippi          | 23,047             | 10.22       |
| Missouri             | 19,553             | 6.33        |
| Montana              | 7,196              | 5.25        |
| Nebraska             | 9,631              | 4.67        |
| Nevada               | 2,952              | 5.35        |
| New Hampshire        | 4,602              | 5.04        |
| New Jersey           | N/A                | N/A         |
| New Mexico           | 9,821              | 7.71        |
| New York             | 16,537             | 5.76        |
| North Carolina       | 33,319             | 7.92        |
| North Dakota         | 4,140              | 4.52        |
| Ohio                 | 27,620             | 6.42        |
| Oklahoma             | 17,261             | 6.64        |
| Oregon               | 9,273              | 4.70        |
| Pennsylvania         | 20,344             | 6.18        |
| Rhode Island         | N/A                | N/A         |
| South Carolina       | 13,390             | 9.88        |
| South Dakota         | 5,746              | 5.38        |
| Tennessee            | 19,477             | 7.44        |
| Texas                | 41,265             | 6.91        |
| Utah                 | 5,020              | 5.54        |
| Vermont              | 4,058              | 4.76        |
| Virginia             | 11,589             | 7.46        |
| Washington           | 9,229              | 4.44        |
| West Virginia        | 9,063              | 8.28        |
| Wisconsin            | 16,947             | 4.83        |
| Wyoming              | 4,770              | 7.11        |
| <b>National</b>      | <b>611,932</b>     | <b>6.76</b> |

N/A = not applicable because of no rural births.

Includes only singleton births to U.S. residents.

Geographic location is based on mother's state of residence.

122 rural births were excluded due to missing birth weight information.