

# 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:

- In most states, rural minority racial/ethnic groups had levels of inadequate prenatal care (less than 50% of expected visits) in the “worst” or “worse than mid-range” categories.
- Texas, New Mexico, and Hawaii had levels of inadequate prenatal care in the “worst” or “worse than mid-range” categories both for rural minority racial/ethnic groups and for non-Hispanic whites.
- A few states achieved levels of inadequate prenatal care in the “mid-range” or “better than mid-range” categories for some rural minority racial/ethnic groups.



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# Inadequate Prenatal Care Among Racial and Ethnic Groups in the Rural United States, 2005

## BACKGROUND

Recent research by the WWAMI Rural Health Research Center has shown that rural low birth weight (LBW) rates vary substantially both by race/ethnicity and by state and region across the United States.<sup>1</sup> However, there are no recent data on whether another important measure of perinatal care for rural women—the inadequate prenatal care rate—varies by race/ethnicity and geography. Nationally, women from most racial and ethnic minority groups have been less likely to obtain timely and adequate prenatal care services than non-Hispanic white women.<sup>2</sup> Given the barriers to health care receipt overall in rural areas, these disparities in prenatal care receipt among women from racial and ethnic minority groups could be exacerbated in rural areas.

## STUDY AIM

To describe the 2005 inadequate prenatal care rates among rural women of different races and ethnicities in each U.S. state.

## STUDY DESIGN

This is a national, cross-sectional analysis of the 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) counties. Inadequate prenatal care was calculated by the National Center for Health Statistics using Kotelchuck's Adequacy of Prenatal Care Index.<sup>3</sup> This index calculates an expected number of prenatal visits based on the number of weeks of pregnancy, and defines inadequate prenatal care as receipt of less than 50% of expected visits. In 2005, 38 states, including the District of Columbia, used the 1989 version of the birth certificate and 11 states used the 2003 version. Vermont switched from the 1989 to the 2003 birth certificate version on July 1, 2005; New York State used the 2003 version, New York City the 1989 version. Information regarding prenatal care was recorded differently on the two birth certificate versions

(e.g., when prenatal care began; see Variation in Data Collection Between the 1989 and 2003 Birth Certificate Versions section in Appendix 1), so inadequate prenatal care rates cannot be compared directly between states using the different birth certificates. To solve this problem, we created a standardized inadequate prenatal care score (Z-score) for each birth (see Appendix 1: Technical Documentation). With this standardization method, states' levels of rural inadequate prenatal care can be compared and displayed in categories from "best" to "worst" on the same map.

The Linked Birth/Infant Death Data Set reports maternal Hispanic origin and race separately.<sup>4</sup> Using these variables, we defined infant race/ethnicity as Hispanic, non-Hispanic white, non-Hispanic black or African American, non-Hispanic Asian/Pacific Islander, or non-Hispanic American Indian/Alaska Native. We did not report results in states with low numbers of individuals in rural minority racial/ethnic groups (see Appendix 1: Technical Documentation).

## FINDINGS

- In most states, rural minority racial/ethnic groups, particularly black, Hispanic, and American Indian/Alaska Native groups, had levels of inadequate prenatal care in the "worst" or "worse than mid-range" categories. Rural non-Hispanic whites, on the other hand, rarely had levels of inadequate prenatal care in the "worst" or "worse than mid-range" categories. (See Figures 1-5; see Appendix 2 for actual rates.)
- Texas, New Mexico, and Hawaii, however, had levels of inadequate prenatal care in the "worst" or "worse than mid-range" categories both for rural minority racial/ethnic groups and for non-Hispanic whites.
- There were a few states that achieved levels of inadequate prenatal care in the "mid-range" or "better than mid-range" categories for rural minority racial/ethnic groups. For example, in Mississippi, non-Hispanic blacks had a "better than mid-range" level of inadequate prenatal care (Figure 3).

## LIMITATIONS

Small numbers of rural births to racial and ethnic minority groups limit the ability to examine inadequate prenatal care levels in some states. Because of differences in the way that prenatal care data were reported on the 1989 and the 2003 birth certificate versions, we have compared states using standardized levels of inadequate prenatal care rather than their actual percentages of inadequate prenatal care.

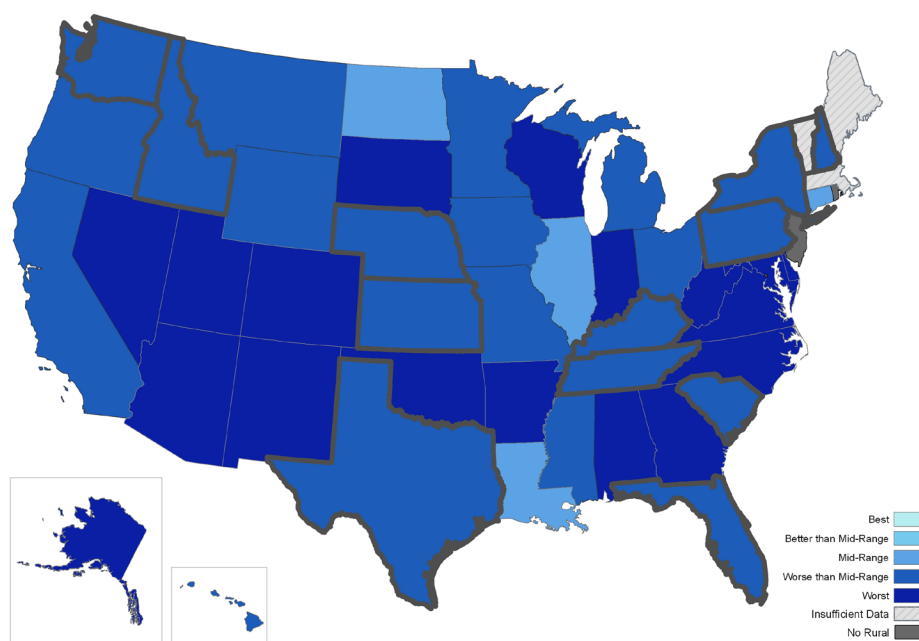
## CONCLUSIONS

Across the United States in 2005 there were high levels of inadequate prenatal care among rural women from racial/ethnic minority groups, especially women from black, American Indian/Alaska Native, and Hispanic groups.

## IMPLICATIONS FOR POLICY, DELIVERY, OR PRACTICE

Despite states' efforts over more than two decades to increase access to prenatal care by expanding Medicaid insurance coverage, simplifying eligibility and enrollment processes, and developing outreach strategies to support these efforts,<sup>5,6</sup> there are still high levels of inadequate prenatal care among black, American Indian/Alaska Native, and Hispanic groups living in rural areas. The Affordable Care Act expands insurance coverage for pregnancy care and supports access to prenatal care for all women.<sup>7</sup> Insurance coverage for prenatal care may not be enough, however, if services are not available because of insufficient provider supply or if patients are unable to access services due to long distances to provider offices, language barriers, or other obstacles. Targeted strategies to improve use of prenatal care by rural minority racial and ethnic groups are needed.

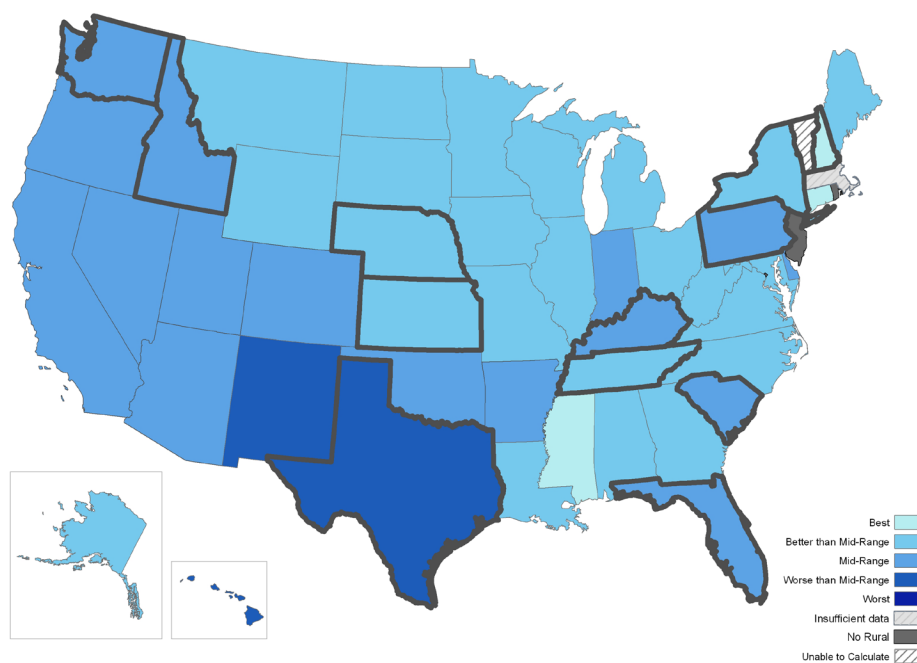
**Figure 1: Rural Inadequate Prenatal Care by State for Hispanics, 2005**



Map Date: August 2013  
Data Source: 2005 Period Linked Birth/Infant Death  
Data Set: NCHS, CDC, Dept. of Health and Human Services

States with bold outlines used the 2003 version of the birth certificate.  
All other states used the 1989 version of the birth certificate.

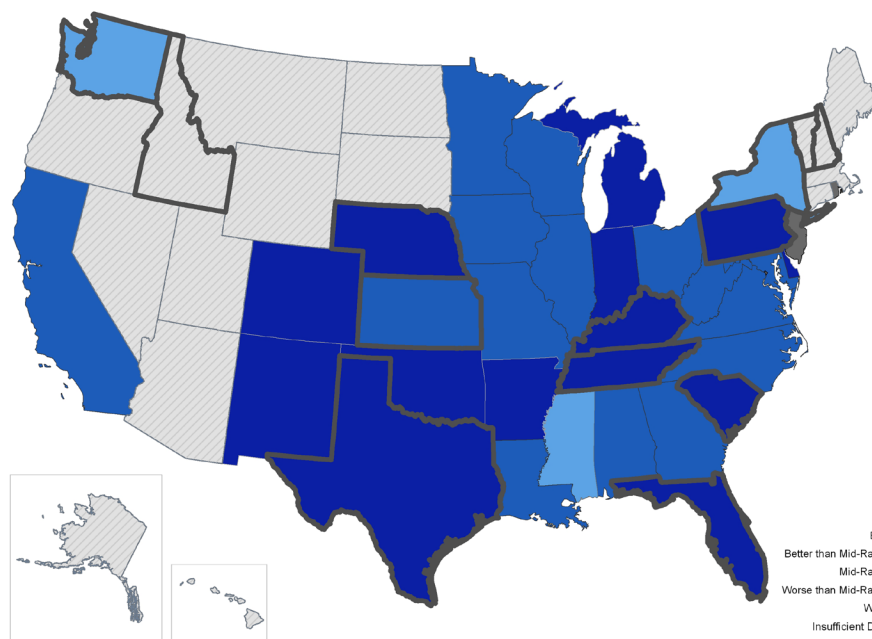
**Figure 2: Rural Inadequate Prenatal Care for Non-Hispanic Whites, 2005**



Map Date: August 2013  
Data Source: 2005 Period Linked Birth/Infant Death  
Data Set, NCHS, CDC, Dept. of Health and Human Services

States with bold outlines used the 2003 version of the birth certificate.  
All other states used the 1989 version of the birth certificate.

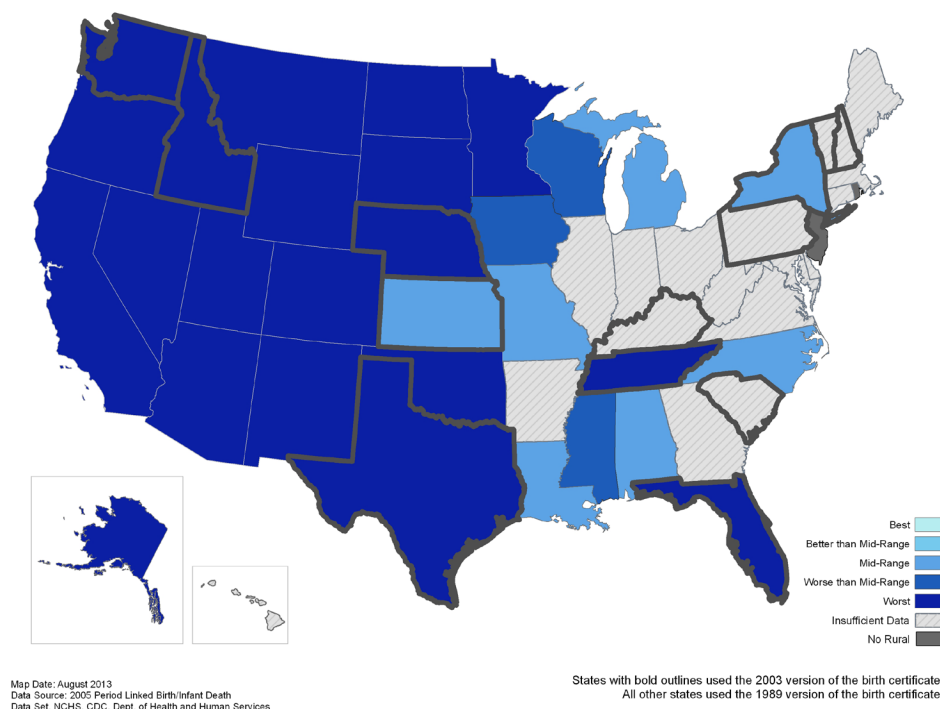
**Figure 3: Rural Inadequate Prenatal Care by State for Non-Hispanic Blacks, 2005**



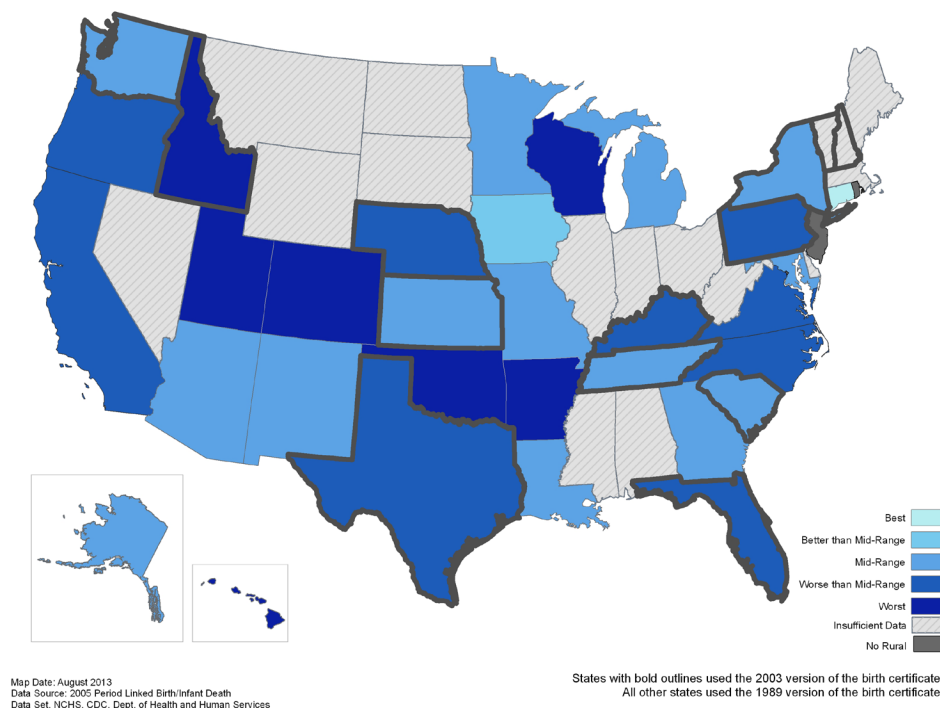
Map Date: August 2013  
Data Source: 2005 Period Linked Birth/Infant Death  
Data Set, NCHS, CDC, Dept. of Health and Human Services

States with bold outlines used the 2003 version of the birth certificate.  
All other states used the 1989 version of the birth certificate.

**Figure 4: Rural Inadequate Prenatal Care by State for Non-Hispanic American Indians/Alaska Natives, 2005**



**Figure 5: Rural Inadequate Prenatal Care by State for Non-Hispanic Asians/Pacific Islanders, 2005**



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1. Baldwin L-M, Fordyce MA, Doescher MP. *Low Birth Weight Rates Among Racial and Ethnic Groups in the Rural United States, 2005*. Policy Brief #139. Seattle, WA: WWAMI Rural Health Research Center, University of Washington; 2013.
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7. U.S. Department of Health and Human Services, Health Resources and Services Administration. Women's preventive services guidelines: Affordable Care Act expands prevention coverage for women's health and well-being. <http://www.hrsa.gov/womensguidelines/>. Accessed October 7, 2013.

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## APPENDIX 1:

# Technical Documentation: 1989 and 2003 Birth Certificate Version Differences and Standardization of Inadequate Prenatal Care Variables Using Z-Scores

### 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.

### BIRTH CERTIFICATE VERSIONS

In 2005, two versions of the birth certificate were in use: the 1989 and 2003 revisions of the U.S. Standard Live Birth Certificate. The 2003 revision was phased in at the state level over a period of years. As of 2005, 13 states were using the 2003 revision: Pennsylvania, Washington, Florida, Idaho, Kentucky, New Hampshire, South Carolina, Tennessee, Kansas, Nebraska, Texas, New York State (except for New York City), and Vermont (from July 1 through December 31, 2005). New York City used the 1989 version throughout 2005, and Vermont used the 1989 version from January 1 through June 30, 2005. All other states were using the 1989 version.

### VARIATION IN DATA COLLECTION BETWEEN THE 1989 AND 2003 BIRTH CERTIFICATE VERSIONS

The 1989 and 2003 versions of the birth certificate gathered data on prenatal care use differently.\* In the 2003 revision, “month prenatal care began” was changed to “date of first prenatal visit.” Additionally, the 2003 revision recommends that prenatal care records or medical records serve as the source for prenatal care information; the 1989 version makes no recommendation. Because of these differences, the values for the adequacy of prenatal care variable are

not comparable across the two birth certificate versions, and require separate analysis.

### HANDLING OF CASES WITH DIFFERING BIRTH CERTIFICATE VERSIONS BETWEEN BIRTH STATE AND MOTHER’S RESIDENCE STATE

The mother’s state and county of residence were used to define geography-based variables (i.e., state, adjacency to urban county), not the state and county in which the birth occurred. If the mother’s state of residence was different than the state in which the birth occurred, and those two states used different versions of the birth certificate, the adequacy of prenatal care variable from the birth certificate would not be compatible with that from the mother’s residence state. Therefore, for analyses including the adequacy of prenatal care variable, we excluded those births in which the birth state differed from the mother’s state of residence, and these two states used different versions of the birth certificate. This mismatch in birth certificate version affected 46,651 births (1.2%). These exclusions did not apply to analysis of variables that were consistent between the two birth certificate versions, such as low birth weight.

Vermont and New York posed special problems in this regard. For Vermont, which used the 1989 birth certificate revision from January through June 2005 and the 2003 revision from July through December 2005, assignment to mismatch status for the purposes of the inadequate or late prenatal care analysis was based on the version of the birth certificate in use at the time of birth. We handled the assignment of mismatch status for New York State and New York City in the same way. If a New York City resident gave birth elsewhere in New York State or outside New York State, and the birth certificate in use at the birth location was the 2003 birth certificate revision, this birth was considered to have a birth certificate mismatch, because New York City was using the 1989 revision. Likewise, if a New York State resident gave birth in New York City or in another state that used the 1989 birth certificate version, this birth was considered

to have a birth certificate mismatch, because New York State was using the 2003 version. These Vermont and New York birth certificate mismatches are included in the total 46,651 births noted above.

## STANDARDIZING VARIABLES FROM DIFFERENT BIRTH CERTIFICATE VERSIONS FOR COMPARABILITY

Because of differences in the definition of prenatal care utilization between the 1989 and 2003 birth certificate versions (see Variation in Data Collection Between the 1989 and 2003 Birth Certificate Versions section above), we conducted the inadequate prenatal care analyses separately for states using the two different birth certificate versions. However, we wanted to rank the levels of inadequate care across all U.S. states on the same map. To do so, we used the following method to standardize each state's rate of inadequate prenatal care to a Z-score that was comparable across all states. A Z-score is the number of standard deviations that an observation is above or below the population mean. This unitless measure is calculated by subtracting the population mean from each observation and dividing the result by the standard deviation.

We first calculated the standard deviation (SD) for the percent of inadequate prenatal care by state, based on the 1989 and 2003 birth certificate versions separately. We removed from the analysis those outlier states whose rates of inadequate prenatal care were more than 3 SDs from the mean inadequate prenatal care rates, and recalculated the SDs and mean rates. We calculated Z-scores for each state and used the following groupings to map the Z-scores:

Best	Less than or equal to -1.51
Better than mid-range	-1.50 to -0.49
Mid-range	-0.50 to +0.50
Worse than mid-range	+0.51 to +1.50
Worst	Greater than or equal to +1.51

For the maps representing inadequate prenatal care for racial and ethnic subgroups, we calculated Z-scores using the mean rates and SDs for all births nationally to ensure comparability across all subgroups.

For Vermont, which used the 1989 birth certificate version in the first half of 2005 and the 2003 birth certificate version in the second half of 2005, we were either unable to standardize across the entire year or had insufficient data to report, and therefore we were unable to map these results. Thus, we opted to leave Vermont results out of the prenatal care maps. Results

for the individual six-month data periods for Vermont are available in Appendix 2, if sufficient data support reporting.

## RELIABILITY OF ESTIMATES

We have suppressed the results for any state if they did not meet criteria for ensuring their reliability (see Figures 1-5 and Appendix 2). First, we calculated relative standard errors (RSEs) and suppressed the results for states with an RSE of greater than 30%. Second, we suppressed the results for states with less than 30 observations (e.g., a total of 19 rural births within a state) or a numerator of less than 5 (e.g., a total of 3 rural births with inadequate prenatal care within a state).

## DESIGNATION OF INADEQUATE PRENATAL CARE

NCHS calculates the inadequate prenatal care variable based on the Adequacy of Prenatal Care Utilization Index (APNCU), and includes the calculated variable\* in the data file. This index accounts for the month prenatal care began, the number of prenatal visits, and gestational age at birth as reported on the birth certificate.

## DESIGNATION OF RURAL COUNTIES

We used the 2003 Urban Influence Codes (UIC) developed at the Economic Research Service, USDA,† to identify non-metropolitan (referred to as rural) counties (UIC = 3-12). Rhode Island, New Jersey, and the District of Columbia had no rural counties and therefore have no data represented on the maps.

\* U.S. Department of Health and Human Services. *Detailed Technical Notes, United States, 2005 Natality*. Hyattsville, MD: USDHHS, Centers for Disease Control and Prevention, National Center for Health Statistics; 2008.

† 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 2: Rural Inadequate Prenatal Care Rates by Race/Ethnicity and State, 2005

State	Hispanic		Non-Hispanic White		Non-Hispanic Black		Non-Hispanic AI/AN		Non-Hispanic Asian/PI	
	Total Rural Births	% Rural Inadequate Prenatal Care	Total Rural Births	% Rural Inadequate Prenatal Care	Total Rural Births	% Rural Inadequate Prenatal Care	Total Rural Births	% Rural Inadequate Prenatal Care	Total Rural Births	% Rural Inadequate Prenatal Care
States using 1989 birth certificate version										
Alabama	1,472	49.3	10,444	7.9	4,035	19.0	72	15.3	~	~
Alaska	175	22.3	1,369	10.4	~	~	1,593	32.1	124	13.7
Arizona	2,631	22.7	3,903	11.8	~	~	2,476	32.5	87	12.6
Arkansas	933	25.8	9,634	12.1	2,341	22.1	~	~	90	20.0
California	2,078	16.0	5,900	12.2	74	18.9	448	25.9	169	17.8
Colorado	2,516	24.8	5,010	12.7	32	28.1	149	26.2	51	23.5
Connecticut	270	13.3	2,539	5.0	~	~	~	~	76	0.0
Delaware	504	73.0	1,209	12.0	426	25.6	~	~	~	~
District of Columbia	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Georgia	2,444	34.1	13,759	9.3	7,174	17.4	~	~	188	14.9
Hawaii	899	17.9	1,314	17.9	~	~	~	~	2,392	23.3
Illinois	826	13.3	16,068	6.9	602	18.8	~	~	~	~
Indiana	1,160	26.1	15,801	13.2	203	25.6	~	~	~	~
Iowa	1,267	18.1	13,733	6.7	185	20.5	82	18.3	186	9.1
Louisiana	292	15.1	9,356	5.7	5,732	18.0	89	11.2	137	12.4
Maine	~	~	5,100	6.6	~	~	~	~	~	~
Maryland	209	26.8	2,604	9.4	539	19.5	~	~	71	14.1
Massachusetts	~	~	~	~	~	~	~	~	~	~
Michigan	989	16.7	17,111	8.1	156	25.6	388	10.8	157	11.5
Minnesota	1,233	19.2	14,260	7.0	220	19.1	660	31.5	215	13.5
Mississippi	510	19.6	10,739	5.0	10,426	15.3	206	19.4	~	~
Missouri	719	17.8	17,006	8.6	779	20.0	82	12.2	148	11.5
Montana	210	16.7	5,550	8.8	~	~	1,094	31.0	~	~
Nevada	549	27.5	1,978	13.0	~	~	101	29.7	~	~
New Jersey	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
New Mexico	4,572	25.5	2,789	16.3	159	24.5	1,550	35.0	106	14.2
North Carolina	4,353	21.2	19,338	7.4	7,143	17.9	1,210	12.1	353	16.1
North Dakota	99	14.1	3,101	6.7	~	~	725	28.6	~	~
Ohio	752	20.6	24,772	9.4	369	19.0	~	~	~	~
Oklahoma	1,359	24.6	11,426	15.0	558	22.8	2,979	22.3	201	28.9
Oregon	1,512	20.2	6,716	11.6	~	~	345	24.9	148	18.9
Rhode Island	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
South Dakota	123	26.8	4,072	9.5	~	~	1,383	38.0	~	~
Utah	422	24.6	4,160	11.2	~	~	263	34.6	44	36.4
Vermont†	~	~	1,637	6.7	~	~	~	~	~	~
Virginia	691	24.2	8,402	8.5	1,972	20.3	~	~	71	15.5
West Virginia	46	26.1	8,338	10.0	222	20.7	~	~	~	~
Wisconsin	857	22.3	15,153	10.2	64	18.8	504	17.1	224	24.6
Wyoming	514	18.3	3,769	10.2	~	~	266	27.4	~	~
States using 2003 birth certificate version										
Florida	2,198	32.2	7,565	17.8	1,612	25.4	61	29.5	116	19.8
Idaho	1,264	27.8	5,640	16.3	~	~	141	40.4	80	26.3
Kansas	2,239	27.6	9,180	12.4	379	19.5	111	16.2	179	17.9
Kentucky	413	32.0	20,018	16.4	626	25.7	~	~	93	23.7
Nebraska	1,558	25.9	7,356	12.5	32	34.7	107	30.8	90	22.2
New Hampshire	58	24.1	3,778	9.1	~	~	~	~	~	~
New York	688	21.7	14,457	12.5	378	18.0	156	14.7	171	15.8
Pennsylvania	662	32.0	17,053	16.0	321	31.5	~	~	152	20.4
South Carolina	1,185	36.0	5,807	15.1	5,371	26.3	~	~	108	17.6
Tennessee	939	37.9	15,162	14.3	1,101	32.2	35	25.7	113	16.8
Texas	18,088	30.6	18,920	20.8	2,866	31.0	117	29.1	230	23.5
Vermont†	~	~	1,863	8.1	~	~	~	~	~	~
Washington	2,081	25.5	5,745	17.3	79	16.5	330	30.3	204	18.6

~ = insufficient data.

† = Vermont used the 1989 revision of the birth certificate from January 1 through June 30, 2005, and the 2003 revision from July 1 through December 31, 2005.

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

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