Southwest Rural HEALTH RESEARCH CENTER

Trends in Singleton Preterm Birth by Rural Status in the U.S., 2012-2018

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Purpose

This study examines rates of singleton preterm birth by rurality and census region across the United States for the years 2012-2018. It also presents variations by maternal characteristics, including race and ethnicity, payment method, and participation in the Special Supplemental Nutrition Program for Women, Infants and Children (WIC) during pregnancy among women who live in counties with different levels of rurality.

Background

One in ten infants in the U.S. is born before 37 weeks of pregnancy, amounting to over 380,000 preterm births every year.[1] Preterm birth is a major contributor to infant mortality.[2] For example, more than 20,000 children die every year in the U.S. before their first birthday, with almost 70% of such deaths attributable to preterm birth.[3] After birth defects, preterm birth is the second cause of infant mortality in the U.S.[4] Among developed countries, the U.S. has the highest rates of both preterm birth and infant mortality, with rates approximately 10% higher than that of other developed nations.[5]

While there have been several studies that examined preterm birth in the U.S., these studies have mostly focused on individual risk factors including sociodemographic characteristics, access to health insurance, and maternity care. Kozhimannil and colleagues reported that access to obstetric services from 2014-2018 declined due to hospital and obstetric unit closures, particularly in rural areas.[6] The biggest declines were seen in rural counties not adjacent to urban areas, with the least populated rural areas adjacent to urban areas being the least likely to have obstetric services. However, it is unclear how maternal characteristics associate with preterm birth by geographical location. *The purpose of this brief is to examine the variation in prevalence of preterm birth across rural and urban communities and provide policy recommendations to improve maternal and infant health outcomes.*

Key Findings

- The preterm birth rate (number of live-births before 37 weeks of gestation) for singleton pregnancies in the U.S. from 2012-2018 was 7.9%, increasing every year since 2014 in both rural and urban areas.
- The singleton preterm birth rate was higher for women residing in rural areas compared to women residing in urban areas (8.3% vs. 7.9)% overall. Throughout the period of 2012-2018, the rural preterm birth rate has remained consistently higher than the urban preterm birth rate.
- Higher rural vs. urban preterm birth rates in the U.S. were driven by higher rates in the rural South and West U.S. Census Regions, while in the Northeast and Midwest regions the rural rates were lower than the urban preterm birth rates. The highest rate of preterm birth was in the rural South†, where almost one out every 10 singleton births (9.6%) was born preterm.
- The preterm birth rate was higher for rural women across all racial and ethnic groups, but especially for non-Hispanic Black women who have the highest preterm birth rate in the U.S., in both rural (12.5%) and urban (11.3%) areas.

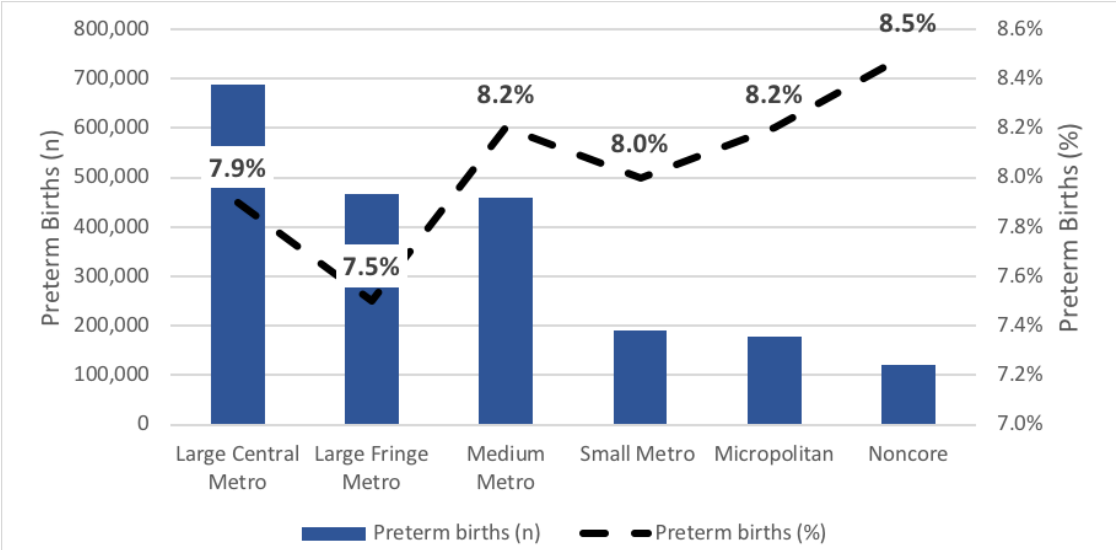
† You can find a map of the U.S. Census Regions in Appendix 1. To see a list of states per census region: https://www2.census.gov/geo/pdfs/maps-data/maps/reference/us_regdiv.pdf.

Methods

To examine the trend in preterm birth by rurality in the U.S., all-county natality files for 2012-2018 were obtained from the National Center for Health Statistics (NCHS). The 2013 NCHS Rural-Urban categorization for counties was used to determine rurality.[7,8] The NCHS scheme identifies six categories: large central metropolitan areas, large fringe metropolitan areas, medium metropolitan areas, small metropolitan areas, micropolitan areas, and non-core areas. From a broader perspective, the first four categories are considered urban areas while the last two categories are considered rural areas.

Preterm birth rates for the seven-year period between 2012-2018 were obtained by dividing the number of live births that occurred before the 37th week of gestation by the number of live births in the county of residence of the mother.[9] Because multiple births have a shorter average gestational length, only singleton births (births of only one child during a single delivery) were included in the analysis. Singleton births represent 96.5% of all births in the period. The analytic data set included 26.5 million singleton U.S. birth certificate records. Preterm birth rates were estimated by level of rurality and census region, as well as maternal characteristics including race and ethnicity, source of payment, and WIC participation. Rates of preterm birth (before 37 weeks of gestation) are based on obstetric estimates of gestational age.[††]

Figure 1. Singleton Preterm Birth Rates by Rural Classification, 2012-2018



Results

The preterm birth rate for singleton births in the period between 2012-2018 was 7.9%. The rate for rural births was 8.3% compared to 7.9% for births to mothers who were urban residents ($p<0.001$). **Figure 1** shows the inverse relationship between urbanicity and preterm birth, with the exception of large fringe metropolitan counties, which have the lowest rate of preterm birth (7.5%) while the highest preterm birth rate was to women residents of non-core, rural counties (8.5%).

Table 1 presents the main demographic characteristics of women giving birth in the U.S., 2012-2018 by urban and rural residence of the mother (not by occurrence of birth location). Only singleton births are included in the analysis; singleton births represent 96.5% of all births. Eighty-six percent of all singleton births occurred in mothers who reside in metropolitan areas while only 14% occurred in rural residents. This is the same distribution as for all births in the period (singleton and multiples). Most urban mothers in 2012-2018 lived in

[††] Beginning in 2014, the NCHS transitioned to using the obstetric estimate as the new standard for estimating the gestational age of the newborn in place of the previous estimate based on the date of the last normal menses.[10] Obstetric estimate of gestational age is available in birth certificate files since 2007 and is the standard used in this analysis.

the South (38%) and West (26%) regions of the country, while rural mothers are mainly South (44%) and Midwest (26%) residents. Women who lived in rural counties were, on average, two years younger than women in urban counties (26.8 vs. 28.7 years). They were more likely to be under 20 years old and less likely to be 35 years or older than their urban counterparts. Mothers in urban counties were more diverse than in rural counties. While 74% of mothers in rural counties were non-Hispanic Whites, only 51% of urban women were non-Hispanic Whites. Mothers in urban areas were more likely to have greater than a high school education when compared to mothers residing in rural counties (61% vs. 52%). They were also more likely to be married (60% vs. 56%). While the mean number of children was very similar between urban and rural mothers (2.1 vs. 2.2 children, respectively), it is important to remember that rural mothers were on average two years younger than urban mothers who had given birth during the study period. This is better illustrated by comparing the mean age of first-time mothers, which was 24.1 years for rural women vs. 26.6 years for urban women. Urban mothers were more likely to pay for their labor and delivery with private insurance and less likely to receive WIC program assistance compared to rural mothers. Because of the large sample size, all rural vs. urban differences described, are statistically significant.

Table 1. Demographic Characteristics of Mothers by Rural and Urban Status, Singleton Births 2012-2018 (N=26.5 Million)*

	Urban Areas	Rural Areas
Preterm Birth Rate	7.9%	8.3%
Census Region		
Northeast	17%	8%
Midwest	19%	33%
South	38%	44%
West	26%	15%
Age, mean (SD)	**28.7 (5.9)**	**26.8 (5.6)**
<20	6%	9%
20-34	77%	81%
35+	17%	10%
Race and Ethnicity		
Non-Hispanic White	51%	74%
Non-Hispanic Black	16%	9%
Hispanic	25%	12%
Other	8%	5%
Education		
Less than High School	14%	17%
High School	25%	31%
More than High School	61%	52%
Marital Status		
Married	60%	56%
Not Married	40%	44%
Parity, mean (SD)	**2.1 (1.3)**	**2.2 (1.3)**
First birth	40%	37%
2nd-3rd birth	48%	49%
4th+ birth	12%	14%
Age of first birth, mean (SD)	**26.6 (5.9)**	**24.1 (5.2)**
Payer		
Private Insurance	50%	40%
Medicaid	42%	50%
Self-pay	4%	5%
Other	4%	5%
WIC Participation	**40%**	**48%**

*all differences are statistically significant ($p<0.001$)

Time trends

Figure 2 shows the decreasing trend in preterm birth rates from 2012-2014, followed by a steady increase since 2014 in both urban and rural counties. The rural and urban difference remained fairly constant across the period, with rural preterm birth rates about 6.4% higher than urban preterm birth rates (OR = 1.064, 95% CI = 1.059; 1.068).

Census Regions

Regionally, almost two out of every five births in the U.S. (39% of singleton births) occurred in the South, 24% in the West, 21% in the Midwest, and 16% in the Northeast. The South also has the highest rate of preterm birth in both rural (9.6%) and urban areas (8.7%). The higher rural vs. urban preterm birth rate observed at the national level is only present in the South and the West regions. However, these two regions account for 63% of all births and 60% of all rural births in the U.S. In contrast, the Northeast and the Midwest rural preterm birth rates are lower than the rates in urban counties (**Figure 3**).

Figure 2. Annual Singleton Preterm Birth Rates by Rural Classification, 2012 – 2018

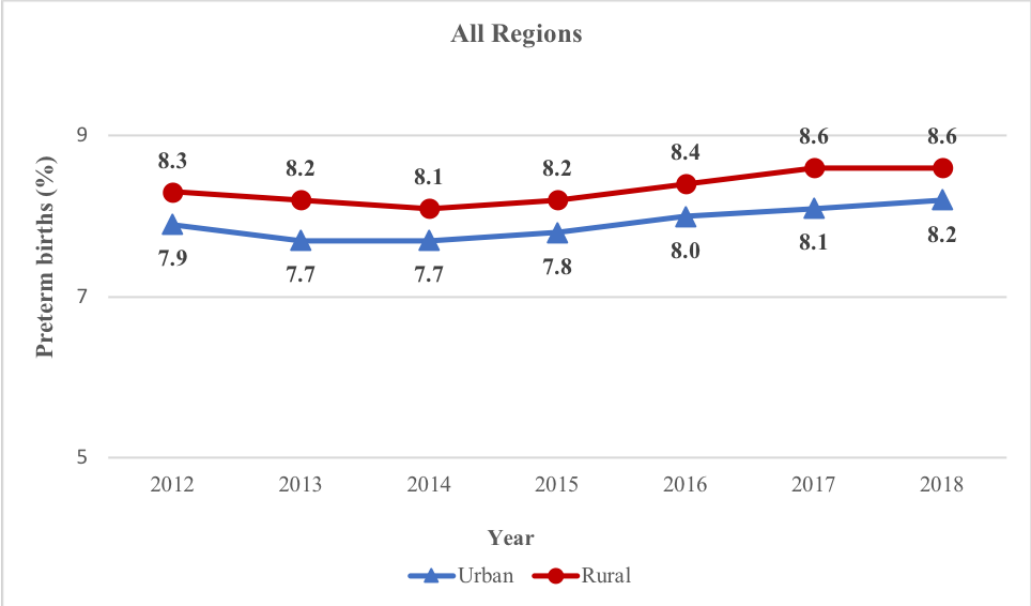
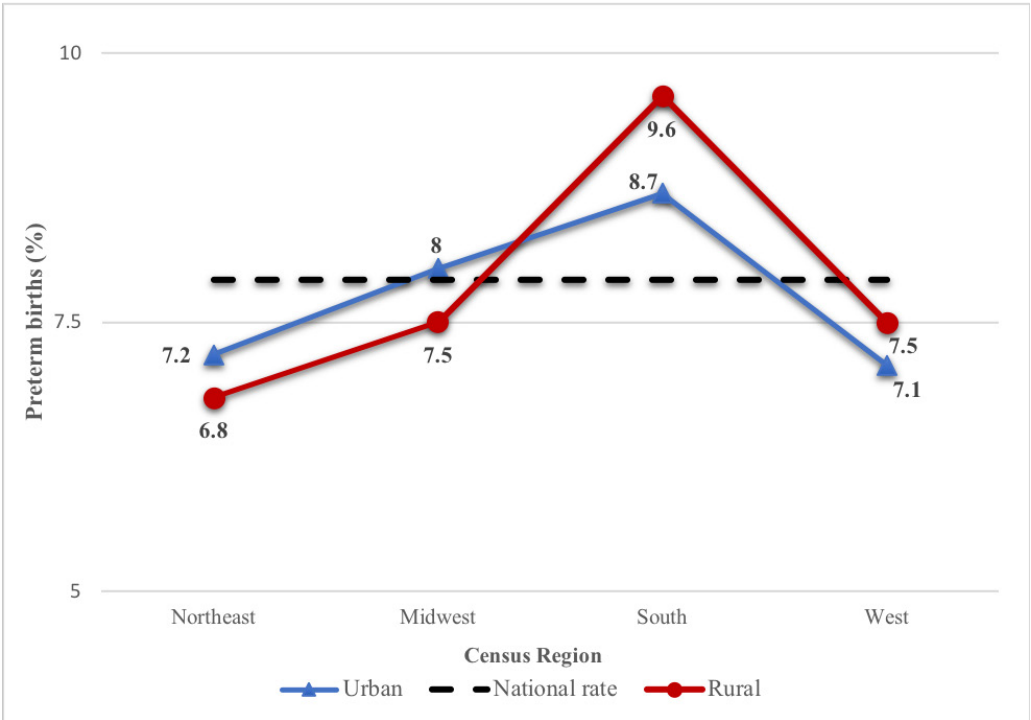
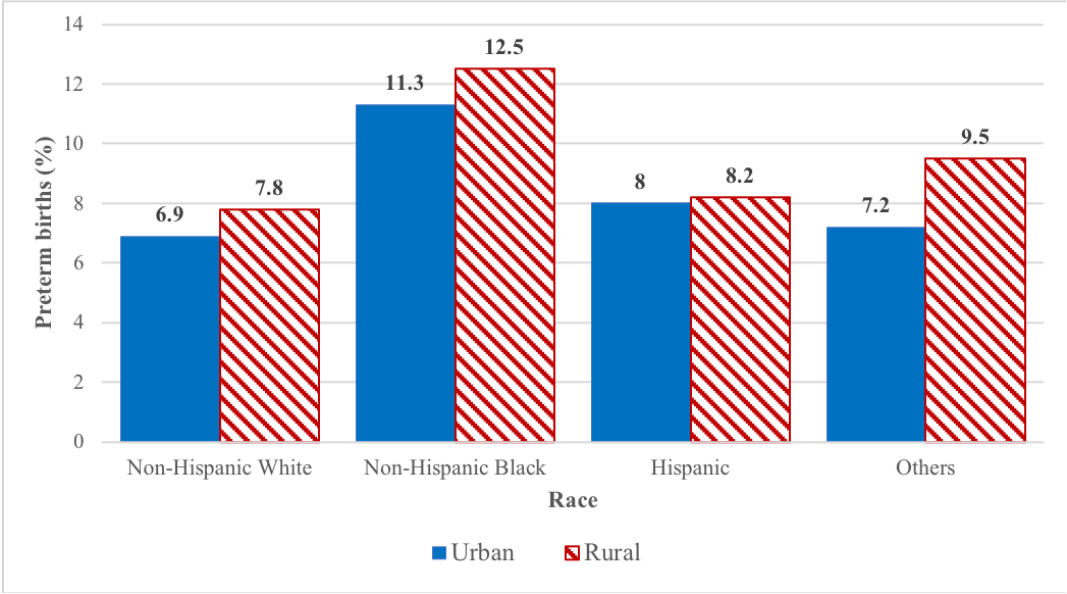


Figure 3. Singleton Preterm Birth Rates by Census Region and Rural Classification, 2012 - 2018



For all racial and ethnic groups, rates of preterm birth are higher for rural residents compared to urban residents. Non-Hispanic Black mothers have the highest rate of preterm birth, especially if they are rural residents. In contrast, non-Hispanic White mothers living in urban counties had the lowest rates of preterm birth (**Figure 4**). Hispanic mothers have the smallest urban-rural differences in preterm birth rates.

Figure 4. Singleton Preterm Birth Rates by Race and Ethnicity and Rural Classification, 2012 - 2018



Health Insurance and WIC participation

Private insurance and Medicaid are the main sources of payment for labor and delivery in the U.S. Half of mothers in urban areas had private insurance, compared to 40% in rural counties where the main payer for delivery was Medicaid (**Table 1**). Women covered by private insurance had the lowest rates of preterm birth, followed by those self-paying or with other payment sources, including Indian Health Service, TRICARE (military health coverage), or other local or state government programs (**Table 2**). Women with Medicaid have the highest rates of preterm birth, particularly in rural counties, however these analyses were not adjusted for differences in maternal characteristics. Preterm birth rates were higher among rural residents across all sources of payment for labor and delivery, except among those self-paying. For that group, which makes up 4% of urban mothers and 5% of rural mothers, the preterm birth rate is slightly higher among urban residents compared to rural residents (7.4% vs. 7%) (**Table 2**).

The WIC program is a federal assistance program that provides supplemental nutrition to low income pregnant women, breastfeeding women, and children under the age of five. Four out of ten pregnant women in 2012-2018 received WIC during pregnancy. This number is higher among women living in rural areas (48% compared to 40% in urban areas) (**Table 1**). To be eligible for WIC and Medicaid, women must have an income at or below a certain level set by their state of residence. Women who received WIC had higher preterm birth rates than those who did not receive WIC, which is consistent with the findings for women covered by government insurance (i.e. Medicaid). Preterm birth rates were higher among women in rural areas compared to those residing in urban areas, regardless of WIC participation **(Table 2)**.

Table 2. Singleton Preterm Birth Rates by Source of Payment, WIC participation and Rural Classification, 2012-2018

	Urban Areas	Rural Areas
Payment Method		
Private Insurance	6.9	7.2
Medicaid	9.1	9.4
Self-Pay	7.4	7.0
Other	7.9	8.0
WIC		
Yes	8.4	8.8
No	7.6	7.8

Discussion

Preterm birth rates were higher in rural vs. urban areas throughout the period of 2012-2018, although differences were small. Higher rural vs. urban preterm birth rates in the U.S. were driven by higher rates in the rural South and West regions, while in the Northeast and Midwest regions the rural rates were lower than the urban preterm birth rates. The rural South region had a preterm birth rate of 9.6%, which is higher than the urban South (8.7%) and the national rate for singleton births (7.9%). The highest preterm birth rate across all racial and ethnic groups was found among non-Hispanic Black women living in rural counties of the U.S. (12.5%), but even in urban areas the preterm birth rate for non-Hispanic Black mothers was higher than for any other group at 11.3%. This is consistent with numerous other studies. Previous studies finding higher rates of preterm birth and other poor birth outcomes among non-Hispanic Black women attributed these differences to exposure to environmental factors across the life course, including interpersonal and systemic racial discrimination.[11,12,13] Racial disparities are partially responsible for regional differences in rural and urban disparities. While the racial and ethnic composition of urban areas is much more diverse than rural areas, where almost three fourths of the population is non-Hispanic White, there are important regional differences. The South and the West, which are the two regions with higher rural vs. urban rates of preterm birth, are the two most diverse regions in the U.S., with 50% of mothers in these regions belonging to a minority group. In contrast, mothers in the Northeast and Midwest regions, particularly rural residents, are largely non-Hispanic Whites.

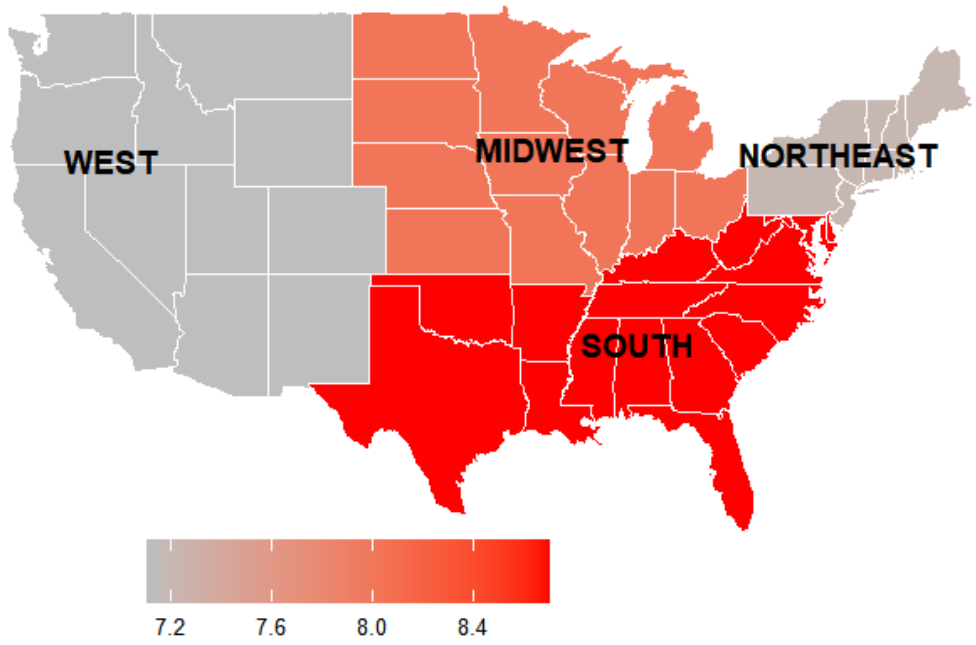
Socioeconomic status and access to healthcare services are also important factors when trying to understand disparities in preterm birth.[14] Rural residents are less likely to have private insurance through their jobs, more likely to be uninsured, and have higher rates of poverty.[15] This was referred to as "triple jeopardy" by Rowland & Lyons in 1989 [16], but it continues to be a problem in rural communities that have also seen a decrease in access to healthcare services in general and obstetric services in particular, due to hospital closures.[6,17] For the study period, women with public insurance like Medicaid and those receiving WIC benefits had higher rates of preterm birth than those with private insurance or who were not WIC participants. Medicaid and the WIC program are intended to serve as a safety net for low income families, especially around critical developmental periods such as pregnancy and early childhood. Participation in the WIC program has been associated with lower rates of preterm birth and infant mortality for low-income women.[18] Both Medicaid and WIC participation occurred at higher rates among women who are rural residents, but WIC participation declined every year during the period of 2012-2018, with the largest single-year decline in the history of the program, a 6% reduction from 2017, observed in 2018.[19] This decline was observed in both urban and rural residents and it is a cause of concern given that the preterm birth rate has been consistently increasing since 2014.[1] While the reason for the increase in premature births is not clear, lack of access to maternal care services and low socioeconomic status increase the risk of having a preterm birth. Race and ethnicity are also associated with a higher risk of prematurity.[20]

Implications

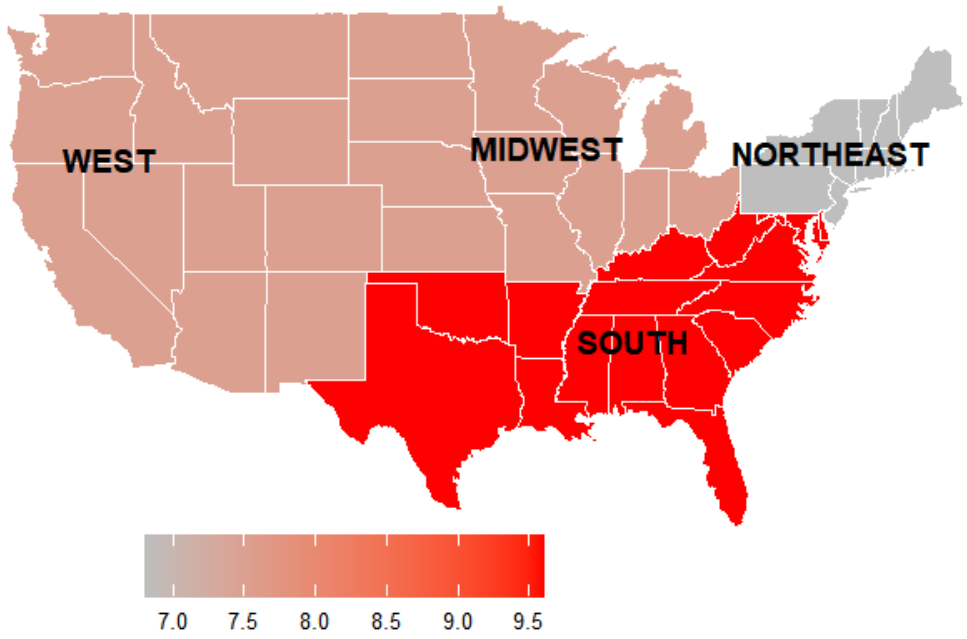
This study focused on differences in preterm birth rates by rurality in the seven-year period between 2012-2018. The rural preterm birth rate was consistently higher than the urban preterm birth rate during this period. Women in rural areas are known to have a higher prevalence of factors associated with higher rates of preterm birth such as less access to comprehensive healthcare services and lower socioeconomic status. Higher rural vs. urban preterm birth rates persist across all race and ethnic groups, main payment sources for delivery, and WIC participation during pregnancy. This suggests that rurality may exacerbate the effects of socioeconomic disadvantage and minority status and highlights the importance of health assistance programs, like WIC and Medicaid, for pregnant women, mothers, and children, particularly in rural communities. Risk for infant and maternal mortality and morbidity are higher for residents in rural areas spotlighting the need for healthcare policies to support obstetric care access in rural communities. Programs to address preterm birth in rural areas need to address different levels of risk and target individuals and regions who are at a higher risk, particularly pregnant non-Hispanic Black women who reside in the rural South.

Appendix 1

Regional Urban Preterm Birth Rate (U.S., 2012-2018)



Regional Rural Preterm Birth Rate (U.S., 2012-2018)



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