

## Rural and Urban Hospital Characteristics by Obstetric Service Provision Status, 2010-2018

Julia D. Interrante, MPH

Lindsay K. Admon, MD, MSc

Mariana S. Tuttle, MPH

Bridget Basile Ibrahim, PhD, MA

Katy B. Kozhimannil, PhD, MPA

### Key Findings

- Rural and urban hospitals that provide obstetric services differ substantially in terms of hospital size, number of births, and community characteristics like population density and remoteness.
- Among rural hospitals, those hospitals that stopped providing obstetric care tended to be smaller and more likely to be located in remote rural areas or in majority Black rural counties.
- These differences have implications for access to safe obstetric care for rural and urban residents, and for rural residents of communities that have recently lost obstetric services.
- All communities need a plan to provide obstetric services. For all hospital types, including rural hospitals that stopped providing obstetric care, about 1 in 5 local residents were women of reproductive age. Policies aimed at improving maternal health should be tailored for geography.

### Purpose

Rural communities in the United States have higher rates of both infant and maternal mortality, as well as serious pregnancy complications; this may be exacerbated by limited health care access.<sup>1,2</sup> For both women and infants, risk of death is elevated among Black and Indigenous people.<sup>3</sup> Addressing these health disparities, and improving maternal and child health for all rural residents, requires a thorough understanding of the obstetric care landscape. The purpose of this policy brief is to illustrate the differences between urban and rural hospitals that provide obstetric services by their size, capacity, location, and community characteristics, as well as to compare these factors between rural hospitals with obstetric services and those that recently closed their obstetric units.

### Background and Policy Context

Hospital-based obstetric services have been consistently declining in recent years in rural United States communities, potentially impacting the more than 18 million women of reproductive age that live in rural counties;<sup>4</sup> obstetric services loss has not occurred in urban areas.<sup>5,6</sup> More than 50 rural counties lost hospital-based obstetric care between 2014-2018, following a decade of declining access, and in 2018, 56% of rural counties had no hospital-based obstetric care.<sup>6</sup> These losses create access challenges for pregnant rural residents and are associated with an increased risk of births in hospital emergency departments and out-of-hospital births.<sup>5</sup> There are also potential consequences for the infant, as the loss of hospital-based obstetric care has been associated with higher rates of preterm birth in rural counties nonadjacent to urban areas.<sup>5</sup>

The availability of obstetric care, and the clinical capacity (or “maternal level of care”) of hospitals that provide these services, underpins many clinical and policy efforts to improve maternal health.<sup>7</sup> To date, efforts to ascertain capacity through the designation of “maternal levels of care”<sup>7</sup> have laid out clinical capacity for higher acuity services at higher level facilities, but have not comprehensively addressed the changing rural context, where “level 1” facilities are difficult to maintain, so hospitals are closing units or shutting down entirely.

In December 2020, the United States Surgeon General announced a new strategy to combat maternal mortality focused on workforce development, increasing hospital participation

in national quality programs, and reporting measures of maternal health equity.<sup>8</sup> As federal efforts to improve maternal health broadly are rolled out in communities across the United States, there is a need for tailored information about rural-urban differences in obstetric care capacity and about the rural hospitals at greatest risk of closing their obstetric units. This analysis describes rural and urban hospitals that provided obstetric services in 2018 and compares characteristics of these hospitals against those of rural hospitals that stopped providing obstetric care between 2010-2018.

## Approach

Data from 2010 through 2018 from the American Hospital Association (AHA) Annual Survey were used for this analysis.<sup>7</sup> Hospital provision of inpatient obstetric services was identified by AHA survey responses of having (1) an obstetric service line, (2) level 1 (basic obstetric care)<sup>7</sup> or higher obstetric care (i.e., routine provision of basic obstetric care at minimum), (3) at least 1 dedicated obstetric bed, and (4) 10 or more births per year, as used in prior studies.<sup>9</sup> Hospitals that stopped providing obstetric care included those open and providing obstetric services in 2010 who stopped providing those services or hospitals that closed between 2011 and 2018. Discrepancies in obstetric services indicators were amended using information from the Centers for Medicare & Medicaid Services' Provider of Services file and from hospital websites. All variables examined used the most recent year of data available (i.e., 2018 for hospitals with current obstetric services and 2018 or earlier for hospitals that stopped providing obstetric services).

Rural and urban hospital location was based on metropolitan statistical areas as defined by the Office of Management and Budget and indicated in the AHA data, validated against the Area Health Resources File.<sup>8</sup> Urban counties include those classified as metropolitan, and rural counties include both micropolitan (with a population center of 10,000–50,000) and noncore counties (with a population center of fewer than 10,000).

We examined hospital financial structure and ownership, hospital size, county-level population and racial/ethnic composition, and location. Financial structure and ownership included whether the hospital was a Critical Access Hospital versus a prospective payment system hospital, the type of ownership (government—nonfederal and federal or nongovernment—not-for-profit and for-profit), and membership in a hospital system. Hospital size measures included average daily census and annual measures of inpatient and outpatient visits, as well

as annual births. County-level characteristics included the proportion of the population in the hospital's county that were women of reproductive age using data from the Surveillance, Epidemiology, and End Results (SEER) Program Populations, as well as county-level racial/ethnic composition, measured as the racial/ethnic group that accounted for more than 50% (a majority) of the hospital county's population using data from the Census Bureau's American Community Survey. The categories examined were majority non-Hispanic white, non-Hispanic Black, Hispanic, or Indigenous. Geographic location included region (Northeast, Midwest, South, or West) and rural county type (micropolitan or noncore) in addition to adjacency to an urban area.

We report statistics using frequency and percentage for categorical variables and multiple continuous variable measures, including mean, median, interquartile range (IQR), minimum, and maximum. We conducted all analyses with SAS 9.4 (SAS Institute, Cary, NC).

## Results

As of 2018, there were 1,883 urban hospitals providing obstetric services, 987 rural hospitals providing obstetric services, and 154 rural hospitals that stopped providing obstetric services between 2010 and 2018. An overview of results is presented in Table 1 (next page), and more detailed findings are in the figures that follow.

Of all urban hospitals that provided obstetric services in 2018, 13.4% were government owned, 80.1% were hospital system members, and they had a median of almost 51,000 annual inpatient visits and 1,250 births, 6.9% were located in counties with a majority of residents who are non-white or Hispanic, and 35.4% were located in the South (see Figure 6, page 6). Of all rural hospitals that provided obstetric services in 2018, 39.6% were Critical Access Hospitals, 29.7% were government owned, 56.2% were hospital system members, they had a median of almost 8,000 annual inpatient visits with 280 births, 7.0% were located in counties with a majority of residents who are non-white or Hispanic (including 1.8% non-Hispanic Black), 39.4% were located in the Midwest (see Figure 6, page 6), and 40.7% in noncore rural counties. Of all rural hospitals that stopped providing obstetric services between 2010-2018, 53.3% were Critical Access Hospitals, they had a median of almost 4,000 annual inpatient visits with 120 births, 7.1% were located in counties with a majority of residents who are non-white or Hispanic (including 3.9% non-Hispanic Black), 40.3% were located in the Midwest, and 62.3% in noncore rural counties.

**Table 1. Overview of hospital and county characteristics by obstetric provision status**

	Urban	Rural		
	With OB (n=1,883)	With OB (n=987)	Lost OB (n=154)	Total Rural (n=1,141)
<i>Hospital characteristics (2018 or most recent year available)</i>				
Critical Access Hospitals <sup>10</sup>	3.5%	39.6%	53.3%	41.5%
Government owned	13.4%	29.7%	27.3%	29.4%
Hospital system member	80.1%	56.2%	63.0%	57.1%
Median annual inpatient visits	50,790	7,580	3,990	6,860
Median annual births (2018 or last year of OB services)	1,250	280	120	250
<i>Hospital county characteristics (2018)</i>				
Median percent of county residents that are women of reproductive age	23.1%	20.2%	19.4%	20.1%
Percent in counties with majority non-Hispanic Black residents	2.0%	1.8%	2.9%	2.1%
Percent in counties with majority Hispanic residents	4.9%	3.2%	1.3%	3.0%
Percent in counties with majority Indigenous residents	0%	2.0%	1.9%	2.0%
Percent of hospitals located in rural noncore counties	—	40.7%	62.3%	51.2%

Figure 1 shows the distribution of hospital financing and ownership characteristics within each hospital category. While 3.5% of hospitals located in urban counties were Critical Access Hospitals, rural hospitals that stopped providing obstetric services were more often Critical Access Hospitals (53.3%) compared to rural hospitals with obstetric services (39.6%). Ur-

ban hospitals with obstetric services were less often government owned (13.4%) and more often hospital system members (80.1%) compared to rural hospitals with obstetric services (29.7% and 56.2%, respectively) and those that stopped providing services (27.3% and 63.0%, respectively).

**Figure 1. Financing and ownership of hospitals by rural and urban location and obstetric service provision status**

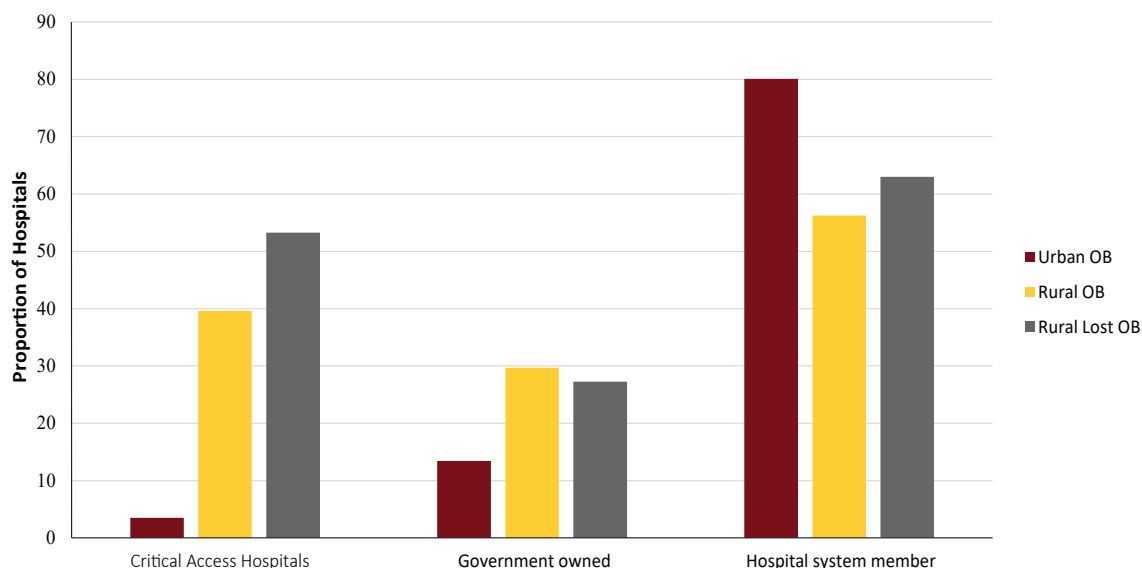


Figure 2. Hospital size characteristics by rural and urban location and obstetric service provision status

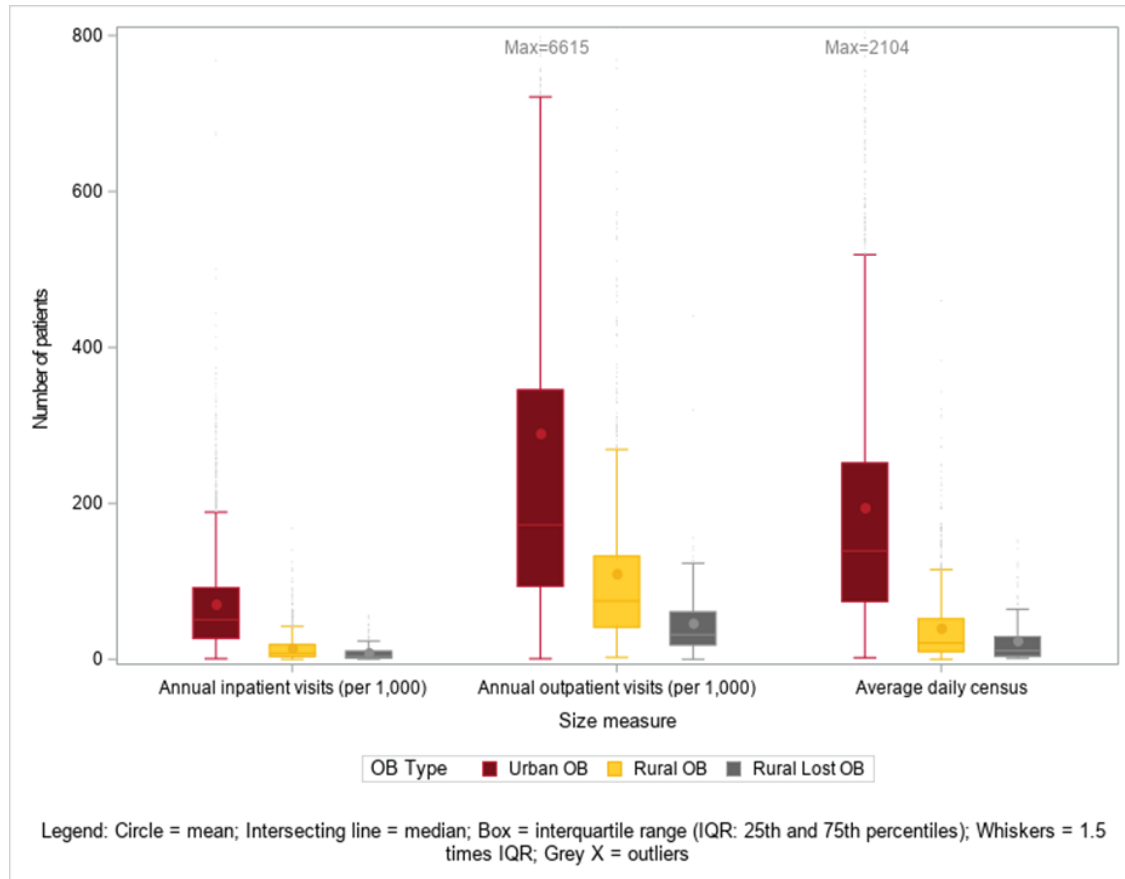
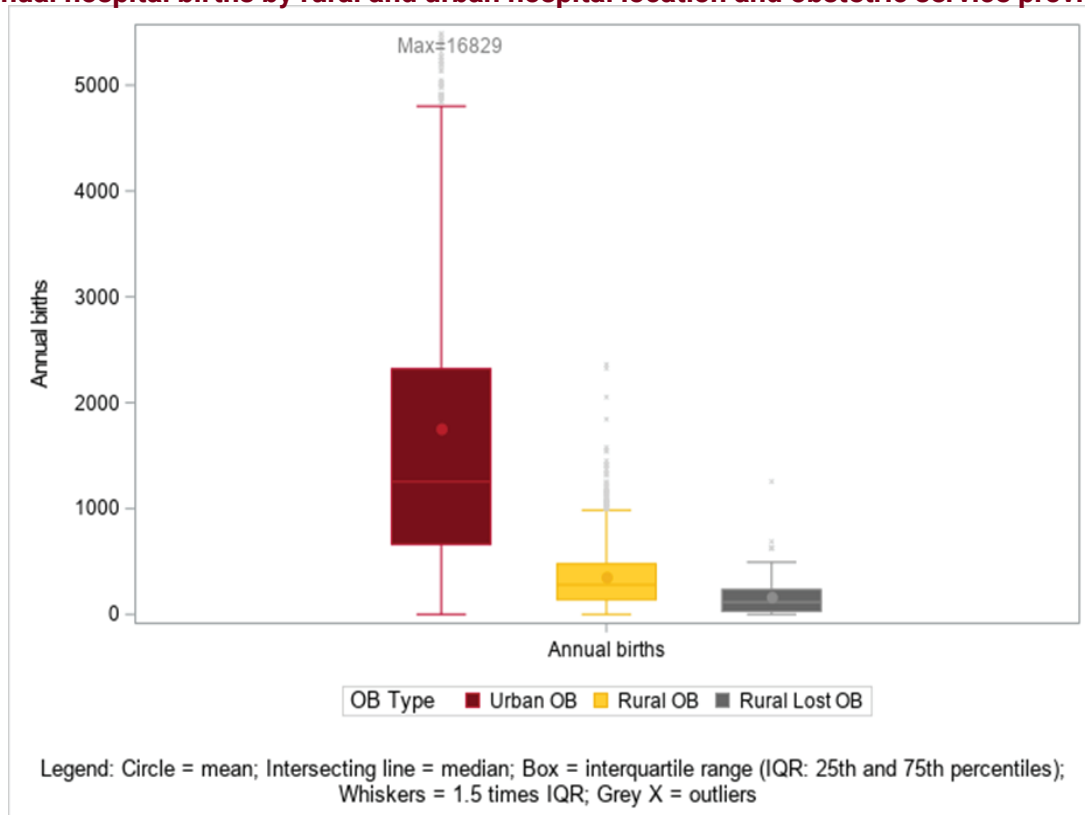
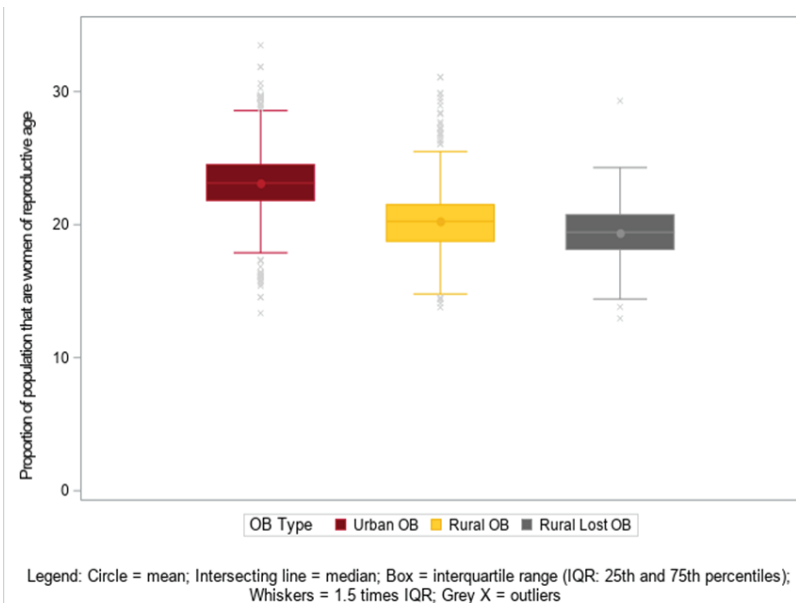


Figure 3. Annual hospital births by rural and urban hospital location and obstetric service provision status



Figures 2 and 3 (previous page) compare differences in hospital size measures across urban hospitals, rural hospitals that provide obstetric services, and rural hospitals that stopped providing obstetric services. In all measures of hospital size, as expected, urban hospitals with obstetric services were the largest, followed by rural hospitals with obstetric services. Rural hospitals that stopped providing obstetric services were the smallest in size. However, there were some rural hospitals with obstetric services that were similar in size to some urban hospitals, as well as some rural hospitals that lost obstetric services that were similar in size

**Figure 4. Proportion of the population that are women of reproductive age within the county where hospitals are located, by rural and urban hospital location and obstetric service provision status**



to rural hospitals with obstetric services. More specifically, 14% of rural hospitals provided obstetric services for 600 – 2,400 annual births, which is similar to the number of annual births seen in a majority of urban hospitals. Further, almost half (42%) of rural hospitals that ceased offering obstetrics had as many births during their last year providing services as most rural hospitals that maintained obstetric services (e.g., over 140 annual births, with a maximum of 1,255 births).

Figure 4 shows that while urban hospitals with obstetric services were located in counties with the largest proportion of their populations that are women of reproductive age (median: 23.1), rural hospitals with obstetric services (median: 20.2) and those that stopped providing obstetric services (median: 19.4) were also located in counties with a substantial proportion of their populations comprised of people with the capability for pregnancy who may need access to a hospital with obstetric services.

Among all hospitals included in analyses, 77.1% were located in counties where the majority of residents identified as non-Hispanic white, 7.0% in majority non-white or Hispanic coun-

ties (including 2.0% in non-Hispanic Black, 4.2% in Hispanic, and 0.8% in Indigenous), and 16% in counties with no majority.

**Figure 5. Percent of hospitals located in counties with a majority racial/ethnic population, by rural and urban hospital location and obstetric service provision status**

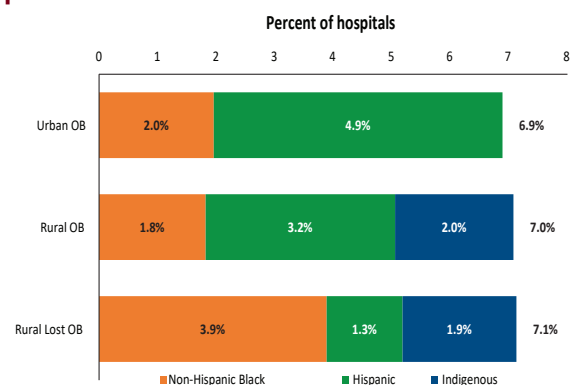


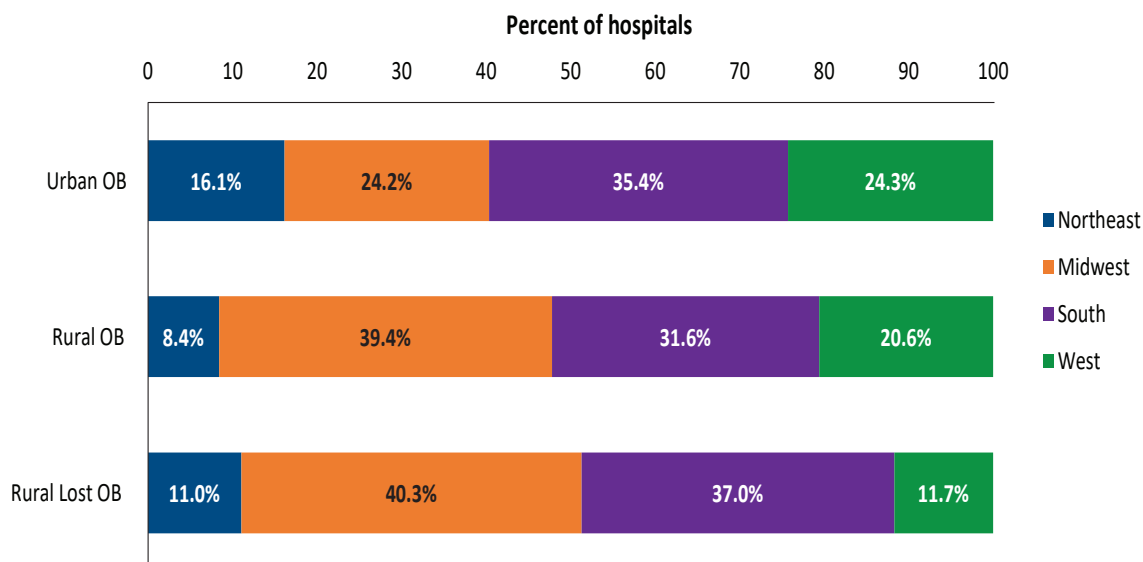
Figure 5 shows the distribution of hospitals by majority racial/ethnic population at the county level by hospital type. Urban hospitals with obstetric services were located in counties with majority non-Hispanic Black residents in similar proportion as rural hospitals with obstetric services (2.0% and 1.8%, respectively), but were located in counties with majority Hispanic residents in greater proportion (4.9% and 3.2%, respectively). Compared to rural hospitals with obstetric services, those that lost obstetric services were proportionally more often located in counties with a majority of non-Hispanic Black residents (3.9% vs. 1.8%), were less often located in counties with majority Hispanic residents (1.3% vs. 3.2%), and had similar proportions located in counties with majority Indigenous residents (1.9% vs. 2.0%).

Among all hospital included in analyses, 13.4% were located in the Northeast, 30.0% in the Midwest, 34.2% in the South, and 22.4% in the West. Urban hospitals with obstetric services were more often located in the South (35.4%) while rural hospitals were most often located in the Midwest (39.5%). Figure 6 (next page) represents the percent of hospitals within region by obstetric service type. Proportionally more rural hospitals in the South stopped providing obstetric services compared to those maintaining obstetric services, while more rural hospitals in the West maintained obstetric services rather than stopped providing services.

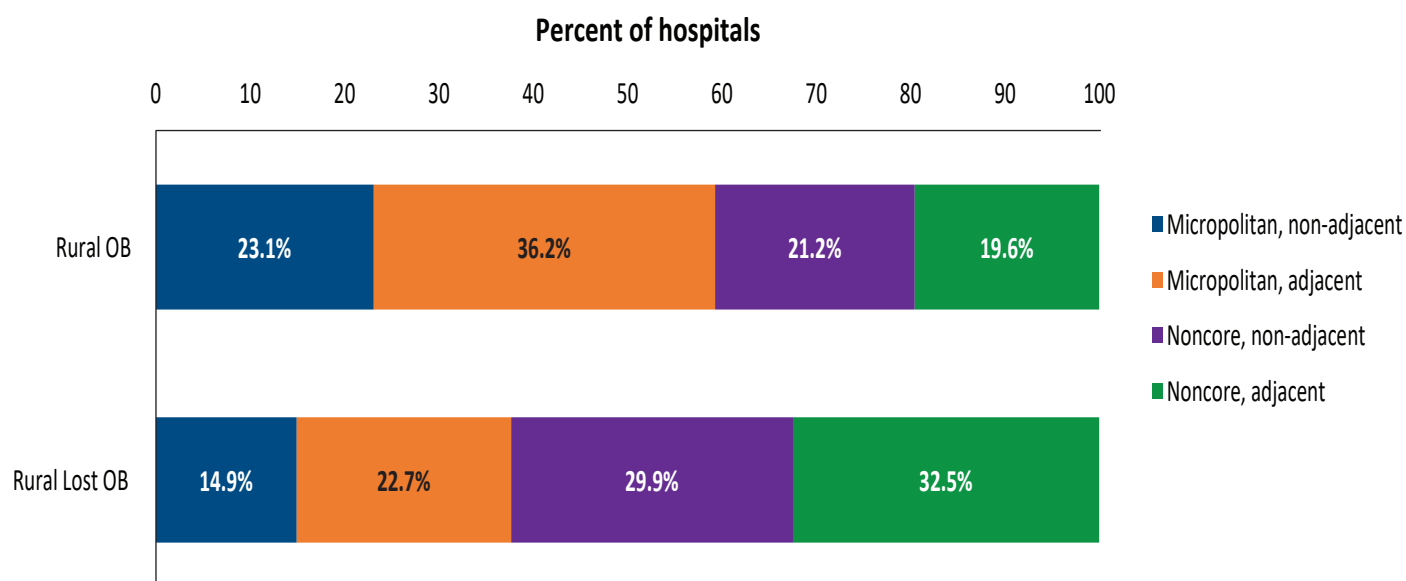
Rural hospitals that maintained obstetric services were more often located in micropolitan, urban-adjacent counties (36.2%), while rural hospitals



**Figure 6. Percent of hospitals within U.S. regions, by rural and urban hospital location and obstetric service provision**



**Figure 7. Distribution of rural hospitals across rural county type and urban adjacency by obstetric service provision**



that stopped providing obstetric services were more often located in noncore, urban adjacent (32.5%) or noncore, non-urban adjacent counties (29.9%) (Figure 7).

## Discussion and Implications

### Key Findings

Among the 2,870 hospitals providing obstetric care in the United States in 2018, 34% (n=987) were rural. Between 2010 and 2018, 154 rural hospitals stopped providing obstetric care. Compared to urban hospitals pro-

viding obstetric care, rural hospitals providing obstetric care were more often government owned, less often hospital system members, and had fewer births. Additionally, rural hospitals that provide obstetric services were more often located in counties where women of reproductive age made up a slightly smaller proportion of the population compared to their urban counterparts, and were more often located in the Midwest.

Among rural hospitals, those that stopped providing obstetric care were more often Critical Access Hospitals, hospital system members, and had lower birth volumes

compared to rural hospitals that maintained obstetric care during the study period. Further, rural hospitals that stopped providing obstetric care were more often located in counties where the majority of residents identified as non-Hispanic Black and were located in the South or in counties classified as noncore rather than micropolitan.

### *Implications*

Policies aimed at improving maternal health outcomes and access to obstetric services need to account for differences in obstetric care infrastructure by geography. Hospitals that provide obstetric care in rural counties differ from their urban counterparts in ways that impact staffing decisions, resource allocation, and financing mechanisms. They also serve a different mix of patients with unique needs and challenges.

Many obstetric practice guidelines are not tailored to the needs and settings of rural hospitals, which may impact the adoption and effectiveness of such guidelines in improving maternal outcomes. For example, the Association of Women's Health, Obstetric and Neonatal Nurses (AWHONN) recommends that labor and delivery unit nurses have a 1-to-1 nurse to patient ratio for patients with induced or unmedicated active labors and that at least two nurses should attend every birth.<sup>11,12</sup> However, many rural hospitals do not have dedicated nurses within labor and delivery units. Low staff and patient volumes mean that nurses must balance time between multiple departments, and the unpredictability of births in low-volume settings makes scheduling difficult.<sup>13</sup> Examples of geographic tailoring of policies to improve maternal health are available. The California Maternal Quality Care Collaborative developed preparedness considerations for small and rural hospitals as a part of their obstetric hemorrhage toolkit, including discussions and contingency planning for high risk patients, establishment of communication and collaboration process prior to emergencies, and staff awareness about response times and delays should an emergency situation occur.<sup>14</sup> Additionally, evaluation of a rural-specific pilot program is underway through the federally-funded Rural Maternal and Obstetrics Management Strategies (RMOMS) Program.<sup>15</sup>

As clinical and policy leaders seek to improve maternal health, it is important to address the needs of pregnant rural residents living in communities that have lost hospital-based obstetric care.<sup>16</sup> Rural hospitals that have recently closed their obstetric units, while generally lower in

birth volume prior to closure, are located in more remote communities, but these areas have similar proportions of reproductive-age women as rural communities that currently have hospital-based obstetric care. It should not be assumed that, because rural hospitals are losing obstetric services, rural residents in those communities are having fewer babies. To address geographic inequities in maternal health, all rural residents need access to safe, quality, affordable obstetric care.<sup>17</sup>

### *Limitations*

These data are subject to several limitations. First, measures of quality or patient outcomes are not included in AHA survey data and the data may contain respondent bias or misclassification depending on the knowledge level and access of the staff person completing the survey. However, these data have been widely used to study rural obstetric care and are considered a trusted source of information on rural hospitals.<sup>9</sup> Second, the use of county as the level of comparison is an important limitation as counties vary in size and as some hospital service areas cross county borders. Nevertheless, the rural-urban classification used in this analysis is widely used in rural-urban hospital comparisons.<sup>2,18</sup> Finally, these data do not reflect the ability of hospitals that stopped providing obstetric care to care for obstetric patients in the case of an emergency.<sup>19</sup>

### *Conclusion*

Urban and rural hospitals providing obstetric services differ enormously in their size, capacity, and location. Further, rural hospitals that recently stopped providing obstetric care are located in more sparsely populated rural locations, are smaller than rural hospitals providing obstetric care while also having similar proportions of reproductive-age women in their communities, and more often serve majority Black areas. Understanding the characteristic differences between urban and rural hospitals that provide obstetric care, as well as the characteristics of rural hospitals that recently stopped providing obstetric care compared with rural hospitals that continue to provide these services, is essential to clinical and policy efforts to ensure safe obstetric care for rural residents. Examples of geographic tailoring of policies to improve maternal health are available and should be followed in other policies aimed at improving maternal health.

## References

1. Ely D, Driscoll A, Matthews T. Infant Mortality Rates in Rural and Urban Areas in the United States, 2014. National Center for Health Statistics; 2017. Accessed November 22, 2019. <https://www.cdc.gov/nchs/products/databriefs/db285.htm>
2. Kozhimannil KB, Interrante JD, Henning-Smith C, Admon LK. Rural-urban differences in severe maternal morbidity and mortality in the US, 2007–15. *Health Aff (Millwood)*. 2019;38(12):2077-2085. doi:10.1377/hlthaff.2019.00805
3. Ely D, Driscoll A. Infant Mortality in the United States, 2018: Data From the Period Linked Birth/Infant Death File. *Natl Vital Stat Rep*. 2020;69(7):18.
4. US Census Bureau. American Community Survey Demographic and Housing Estimates. American Community Survey. Accessed April 6, 2021. <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/>
5. Kozhimannil KB, Hung P, Henning-Smith C, Casey MM, Prasad S. Association between loss of hospital-based obstetric services and birth outcomes in rural counties in the United States. *JAMA*. 2018;319(12):1239-1247. doi:10.1001/jama.2018.1830
6. Kozhimannil KB, Interrante JD, Tuttle MKS, Henning-Smith C. Changes in Hospital-Based Obstetric Services in Rural US Counties, 2014-2018. *JAMA*. 2020;324(2):197-199. doi:10.1001/jama.2020.5662
7. ACOG. Levels of Maternal Care: Obstetric Care Consensus No. 9. *Obstet Gynecol*. 2019;134(2):e41-e55. doi:10.1097/AOG.0000000000003383
8. Division N. HHS Outlines New Plans and a Partnership to Reduce U.S. Pregnancy-related Deaths. HHS.gov. Published December 2, 2020. Accessed February 16, 2021. <https://www.hhs.gov/about/news/2020/12/03/hhs-outlines-new-plans-to-reduce-us-pregnancy-related-deaths.html>
9. Hung P, Henning-Smith CE, Casey MM, Kozhimannil KB. Access to obstetric services in rural counties still declining, with 9 percent losing services, 2004–14. *Health Aff (Millwood)*. 2017;36(9):1663-1671. doi:10.1377/hlthaff.2017.0338
10. Centers for Medicare & Medicaid Services. Critical Access Hospital. CMS; 2019:13. <https://www.cms.gov/Outreach-and-Education/Medicare-Learning-Network-MLN/MLNProducts/Downloads/CritAccessHospfctst.pdf>
11. AWHONN releases new staffing guidelines. *American Nurse*. Published December 11, 2010. Accessed February 16, 2021. <https://www.myamericannurse.com/awhonn-releases-new-staffing-guidelines/>
12. Guidelines for Professional Registered Nurse Staffing for Perinatal Units Executive Summary. *J Obstet Gynecol Neonatal Nurs*. 2011;40(1):131-134. doi:10.1111/j.1552-6909.2010.01214.x
13. Hung P, Kozhimannil KB, Casey MM, Moscovice IS. Why are obstetric units in rural hospitals closing their doors? *Health Serv Res*. 2016;51(4):1546-1560. doi:10.1111/1475-6773.12441
14. Chagolla B. Preparedness Considerations for Small and Rural Hospitals. California Maternal Quality Care Collaborative. Published March 24, 2015. Accessed February 16, 2021. <https://www.cmqcc.org/resources-toolkits/toolkits>
15. HRSA. Rural Maternity and Obstetrics Management Strategies (RMOMS) Program. Official web site of the U.S. Health Resources & Services Administration. Published November 10, 2020. Accessed April 9, 2021. <https://www.hrsa.gov/rural-health/community/rmoms>
16. Kozhimannil K, Interrante J, Tuttle M, Henning-Smith C. Changes in Hospital-Based Obstetric Services in Rural US Counties, 2014-2018. *JAMA*. Published July 2020.
17. Kozhimannil KB, Henning-Smith C, Hung P, Casey MM, Prasad S. Ensuring Access to High-Quality Maternity Care in Rural America. *Womens Health Issues Off Publ Jacobs Inst Womens Health*. 2016;26(3):247-250. doi:10.1016/j.whi.2016.02.001
18. WWAMI Rural Health Research Center. The Supply and Rural-Urban Distribution of the Obstetrical Care Workforce in the US. University of Washington; 2020. Accessed February 16, 2021. [https://depts.washington.edu/fammed/rhrc/wp-content/uploads/sites/4/2020/06/RHRC\\_PB168\\_Patterson.pdf](https://depts.washington.edu/fammed/rhrc/wp-content/uploads/sites/4/2020/06/RHRC_PB168_Patterson.pdf)
19. Kozhimannil KB, Interrante JD, Tuttle MS, Gilbertson M, Wharton KD. Local Capacity for Emergency Births in Rural Hospitals Without Obstetrics Services. *J Rural Health*. n/a(n/a). <https://doi.org/10.1111/jrh.12539>

## Suggested Citation

Interrante JD, Admon LK, Tuttle MS, Basile Ibrahim B, and Kozhimannil KB. “Rural and Urban Hospital Characteristics by Obstetric Service Provision Status, 2010-2018.” *UMN Rural Health Research Center Policy Brief*. April 2021. <http://rhrc.umn.edu/publication/rural-and-urban-hospital-characteristics-by-obstetric-service-provision-status-2010-2018/>



**Rural Health Research  
& Policy Centers**

Funded by the Federal Office of Rural Health Policy  
[www.ruralhealthresearch.org](http://www.ruralhealthresearch.org)

Support for this study was provided by the Federal Office of Rural Health Policy, Health Resources and Services Administration, Cooperative Agreement U1CRH03717-13-00. The information, conclusions, and opinions expressed are those of the authors, and no endorsement by FORHP, HRSA, or HHS is intended or should be inferred.

For more information, contact Katy Backes Kozhimannil ([kbk@umn.edu](mailto:kbk@umn.edu))

University of Minnesota Rural Health Research Center  
Division of Health Policy and Management, School of Public Health  
2221 University Avenue SE, #350 Minneapolis, MN, 55414