



Obstetric Services and Quality among Critical Access, Rural, and Urban Hospitals in Nine States

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Key Findings

- Women who gave birth in Critical Access Hospitals (CAHs) and other rural hospitals in 2010 were younger on average and had lower rates of clinical complications than those who gave birth in urban hospitals.
- CAHs compared favorably with other rural and urban hospitals on obstetric care quality measures including cesarean delivery among low-risk women, cesarean delivery without medical indication, and labor induction with medical indication.
- Medicaid covered 49 percent of births in CAHs and 56 percent of births in other rural hospitals, compared to 41 percent of births in urban hospitals.
- The percentage of CAHs, other rural hospitals, and urban hospitals providing obstetric services in 2010 varied significantly across states, with the greatest variation among CAHs.
- Half of the CAHs in this study's sample provided obstetric services in 2010, likely a higher rate than all CAHs nationwide due to the selection criteria for the sample.

Background

Motivated by concerns about the closure of obstetric units in rural hospitals and limited availability of obstetric care providers in rural areas, much contemporary research on rural obstetric care has focused on access and workforce issues.¹⁻⁴ Increasingly, health policy is focused on measurement and improvement of obstetric care quality in U.S. hospitals, including an obstetric care patient safety initiative by the National Partnership for Patients. The Joint Commission adopted a new set of perinatal care measures in 2011, and the National Quality Forum endorsed 14 perinatal measures in 2012. State interest in obstetric care quality measurement is growing as the percentage of births covered by Medicaid (currently 47 percent) continues to rise.⁵ Despite these trends, questions about the quality of childbirth-related care in different types of hospital settings (e.g., development of maternity care quality measures, reducing primary cesarean rates, and increasing access to vaginal birth after cesarean) have remained unexamined.⁶⁻⁹ Understanding how obstetric care is currently provided in CAHs and other rural hospitals is important for assessing the quality of maternity services and quantifying implications for maternal and child health.

Purpose

The goal of this research was to assess and compare the characteristics and quality of obstetric care in CAHs, other rural hospitals, and their urban counterparts.

Approach

The study measured obstetric care quality related to delivery mode, elective procedures, and perinatal safety in CAHs, other rural hospitals, and their urban counterparts using 2010 discharge data from Colorado, Iowa, Kentucky, New York, North Carolina, Oregon, Vermont, Washington, and Wisconsin State Inpatient Databases (SID), Healthcare Cost and Utilization Project (HCUP), Agency for Healthcare Research and Quality.¹⁰ The data set included all births occurring in 623 hospitals in the nine states (N=686,703 births). These hospitals comprise a census of all rural hospitals providing obstetric services in the nine states we studied.

These nine states were chosen based on the size of their rural population, number of rural hospitals (including CAHs) providing obstetric care, U.S. regional distribution, and because they permitted linkage with American Hospital Association (AHA) Annual Survey data on hospital characteristics and location.¹¹

Outcomes measured were the low-risk cesarean rate (among full term, vertex, singleton pregnancies with no prior cesarean deliveries), labor induction without medical indication, cesarean delivery without medical indication, episiotomy, and 3rd- or 4th-degree perianal laceration. Medical indications used in the calculation of non-indicated induction and cesarean delivery outcomes were defined based on the Joint Commission National Quality Measure, “Perinatal Care Measure PC-01: Elective Delivery.”¹²

Limitations

The rural designation we used is based on the hospital where a birth occurred, not on the residence of the mother. Hospital discharge data do not contain clinical notes or information on prenatal care, parity, or gestational age at birth. The 623 hospitals in the study come from nine states distributed across all four US Census regions, but the results may not be representative of all hospitals nationally.

Results

Hospital Characteristics

Overall, 50 percent of CAHs, 90 percent of other rural hospitals, and 82 percent of urban hospitals provided obstetric services (defined by having 10 or more births) in 2010 in these nine states (Table 1). The rate of CAHs doing obstetrics is higher than CAHs nationwide (40 percent, based on AHA data), likely due to the state-selection criteria for the study, which included the number of CAHs and other rural hospitals in a state providing obstetric services.¹

The percentage of hospitals that pro-

Table 1. Critical Access Hospitals, Rural Hospitals, and Urban Hospitals with Ten or More Births in 2010

	CAHs ^a		Other Rural Hospitals ^b		Urban Hospitals ^b	
	n ≥ 10 births	% of state's CAHs	n ≥ 10 births	% of state's Other Rural Hospitals	n ≥ 10 births	% of state's Urban Hospitals
Colorado	12	41%	12	92%	28	93%
Iowa	45	55%	14	100%	20	95%
Kentucky	2	7%	31	78%	19	61%
North Carolina	7	30%	38	90%	39	80%
New York	1	8%	27	90%	104	77%
Oregon	19	76%	7	100%	25	96%
Vermont	6	75%	4	100%	2	100%
Washington	22	59%	6	100%	35	83%
Wisconsin	38	64%	18	100%	42	84%
Total	152	50%	157	90%	314	82%

^aThe number of CAHs in each state is from a CAH dataset maintained by the Flex Monitoring Team and includes all CAHs open as of 12/31/2010.

^bThe number of other rural and urban hospitals in each state are from the AHA Annual Survey Database 2010.

vided obstetric services varied across states. CAHs were much less likely to provide obstetric services than other rural hospitals or urban hospitals. Only 7 percent of CAHs in Kentucky had at least 10 births in 2010, compared to 76 percent of CAHs in Oregon. Among other rural hospitals (not CAHs), rates varied from 78 percent in Kentucky to 100 percent in five states. Urban hospitals shared similar variability across states, with Kentucky at 61 percent compared to a rate of 100 percent in Vermont.

Table 2 shows the distribution of births in each type of hospital in 2010. CAHs had an average (mean) of 157 deliveries. Half of the CAHs had 129 or fewer births, and one-quarter had 70 or fewer births. Although both the other rural and urban hospital cate-

gories included some hospitals with a low volume of births, most other rural hospitals and urban hospitals had many more births than CAHs.

Differences Among Hospitals Providing and Not Providing Obstetric Services

On average, CAHs that provided obstetric services had significantly higher annual inpatient admissions (1,060) and surgeries (249) than CAHs that did not provide obstetric services (583 and 83, respectively) (p<.001). They did not differ significantly by bed size or the average number of inpatient days; the lack of differences in these characteristics is likely to due to CAH program statutory requirements, which include limits on the maximum number of beds a CAH can have (25) and average length of stay (96 hours).

Other rural hospitals that provided obstetric services were significantly different from those that did not. On average, they had larger numbers of beds (110 vs. 56), admissions (4,916 vs. 1,896), and inpatient days (20,985 vs. 12,078), as well as higher annual surgery volume (1,315 vs. 388) ($p < .001$). Similarly, urban hospitals with obstetric services had significantly more beds, higher annual surgery volume, admissions, and inpatient days than those without obstetric services. Urban hospitals doing deliveries were also significantly more likely to be Joint Commission accredited than those not doing deliveries; differences in accreditation rates for CAHs and other rural hospitals by delivery status were not significant.

Demographic Characteristics

Women who delivered in other ru-

Table 2. Number of births by hospital type in 2010

	CAHs (n=152)	Other Rural Hospitals (n=157)	Urban Hospitals (n=314)
Mean (SD)	157 (114)	511 (308)	1,855 (1,534)
25% Quartile	70	282	788
Median	129	450	1,435
75% Quartile	209	664	2,451
Range	10-599	19-1,610	10-12,093

ral hospitals and CAHs tend to be younger than those who delivered in urban hospitals (Figure 1). Over half (51.1 percent) of women delivering in other rural hospitals were 25 years of age or younger, as were 45.4 percent of women delivering in CAHs, compared to only 33.5 percent of women delivering in urban hospitals. A correspondingly larger proportion of older women delivered in urban hospitals compared with rural hospitals. Maternal patients in

CAHs and other rural hospitals were less racially-diverse, with significantly higher percentages of white patients (73-76 percent) than urban hospitals (54 percent). CAHs had a lower percentage of black patients (1.8 percent) than other rural (8.5 percent) and urban hospitals (12.6 percent). Hispanic patients comprised 12.5 percent of births in CAHs, compared to 10 percent in other rural hospitals and 13.8 percent in urban hospitals ($p < 0.001$).

Figure 1. Age of delivering women by hospital type in 2010

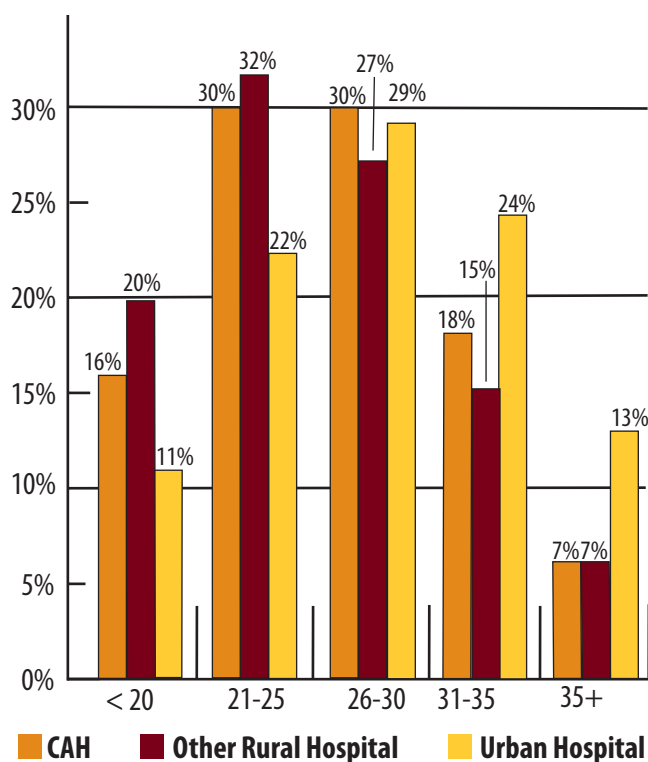
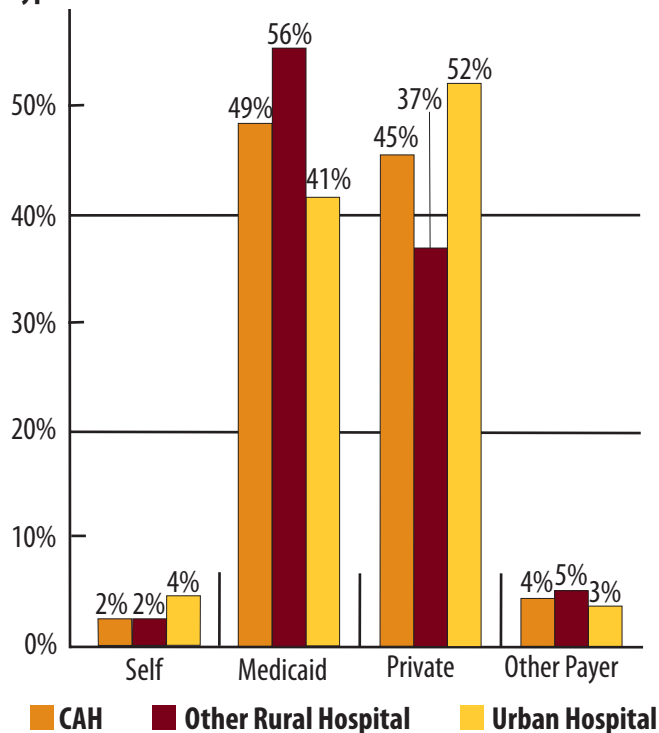


Figure 2. Insurance status of delivering women by hospital type in 2010



Insurance Coverage

The percentage of births covered by Medicaid (Figure 2) was higher in other rural hospitals (56 percent) and CAHs (49 percent) than in urban hospitals (41 percent). Conversely, rural hospitals had the lowest percentage of deliveries covered by private insurance (37 percent), followed by CAHs (45 percent); urban hospitals had significantly more births covered privately (52 percent).

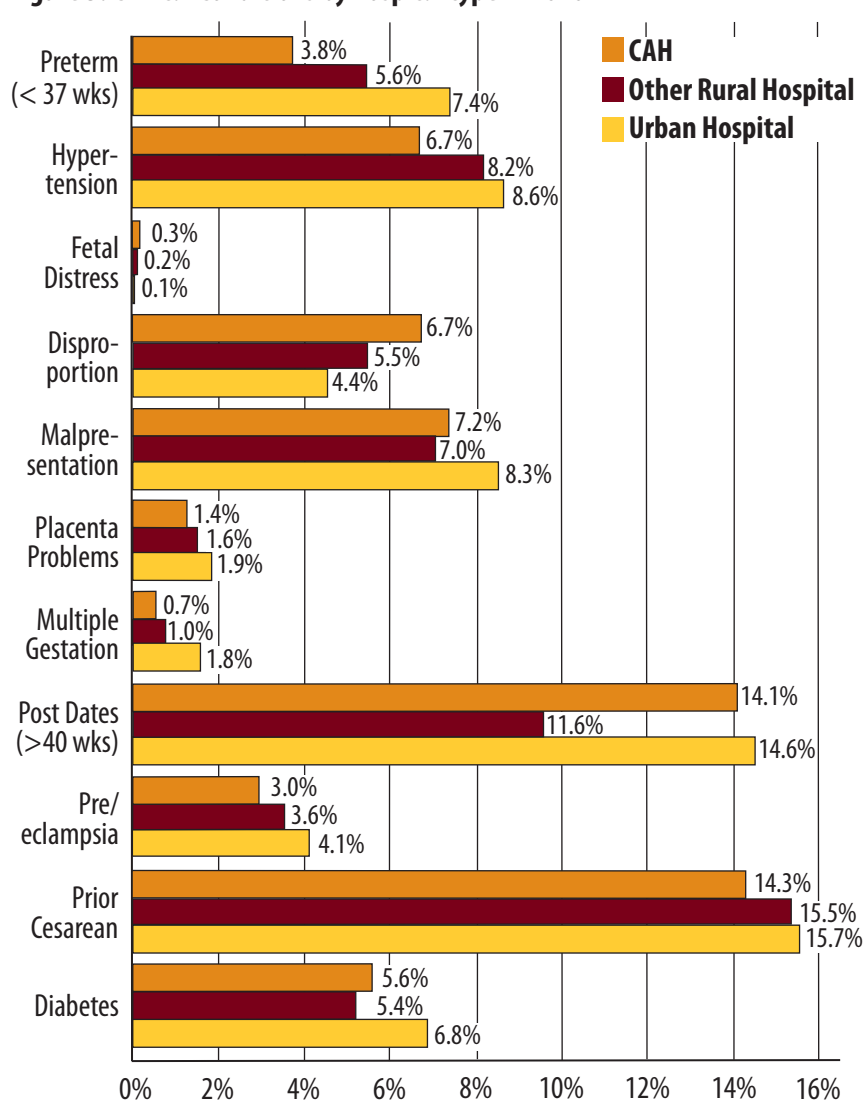
Clinical Conditions

Overall, the groups of women who gave birth in CAHs and other rural hospitals had lower rates of clinical complications than the group who gave birth in urban hospitals (Figure 3). Notably, women who gave birth in CAHs had the lowest percentage of prior cesareans (14 percent). Other rural hospitals had the lowest percentage of post-term deliveries (after 40 weeks gestation) and malpresentation (e.g., breech).

Obstetric Care Quality

CAHs compared favorably to both other rural hospitals and urban hospitals on obstetric care quality measures (Figure 4). They had significantly lower rates of cesarean delivery among low risk women (13.4 percent vs. 15.5 percent for other rural hospitals and 15.6 percent for urban hospitals), cesarean delivery without medical indication (15.1 percent vs. 17.0 percent for other rural hospitals and 17.2 percent for urban hospitals), and episiotomy (6.0 percent compared to 10.1 percent in other rural hospitals and 9.2 percent in urban hospitals). CAHs compared less-favorably on 3rd- or 4th-degree lacerations, slightly exceeding the

Figure 3. Clinical Conditions by hospital type in 2010



rates in other rural and urban hospitals. Rates of labor induction without medical indication were not significantly different across the three types of hospitals.

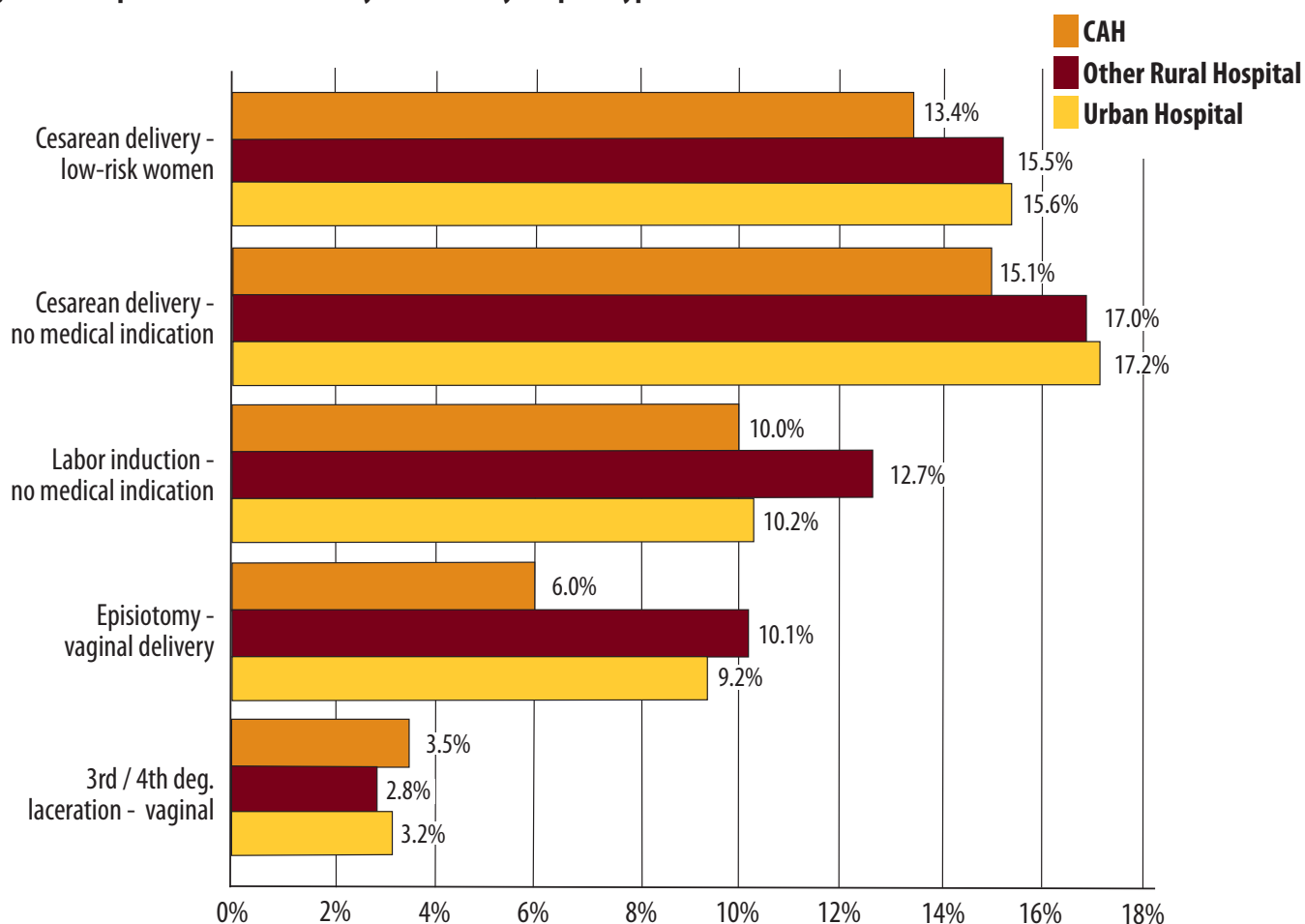
Policy Implications

This analysis revealed that obstetric care quality in CAHs and other rural hospitals compares favorably with urban hospitals. This finding is important in the context of decreases in the number of rural hospitals that are providing obstetric services,^{2,4} and implies that the CAHs that have chosen to keep an obstetric service line

within their hospital are providing care that is, on average, largely consistent with or better than the care provided in other rural and urban hospitals. At the same time, obstetric care quality in all hospitals requires improvement to be consistent with professional recommendations and clinical guidelines.

Federal Healthy People 2020 goals aim to reduce primary and repeat cesarean rates among low-risk mothers by 10 percent, to 23.9 and 81.7 percent, respectively.¹³ In February 2012, a consensus panel convened by

Figure 4. Comparison of rates of study outcomes by hospital type in 2010



the National Institutes of Health issued guidance for reducing first-time cesarean deliveries, recommending strategies such as: 1) performing labor induction only when medically indicated, with favorable cervix, and after 39 weeks gestation; 2) appropriately using diagnoses for failure to progress and failed labor induction; 3) allowing adequate time for the first and second stages of labor; and 4) ensuring that clinicians are trained and experienced with respect to operative vaginal delivery.⁸ This guidance may be useful for clinicians in CAHs, other rural hospitals, and urban hospitals; however, adoption of some of these strategies (e.g., clinician training in operative vaginal delivery)

may be more challenging in CAHs or other rural settings, where staffing shortages and resource limitations are known challenges.^{2, 4}

Our analysis reveals that payer mix differs across hospital settings, with Medicaid financing a greater percentage of births in CAHs and other rural hospitals, compared with urban hospitals. This has important implications as Medicaid adopts strategies designed to improve maternity care,¹⁴ which may not account for differences in the rural hospital context. It is also important to the financial solvency of rural hospitals, as Medicaid pays less for childbirth-related services than private insurers. Rural hos-

pital administrators often cite payer mix as a financial concern regarding the provision of obstetric care,² but if payment systems can reward high-quality care, CAHs may benefit from the type of childbirth-related care they are currently providing, especially with respect to management of cesarean deliveries and episiotomies.

Our findings add information on the quality of care provided to women who give birth in rural hospitals. Future work should continue to examine issues of both access and quality of maternal and child healthcare for the nearly one million women who give birth in rural U.S. hospitals and their infants.

Appendix
Table 3. Comparison of hospitals doing deliveries and not doing deliveries by hospital type in 2010

	Doing Deliveries		Not Doing Deliveries		P-Value*
Critical Access Hospitals	n=152		n=153		
Joint Commission accredited	56	36.8%	43	28.3%	0.1116
Surgical volume	249	202.9	88	126.4	P<.001
Hospital beds	25	8.4	25	15.9	0.5731
Hospital inpatient days	4,093	2,961.4	3,680	4,302.9	0.3304
Hospital admissions	1,060	485.1	583	555.6	P<.001
Other Rural Hospitals	n=157		n=17		
Joint Commission accredited	130	83.3%	12	70.6%	0.1932
Surgical volume	1,315	977.0	388	361.9	P<.001
Hospital beds	110	68.3	56	50.7	0.002
Hospital inpatient days	20,985	17,353.7	12,078	15,696.0	0.0442
Hospital admissions	4,916	3,499.3	1,896	1,156.6	P<.001
Urban Hospitals	n=314		n=71		
Joint Commission accredited	284	90.7%	50	70.4%	P<.001
Surgical volume	4,485	4,682.2	2,652	4,609.6	0.003
Hospital beds	300	244.0	179	169.7	P<.001
Hospital inpatient days	78,421	78,170.6	43,852	46,557.0	P<.001
Hospital admissions	15,262	12,799.3	7,097	6,562.4	P<.001

*Figures in boldface are significant at 0.05; P-values represent significance for differences in the hospital characteristics between hospitals doing and not doing deliveries, based on chi-square or t-statistics.

Table 4. Descriptive statistics by hospital type in 2010

	CAH		Rural PPS		Urban PPS		
Age	Number of	%	Number of	%	Number of	%	P-value
<20	3,778	15.9	15,634	19.5	65,160	11.2	p<.001
21-25	7,017	29.5	25,359	31.6	130,110	22.3	p<.001
26-30	7,078	29.7	21,723	27.1	169,721	29.1	p<.001
31-35	4,201	17.6	12,200	15.2	141,779	24.3	p<.001
35+	1,746	7.3	5,377	6.7	75,820	13.0	p<.001
Race	Number of	%	Number of	%	Number of	%	
White	18,115	76.1	58,221	72.5	316,091	54.3	p<.001
Black	421	1.8	6,817	8.5	73,184	12.6	p<.001
Hispanic	2,974	12.5	8,005	10.0	80,576	13.8	p<.001
Other	1,421	6.0	4,498	5.6	69,478	11.9	p<.001
Missing	889	3.7	2,752	3.4	43,261	7.4	
Insurance	Number of	%	Number of	%	Number of	%	
Self	415	1.8	1,603	2.0	22,601	3.9	p<.001
Medicaid	11,615	48.8	44,742	55.7	239,065	41.0	p<.001
Private	10,790	45.3	29,963	37.3	303,010	52.0	p<.001
Other payer	956	4.0	3,979	5.0	17,166	2.9	p<.001
Missing	44	0.2	6	0.0	748	0.1	
Clinical Conditions	Number of	%	Number of	%	Number of	%	
Diabetes	1,335	5.6	4,368	5.4	39,653	6.8	p<.001
Hypertension	1,603	6.7	6,574	8.2	49,859	8.6	p<.001
Pre-eclampsia/Eclampsia	706	3.0	2,879	3.6	23,779	4.1	p<.001
Post dates (>40 wks)	3,355	14.1	9,325	11.6	85,100	14.6	p<.001
Multiple Gestation	178	0.7	831	1.0	10,733	1.8	p<.001
Placenta Problems	331	1.4	1,278	1.6	11,299	1.9	p<.001
Malpresentation	1,711	7.2	5,618	7.0	48,430	8.3	p<.001
Disproportion	1,593	6.7	4,382	5.5	25,412	4.4	p<.001
Fetal distress	80	0.3	153	0.2	686	0.1	p<.001
Prior Cesarean	3,395	14.3	12,434	15.5	31,521	15.7	p<.001
Preterm delivery (<37 wks)	897	3.8	4,468	5.6	43,263	7.4	p<.001

Table 5. Comparison of rates of study outcomes by hospital type

	CAH			Rural PPS			Urban PPS			P-value across three
	Den.	Num.	%	Den.	Num.	%	Den.	Num.	%	
Cesarean delivery: low risk women	18,152	2,437	13.4%	59,439	9,212	15.5%	417,626	65,026	15.6%	0.0177
Labor induction without medical indication	13,290	1,324	10.0%	44,857	5,696	12.7%	290,003	29,491	10.2%	0.122
Cesarean delivery without medical indication	18,835	2,841	15.1%	61,480	10,437	17.0%	433,370	74,698	17.2%	0.0071
Episiotomy: vaginal deliveries	16,947	1,025	6.0%	54,955	5,569	10.1%	397,404	36,710	9.2%	p<.001
3rd or 4th degree laceration: vaginal deliveries	16,947	588	3.5%	54,955	1,525	2.8%	397,404	12,845	3.2%	0.0062

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Funded by the Federal Office of Rural Health Policy

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Support for this study was provided by the Office of Rural Health Policy, Health Resources and Services Administration, PHS Grant No. 5U1CRH03717. For more information, contact Katy Kozhimannil (612.626.3812, kbk@umn.edu).

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