ORIGINAL RESEARCH

Maternity Access in Rural America: The Role of Family Physicians in Providing Access to Cesarean Sections

Sebastian T. Tong, MD, MPH, Zachary J. Morgan, MS, Andrew W. Bazemore, MD, MPH, Aimee R. Eden, PhD, MPH, and Lars E. Peterson, MD, PhD

Introduction: **As an increasing number of rural hospitals close their maternity care units, many of the approximately 28 million reproductive-age women living in rural America do not have local access to obstetric services. We sought to describe the characteristics and distribution of cesarean section-providing family physicians who may provide critical services in maintaining obstetric access in rural hospitals.**

Methods: **Using a cross-sectional study design, we linked data from the 2017 to 2022 American Board of Family Medicine's Continuting Certification Questionnaire on provision of cesarean sections as primary surgeon and practice characteristics to geographic data. Logistic regression determined associations with provision of cesarean sections.**

Results: **Of 28,526 family physicians, 589 (2.1%) provided cesarean sections as primary surgeon. Those who provided cesarean sections were more likely to be male (odds ratio (OR) = 1.573, 95% confidence limits (CL) 1.246–1.986), and work in rural health clinics (OR = 2.157, CL 1.397–3.330), small rural counties (OR = 4.038, CL 1.887–8.642), and in counties without obstetrician/gynecologists (OR = 2.163, CL 1.440–3.250).**

Discussion: **Although few in number, family physicians who provide cesarean sections as primary surgeon disproportionately serve rural communities and counties without obstetrician/gynecologists, suggesting that they provide access to obstetric services in these communities. Policies that support family physician training in cesarean sections and facilitate credentialing of trained family physicians could reverse the trend of closing obstetric units in rural communities and reduce disparities in maternal and infant health outcomes. (J Am Board Fam Med 2023;00:000–000.)**

Keywords: **Cesarean Section, Cross-Sectional Studies, Family Physicians, Logistic Regression, Maternal Health Services, Obstetrics, Rural Population, Workforce**

Introduction

Approximately 28 million reproductive-age women in the United States live in rural communities but more than half of rural counties do not have hospital-based obstetric services.[1] An increasing number of rural areas are losing access to hospital obstetric services. Between 2004 and 2014, 9% or 179 rural counties lost access to in-county obstetric services due to hospital or maternity ward closures.[2] A further 3% or 53 rural counties lost access to in-county obstetric services between 2014 and 2018.[3] In particular, remote rural regions and majority black rural communities are more likely to lack in-county obstetric services.[4]

This article was externally peer reviewed.

Submitted 18 January 2023; revised 17 March 2023; accepted 27 March 2023.

This is the Ahead of Print version of the article.

From the Department of Family Medicine, University of Washington, Seattle, WA (STT), American Board of Family Medicine, Lexington, KY (ZJM, AWB, ARE, LEP), Department of Family and Community Medicine, College of Medicine, University of Kentucky, Lexington, KY (LEP)

Funding: Dr. Tong's work was supported by the American Board of Family Medicine Foundation.

Conflict of interest: Mr. Morgan, Dr. Bazemore and Dr. Peterson are employees of the American Board of Family Medicine. Dr. Eden was an employee of the American Board of Family Medicine at the time of this paper's development.

Corresponding author: Sebastian T. Tong, MD, MPH, Department of Family Medicine, University of Washington, Box 354696, Seattle, WA 98195-4696 (E-mail: setong@uw.edu).

Maternal and infant outcomes in rural communities are generally worse than in urban areas[5,6] due to the need to travel further distances to receive prenatal care and to deliver.[7,8] Women living in rural counties without maternity services have higher rates of preterm birth, births in hospitals without obstetric services, out-of-hospital births, newborn morbidity and mortality as well as lower prenatal care use compared with those living in counties with maternity services.[9–11]

Among a multitude of logistic and financial reasons, one of the primary reasons why rural hospitals are closing their obstetric units is the lack of an obstetric workforce.[12] More than half of rural counties do not have any obstetrician/gynecologists (OB/GYNs).[1] Family physicians (FPs), who are trained to provide comprehensive care for patients of all ages, can fill this gap in the maternity care workforce[13] with 1 study showing that rural hospitals in communities with an addition FP per 10,000 population having a 38% lower odds of obstetric unit closure.[12] A 2014 survey of 9 states reported that rural hospitals with low delivery volume are more likely to have FPs and general surgeons provide surgical obstetric services.[14] Other studies on single or a small number of states report that FPs provide important contributions to maternity care in rural areas.[15,16] Another study found that rural communities with fewer FPs were less likely to provide hospital obstetric services.[12]

Hospital-based obstetrics services are often dependent on having cesarean section capacity. Although not all FPs are trained to perform cesarean sections, all FPs are trained in maternity care and, with additional training within a residency or with an advanced maternity care fellowship, can provide cesarean sections and other advanced maternity care.[17,18] Evidence suggests that no substantial differences in maternal and infant outcomes exist in cesarean section provision between FPs and OB/GYNs.[19,20]

Our study seeks to describe the individual and practice characteristics, as well as the geographic distribution of FPs who provide cesarean sections using a national sample with a focus on elucidating the contribution of the FP workforce on providing obstetric access in rural communities.

Methods

Using a cross-sectional study design, we analyzed data collected from the American Board of Family Medicine's Continuing Certification Questionnaire from 2017 to 2022. Board certified FPs seeking to continue their certification completed the questionnaire as a required component of registration 3 to 4 months before the examination date. The questionnaire included questions on current primary practice site information and scope of practice. In particular, FPs were asked whether they provided obstetric deliveries and, if yes, whether they performed cesarean section deliveries as primary surgeon. Further questionnaire details can be found elsewhere.[21]

FPs who were not providing continuity care or who had missing geographic or demographic data were excluded. We created 3 categories of FPs based on their provision of deliveries: deliveries including cesarean sections as primary surgeon, deliveries but no cesarean sections as primary surgeon, and no deliveries. We then linked FPs to their demographic data in the American Board of Family Medicine's administrative files. Physician practice addresses were geocoded and linked to county level data on OB/GYN availability, midwife availability and percentage of women being of reproductive age, which were available from the Area Health Resources Files.[22] We classified rurality based on the Rural-Urban Continuum Codes from the US Department of Agriculture's Economic Research Service (classified as urban codes with 1 to 3, micropolitan 4 to 5, large rural 6 to 7 and small rural 8 to 9).[23] We also linked data to county-level primary care health professional shortage areas (HPSA), as defined by the Health Resources and Services Administration,[24] and to a social deprivation index that combines multiple community measures that are associated with worse population health outcomes (higher scores refer to higher overall deprivation).[25,26]

We performed χ^2 tests to determine associations between demographic, practice and geographic variables with involvement in obstetric deliveries. We calculated p-values using the false discovery rate method.[27] To determine the adjusted associations between physician, practice and county level characteristics, with provision of performing cesarean sections as primary surgeon, compared with providing deliveries but not performing cesarean sections, we used a logistic regression model that excluded FPs who did not do any deliveries. Using descriptive statistics, we also measured counts and frequencies of FPs who reported being faculty at a medical school or residency, because being an educator was associated

Table 1. Characteristics of Family Physicians Who Perform versus Do Not Perform Cesarean Sections as Primary Surgeon from the 2017-2022 ABFM Continuing Certification Questionnaire

	FPs Performing Primary C-Sections		FPs Doing Obstetric Deliveries but Not Primary C-Sections		FPs Not Doing Any Obstetric Deliveries		
	N	%	*N*	%	*N*	%	*p-Value*
Total	589		1523		26,414		
Individual Characteristics							
Age							
Under 40	103	17.5%	311	20.4%	3145	11.9%	<0.0001
40 to 49	301	51.1%	656	43.1%	10,640	40.3%	
50 to 59	119	20.2%	393	25.8%	7556	28.6%	
60 or Older	66	11.2%	163	10.7%	5073	19.2%	
Gender							
Women	239	40.6%	897	58.9%	12,142	46.0%	<0.0001
Men	349	59.3%	626	41.1%	14,272	54.0%	
Non-binary	1	0.2%	0	0%	0	0%	
Degree Type							
MD	520	88.3%	1358	89.2%	23,364	88.5%	0.6897
DO	69	11.7%	165	10.8%	3050	11.5%	
IMG							
Yes	73	12.4%	121	7.9%	6337	24.0%	<0.0001
No	516	87.6%	1402	92.1%	20,077	76.0%	
Race							
Asian	36	6.1%	89	5.8%	4547	17.2%	<0.0001
Black	25	4.2%	47	3.1%	1658	6.3%	
White	505	85.7%	1305	85.7%	18,228	69.0%	
Other	23	3.9%	82	5.4%	1981	7.5%	
Ethnicity							
Hispanic/Latino	35	5.9%	81	5.3%	2002	7.6%	0.0020
Not Hispanic/Latino	554	94.1%	1442	94.7%	24,412	92.4%	
Faculty at Medical School or Residency							
Yes, core/salaried faculty	120	20.4%	645	42.4%	2329	8.8%	<0.0001
Yes, volunteer/clinical faculty	237	40.2%	423	27.8%	5388	20.4%	
No	232	39.4%	455	29.9%	18,697	70.8%	
Practice Characteristics							
Site Size							
Solo practice	30	5.1%	33	2.2%	2978	11.3%	<0.0001
2 to 5 Providers	162	27.5%	213	14.0%	9090	34.4%	
6 to 20 Providers	261	44.3%	632	41.5%	8099	30.7%	
>20 Providers	136	23.1%	645	42.4%	6247	23.7%	
Principal Practice Site							
Hospital/Health System Owned	184	31.2%	452	29.7%	9407	35.6%	<0.0001
Independently Owned	141	23.9%	228	15.0%	8293	31.4%	
Managed Care/HMO	3	0.5%	32	2.1%	1745	6.6%	
Academic Health Center/Faculty Practice	81	13.8%	473	31.1%	1600	6.1%	
FQHC or look-alike	55	9.3%	190	12.5%	1727	6.5%	
Rural Health Clinic	96	16.3%	51	3.3%	559	2.1%	
Other	29	4.9%	97	6.4%	3083	11.7%	

Continued

Table 1. Continued

	FPs Performing Primary C-Sections		FPs Doing Obstetric Deliveries but Not Primary C-Sections		FPs Not Doing Any Obstetric Deliveries		
	N	%	*N*	%	*N*	%	*p-Value*
Specialty Mix of Principal Practice							
Family medicine only	312	53.0%	904	59.4%	12,936	49.0%	<0.0001
Primary care specialty mix	134	22.8%	300	19.7%	7610	28.8%	
Multiple specialties (not only primary care)	143	24.3%	319	20.9%	5868	22.2%	
Presence of Midwife at Practice							
Yes	104	17.7%	204	13.4%	1130	4.3%	<0.0001
No	485	82.3%	1319	86.6%	25,284	95.7%	
Geographic Characteristics							
Rurality of Practice Site*							
Urban	267	45.3%	1183	77.7%	22,847	86.5%	<0.0001
Micropolitan	54	9.2%	119	7.8%	1522	5.8%	
Large Rural	230	39.0%	205	13.5%	1744	6.6%	
Small Rural	38	6.5%	16	1.1%	301	1.1%	
Census Region							
Northeast	23	3.9%	154	10.1%	3787	14.3%	<0.0001
Midwest	212	36.0%	660	43.3%	6197	23.5%	
South	162	27.5%	191	12.5%	9285	35.2%	
West	192	32.6%	518	34.0%	7145	27.1%	
Presence of General OB/GYN in county							
None	193	32.8%	144	9.5%	1408	5.3%	<0.0001
5 or Fewer/10,000 reproductive age females in county	205	34.8%	507	33.3%	8453	32.0%	
Greater than 5 / 10,000 reproductive age females in county	191	32.4%	872	57.3%	16,553	62.7%	
Presence of Nurse Midwives							
None	247	41.9%	248	16.3%	3560	13.5%	<0.0001
1 or Fewer / 10,000 reproductive age females in county	122	20.7%	360	23.6%	10,079	38.2%	
Greater than 1/10,000 reproductive age females in county	220	37.4%	915	60.1%	12,775	48.4%	
Primary Care HPSA							
Full/Partial County	520	88.3%	1395	91.6%	24,243	91.8%	0.0103
No	69	11.7%	128	8.4%	2171	8.2%	
Percent of reproductive age females in county							
Under 18%	280	47.5%	328	21.5%	5515	20.9%	<0.0001
18% to 21%	213	36.2%	719	47.2%	13,400	50.7%	
More than 21%	96	16.3%	476	31.3%	7499	28.4%	
Social Deprivation Index**							
Under 25	201	34.1%	468	30.7%	6902	26.1%	<0.0001
25 to 75	305	51.8%	829	54.4%	14,040	53.2%	
More than 75	83	14.1%	226	14.8%	5472	20.7%	

Abbreviations: CS, Cesarean Section, FP, Family Physician, FQHC, federally qualified health center, HMO, health maintenance organization, HPSA, health professional shortage area, IMG, International Medical Graduate, OB/GYN, obstetrician/gynecologist.

*Rurality was defined using Rural-Urban Continuum Codes by county of primary practice site with urban codes 1-3, micropolitan 4-5, large rural 6-7 and small rural 8-9. The U.S. Department of Agriculture's Economic Research Service, which created this scale, defines urban as codes 1-3 and rural as codes 4-9.

**Social Deprivation Index is a composite measure of area level deprivation based on income, education, employment, housing, household characteristics, transportation and demographics and is measured on a score of 0-100 with higher numbers suggesting higher deprivation.

Table 2. Odds Ratios of FPs Performing Primary Cesarean Sections versus FPs during Obstetrics Deliveries but Not Primary Cesarean Sections

Characteristic	Odds Ratio	95% Wald Confidence Limits	
Age (ref = 40 to 49)			
Under 40	0.867	0.639	1.176
50 to 59	0.543	0.405	0.728
60 and over	0.659	0.450	0.965
Gender (ref = women)			
Men	1.573	1.246	1.986
Degree Type (ref = MD)			
DO	0.949	0.664	1.355
IMG			
Yes	1.712	1.145	2.560
Race (ref = white)			
Asian	1.474	0.900	2.415
Black or African American	1.646	0.886	3.056
Other	0.576	0.324	1.024
Ethnicity			
Hispanic or Latino	1.536	0.934	2.528
Faculty (ref = no)			
Yes, core/salaried faculty	0.829	0.551	1.245
Yes, volunteer/clinical faculty	1.286	0.981	1.684
Principal Practice Site Size (ref = > 20 providers)			
Solo practice	2.020	1.008	4.046
2 to 5 providers	1.477	1.010	2.160
6 to 20 providers	1.042	0.773	1.404
Principal Practice Site Type (ref = hospital/health system owned)			
Independently Owned	1.314	0.944	1.827
Managed Care/HMO	0.246	0.069	0.882
Academic Health Center/Faculty Practice	0.823	0.523	1.295
FQHC or look-alike	0.813	0.523	1.295
Rural Health Clinic	2.157	1.397	3.330
Other	0.523	0.308	0.888
Specialty Mix of Practice (ref = family medicine only)			
Primary care specialty mix	1.498	1.103	2.034
Multiple specialties	1.244	0.921	1.682
Presence of midwife at practice			
Yes	2.087	1.513	2.880
Rurality (ref = urban)			
Micropolitan	1.468	0.962	2.239
Large Rural	2.308	1.577	3.376
Small Rural	4.038	1.887	8.642
Census Region (ref = Midwest)			
Northeast	0.844	0.499	1.428
South	4.311	3.030	6.133
West	1.933	1.431	2.612
Number of General OB/GYN in county (ref = >5 per 10,000 reproductive age women)			
None	2.163	1.440	3.250
5 or fewer OB/GYNs	1.224	0.928	1.616

Continued

Table 2. Continued

Characteristic	Odds Ratio	95% Wald Confidence Limits	
Percentage of reproductive age females in county (ref = 18 to 21%)			
Under 18%	1.116	0.802	1.553
More than 21%	0.682	0.501	0.929
Primary Care HPSA			
No	1.140	0.769	1.690
Social Deprivation Index (ref = 25 to 75)			
Under 25	0.765	0.575	1.017
More than 75	1.022	0.723	1.445

Abbreviations: FP, Family Physician; HMO, health maintenance organization; OB/GYN, obstetrician/gynecologist; HPSA, health professional shortage area; FQHC, Federally qualified health center.

Table 3. Yearly Delivery Volume of FPs Who Provide Cesarean Sections by Geographic Variables

	Total FPs	Mean Yearly Total Delivery Volume	Mean Year C-Section Delivery Volume	Deliveries Performed Annually (%)		
				1 to 25	26 to 50	>50
Rurality of Practice Site						
Urban	267	93.6	34.6	10.5%	21.0%	68.5%
Micropolitan	54	76.5	24.5	13.0%	25.9%	61.1%
Large Rural	230	56.4	21.3	11.7%	40.9%	47.4%
Small Rural	38	48.2	17.3	28.9%	34.2%	36.8%
Number of General OB/GYN in county						
None	193	54.6	20.6	14.5%	40.4%	45.1%
5 or Fewer/10,000 Reproductive Age Women	205	78.8	28.4	12.7%	25.4%	62.0%
Greater than 5/10,000 Reproductive Age Women	191	89.7	33.1	9.9%	24.6%	65.4%

Abbreviations: FP, Family Physician; OB/GYN, obstetrician/gynecologist; C-Section, Cesarean Section.

with higher likelihood of providing maternity care,[28,29] and counts of cesarean deliveries performed annually based on rurality. Analyses were completed using SAS Version 9.4 (Cary, NC). The American Academy of Family Physicians Institutional Review Board approved this study.

Results

The response rate was 100%. Of 40,185 respondents, we excluded 2854 because they did not provide direct patient care, 8031 due to not providing outpatient continuity care, 410 who either practiced outside the US or had incomplete geographic data and 364 with incomplete demographic data. The remaining sample included 28,526 respondents of which 46.5% are female; 53.2% are under 49 years of age 28.3% are 50 to 59 years and 18.6% are greater than 60 years of age; and 16.4% identify as Asian, 6.1% as Black, 70.2% as White and 7.4% as Hispanic/Latino. Of the sample, 7.4% or 2112 FPs provided any obstetric deliveries and 2.1% or 589 performed cesarean sections as primary surgeon. In rural areas, 15.7% provide obstetric deliveries with this proportion decreasing from 17.3% in 2017 to 13.7% in 2022.

In the χ^2 analyses, individual characteristics associated with provision of cesarean sections as primary surgeon included being between the ages of 40 to 49, identifying as male, graduating from a US medical school, identifying as white and serving as a volunteer/clinical faculty at a medical school or residency (Table 1). Practice characteristics associated with cesarean section provision included working at a primary practice with 6 to 20 providers, in a rural health clinic, in a setting that is not exclusively

Table 4. Rurality of FPs Performing Primary Cesarean Sections by Faculty Status

	Faculty at Medical School or Residency			
Rurality of Primary Practice Site	Yes, Core/Salaried Faculty	Yes, Volunteer/Clinical Faculty	No	Total
Urban	103 (85.8%)	85 (35.9%)	79 (34.1%)	267 (45.3%)
Micropolitan	8 (6.7%)	23 (9.7%)	23 (9.9%)	54 (9.2%)
Large Rural	9 (7.5%)	103 (43.5%)	118 (50.9%)	230 (39.0%)
Small Rural	0 (0.0%)	26 (11.0%)	12 (5.2%)	38 (6.5%)
Total	120	237	232	589

Abbreviation: FP, Family Physician.

composed of FPs and in a practice with midwives. Geographic characteristics associated with providing cesarean sections included working in a region other than the Northeast and working in a county that is rural, without any OB/GYNs, with lower percentages of reproductive-age females and with a lower social deprivation index.

In the logistic regression analyses, the individual characteristic associated with a higher odds of providing cesarean sections compared with FPs providing obstetric deliveries but not cesarean sections was being male (odds ratio [OR] = 1.573, 95% confidence limits (CL) 1.246-1.986) (Table 2). Practice characteristics associated with higher odds included working in a solo (OR = 2.020, CL 1.008-4.046) or 2 to 5 provider practice (OR = 1.477, CL 1.010–2.160, vs working in a practice with >20 providers), working in a rural health clinic (OR = 2.157, CL 1.397–3.330) and working in a setting with a mix of primary care specialties (OR = 1.498, CL 1.103–2.034). Geographic characteristics associated with higher odds include working in a rural location (small rural vs urban OR = 4.038, CL 1.887–8.642), working in the South or West (compared with Midwest) and working in counties with no OB/GYNs (OR = 2.163, CL 1.440–3.250).

FPs who provide cesarean sections perform on average 74.6 deliveries annually with an average of 27.4 cesarean section deliveries (36.7%). Those who work in urban areas on average perform a higher number of deliveries (average 93.6) than those who work in more rural settings (micropolitan: 76.5, large rural: 56.4, small urban: 48.2) (Table 3). Those who work in counties without OB/GYN also provide fewer deliveries than in counties with higher numbers of OB/GYNs.

FPs who provide cesarean sections and are core/salaried faculty are more likely to be practicing in urban areas (Table 4). Volunteer/clinical faculty who provide cesarean sections are more distributed across urban and rural settings.

Discussion

Although only a small proportion of FPs perform cesarean sections, those that do disproportionately work in rural communities, in rural health centers and in counties without any OB/GYNs. This study confirms with a national sample the findings from prior smaller, regional studies that suggested that FPs play an important role in maintaining access to obstetric services in rural communities. Although FPs in rural areas perform fewer cesarean sections than their counterparts in urban areas, this volume difference may be explained by the fewer number of deliveries in rural communities. This lower volume may also explain why OB/GYNs choose not to practice in these communities because obstetric volumes are not high enough to sustain the full-time practice of an OB/GYN but could sustain FPs who provide other services beyond obstetric care. Interestingly, FPs who work with midwives are more likely to perform cesarean sections highlighting an important parallel role of midwives in maintaining obstetric access.

However, over the past few decades, there are decreasing numbers of FPs who provide maternity care services.[28,30–32] Multiple factors contribute to this decline including challenges with obtaining and maintaining credentialing, rural hospital closures, Labor and Delivery unit closures and the difficulty in returning to providing obstetrics if one has stopped practicing maternity care for any period of time.[33,34] As such, although FPs could be an important workforce to help maintain and potentially expand access to rural maternity care services, efforts will need to be undertaken to support this workforce. This could include training or retraining opportunities in

cesarean section delivery, which currently are rare outside of formal fellowships. Other efforts that could be studied include lowering malpractice premiums for providing cesarean sections, eliminating barriers to credentialing for appropriately trained individuals and coordinating efforts to expand the rural family medicine workforce.

There are several limitations to our study. First, because physicians self-report number of deliveries and other characteristics, the data may be subject to reporting bias and in some cases physicians may be prompted to select 1 answer when multiple may apply. Second, the data were collected over a 6 year period and assumes consistency over the time period. Third, as a cross-sectional study, it was only able to evaluate association, not causation, and other variables we did not consider could have contributed to observed associations. Fourth, we only include ABFM certified physicians; family physicians who are not ABFM certified are not included and may also provide cesarean sections.

Conclusion

FPs who perform cesarean sections disproportionately work in rural communities providing essential obstetric services to reproductive age women who live there. Efforts to train FPs in providing cesarean sections and to obtain credentialing when appropriately trained could potentially reverse trends in closing obstetric units in rural hospitals and reduce disparities in maternal and infant outcomes in rural communities.

To see this article online, please go to: http://jabfm.org/content/00/00/000.full.

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