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

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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 Continuing 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;36:565–573.)

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. 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. A further 3% or 53 rural counties lost access to in-county obstetric services between 2014 and 2018. In particular, remote rural regions and majority black rural communities are more likely to lack in-county obstetric services.
Maternal and infant outcomes in rural communities are generally worse than in urban areas due to the need to travel further distances to receive prenatal care and to deliver. 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.

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. More than half of rural counties do not have any obstetrician/gynecologists (OB/GYNs). Family physicians (FPs), who are trained to provide comprehensive care for patients of all ages, can fill this gap in the maternity care workforce 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. 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. Other studies on single or a small number of states report that FPs provide important contributions to maternity care in rural areas. Another study found that rural communities with fewer FPs were less likely to provide hospital obstetric services.

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. Evidence suggests that no substantial differences in maternal and infant outcomes exist in cesarean section provision between FPs and OB/GYNs.

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.

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. 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). We also linked data to county-level primary care health professional shortage areas (HPSA), as defined by the Health Resources and Services Administration, 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).

We performed χ² 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. 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>
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<th>Total</th>
<th>%</th>
<th>N (% of Total)</th>
<th>N (% of Total)</th>
<th>N (% of Total)</th>
<th>p-Value</th>
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<td>40 to 49</td>
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<td><strong>Practice Characteristics</strong></td>
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<tr>
<td>Specialty Mix of Principal Practice</td>
<td>FP\s Performing Primary C-Sections</td>
<td>FP\s Doing Obstetric Deliveries but Not Primary C-Sections</td>
<td>FP\s Not Doing Any Obstetric Deliveries</td>
<td>p-Value</td>
<td></td>
<td></td>
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<tr>
<td>------------------------------------</td>
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</tr>
<tr>
<td></td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
<td>N</td>
<td>%</td>
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<td>Family medicine only</td>
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<td>904</td>
<td>59.4%</td>
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<tr>
<td>Rurality of Practice Site*</td>
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<td>Urban</td>
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<td>77.7%</td>
<td>22,847</td>
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<td>1,522</td>
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<td>Small Rural</td>
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<td>16</td>
<td>1.1%</td>
<td>301</td>
<td>1.1%</td>
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<tr>
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<tr>
<td>Northeast</td>
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<td>3.9%</td>
<td>154</td>
<td>10.1%</td>
<td>3,787</td>
<td>14.3%</td>
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<td>Midwest</td>
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<td>660</td>
<td>43.3%</td>
<td>6,197</td>
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<td>191</td>
<td>12.5%</td>
<td>9,285</td>
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<td>518</td>
<td>34.0%</td>
<td>7,145</td>
<td>27.1%</td>
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<td></td>
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</tr>
<tr>
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<td>193</td>
<td>32.8%</td>
<td>144</td>
<td>9.5%</td>
<td>1,408</td>
<td>5.3%</td>
</tr>
</tbody>
</table>
| 5 or Fewer/10,000 reproductive age females in county | 205| 34.8%| 507 | 33.3% | 8,453 | 32.0%
| Greater than 5 / 10,000 reproductive age females in county | 191| 32.4%| 872 | 57.3% | 16,533| 62.7%
| Presence of Nurse Midwives         |     |      |     |      |     |       |             |
| None                               | 247| 41.9%| 248 | 16.3% | 3,560 | 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%| 1,395| 91.6%| 24,243| 91.8%| 0.0103 |
| No                                 | 69 | 11.7%| 128 | 8.4%  | 2,171 | 8.2% |
| Percent of reproductive age females in county |     |      |     |      |     |       |             |
| Under 18%                          | 280| 47.5%| 328 | 21.5% | 5,515 | 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% | 7,499 | 28.4%|
| Social Deprivation Index**         |     |      |     |      |     |       |             |
| Under 25                           | 201| 34.1%| 468 | 30.7% | 6,902 | 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%| 5,472 | 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

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<th>Characteristic</th>
<th>Odds Ratio</th>
<th>95% Wald Confidence Limits</th>
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</thead>
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<td><strong>Age (ref = 40 to 49)</strong></td>
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<td>Under 40</td>
<td>0.867</td>
<td>0.639 1.176</td>
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<td>50 to 59</td>
<td>0.543</td>
<td>0.405 0.728</td>
</tr>
<tr>
<td>60 and over</td>
<td>0.659</td>
<td>0.450 0.965</td>
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<td><strong>Gender (ref = women)</strong></td>
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<td>Men</td>
<td>1.573</td>
<td>1.246 1.986</td>
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<td>DO</td>
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<td>0.664 1.355</td>
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<td>1.145 2.560</td>
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<td>1.646</td>
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<td>0.324 1.024</td>
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<tr>
<td><strong>Ethnicity</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hispanic or Latino</td>
<td>1.536</td>
<td>0.934 2.528</td>
</tr>
<tr>
<td><strong>Faculty (ref = no)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes, core/salaried faculty</td>
<td>0.829</td>
<td>0.551 1.245</td>
</tr>
<tr>
<td>Yes, volunteer/clinical faculty</td>
<td>1.286</td>
<td>0.981 1.684</td>
</tr>
<tr>
<td><strong>Principal Practice Site Size (ref = &gt; 20 providers)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Solo practice</td>
<td>2.020</td>
<td>1.008 4.046</td>
</tr>
<tr>
<td>2 to 5 providers</td>
<td>1.477</td>
<td>1.010 2.160</td>
</tr>
<tr>
<td>6 to 20 providers</td>
<td>1.042</td>
<td>0.773 1.404</td>
</tr>
<tr>
<td><strong>Principal Practice Site Type (ref = hospital/health system owned)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Independently Owned</td>
<td>1.314</td>
<td>0.944 1.827</td>
</tr>
<tr>
<td>Managed Care/HMO</td>
<td>0.246</td>
<td>0.069 0.882</td>
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<tr>
<td>Academic Health Center/Faculty Practice</td>
<td>0.823</td>
<td>0.523 1.295</td>
</tr>
<tr>
<td>FQHC or look-alike</td>
<td>0.813</td>
<td>0.523 1.295</td>
</tr>
<tr>
<td>Rural Health Clinic</td>
<td>2.157</td>
<td>1.397 3.330</td>
</tr>
<tr>
<td>Other</td>
<td>0.523</td>
<td>0.308 0.888</td>
</tr>
<tr>
<td><strong>Specialty Mix of Practice (ref = family medicine only)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Primary care specialty mix</td>
<td>1.498</td>
<td>1.103 2.034</td>
</tr>
<tr>
<td>Multiple specialties</td>
<td>1.244</td>
<td>0.921 1.682</td>
</tr>
<tr>
<td><strong>Presence of midwife at practice</strong></td>
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<td></td>
</tr>
<tr>
<td>Yes</td>
<td>2.087</td>
<td>1.513 2.880</td>
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<tr>
<td><strong>Rurality (ref = urban)</strong></td>
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<tr>
<td>Micropolitan</td>
<td>1.468</td>
<td>0.962 2.339</td>
</tr>
<tr>
<td>Large Rural</td>
<td>2.308</td>
<td>1.577 3.376</td>
</tr>
<tr>
<td>Small Rural</td>
<td>4.038</td>
<td>1.887 8.642</td>
</tr>
<tr>
<td><strong>Census Region (ref = Midwest)</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Northeast</td>
<td>0.844</td>
<td>0.499 1.428</td>
</tr>
<tr>
<td>South</td>
<td>4.311</td>
<td>3.030 6.133</td>
</tr>
<tr>
<td>West</td>
<td>1.933</td>
<td>1.431 2.612</td>
</tr>
<tr>
<td><strong>Number of General OB/GYN in county (ref = &gt; 5 per 10,000 reproductive age women)</strong></td>
<td>2.163</td>
<td>1.440 3.250</td>
</tr>
<tr>
<td>None</td>
<td>1.224</td>
<td>0.928 1.616</td>
</tr>
<tr>
<td>5 or fewer OB/GYNs</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Continued
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 $\chi^2$ 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 2. Continued

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

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

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

Abbreviations: FP, Family Physician; OB/GYN, Obstetrician/gynecologist; C-Section, Cesarean Section.
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.\(^{13,14}\) 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

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

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

Abbreviation: FP, Family Physician.
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/36/4/565.full](http://jabfm.org/content/36/4/565.full).*

**References**


