



The impact of family physicians in rural maternity care

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Abstract

Background: Reduced access to maternity care in rural areas of the United States presents a significant burden to pregnant persons and infants. The objective of this study was to estimate the impact of family physicians (FPs) on access to maternity care in rural United States hospitals, especially where other providers may not be available.

Methods: We administered a survey to 216 rural hospitals in 10 US states inquiring about the number of babies delivered from 2013 to 2017, the types of delivering physicians, and the maternity services offered. We calculated the percentage of rural hospitals in our sample where FPs performed vaginal deliveries, cesareans, and vaginal births after cesarean (VBACs), and the percentage of all babies delivered by FPs. We estimated the distance patients would have to travel for care if FPs were not providing care locally.

Results: The final study population consisted of 185 rural hospitals. FPs delivered babies in 67% of these hospitals and were the only physicians who delivered babies in 27% of these hospitals. FPs provided VBAC at 18% and cesarean birth services at 46% of the rural hospitals, but with wide geographic differences. Many patients would have to drive an average of 86 miles round-trip to access care if those FPs were to stop delivering.

Conclusions: Family physicians are essential providers of maternity care in the rural United States. Family Medicine residency programs should ensure that trainees who intend to practice in rural locations have adequate maternity care training to maintain and expand access to maternity care for rural patients and their families.

KEYWORDS

family physicians, health care access, maternity care, rural health care

1 | INTRODUCTION

Pregnant people and their families living in rural areas of the United States face significant and increasing barriers to accessing maternity care. One hundred rural hospitals have closed in the past 10 years.¹ This loss of access is further compounded by the discontinuation of delivery services at additional rural hospitals.² Low birth volumes, low Medicaid payment, difficulty recruiting and retaining clinicians, and high liability insurance costs are commonly cited reasons for discontinuation of delivery services.³ Reduced access is more than a convenience issue. Decades of data show that longer distances to care are associated with poorer maternal and infant outcomes, increased interventions, greater likelihood of an unplanned out-of-hospital birth, and preterm birth.⁴⁻⁷ As of 2017, there were approximately 18 million women of reproductive age living in rural counties, making this lack of access to maternity care all the more concerning.⁸ Eighty percent of the 5 million women living in counties without a hospital offering maternity care live in rural counties.⁹

Maternity care is a continuum of antenatal, intrapartum, and postpartum care. Although a variety of clinicians can render antenatal and postpartum care in a variety of clinical settings, intrapartum care is rendered almost exclusively in hospitals and dedicated birth centers. The clinicians who attend and supervise birth are obstetrician gynecologists (OB/GYNs), family physicians (FPs), and certified nurse-midwives (CNMs), and other supporting clinicians including registered nurses (RNs) and anesthesia practitioners. The presence or absence of one or more of these categories of clinicians is the main “make or break” workforce element determining whether a hospital can provide intrapartum maternity care. This study focuses on the presence of OB/GYNs, FPs, and CNMs. There are marked geographic differences in the distribution of OB/GYNs, FPs, and CNMs across the United States. OB/GYNs and CNMs are mostly located in urban areas, whereas FPs are distributed similar to the general population across rural and urban settings.^{10,11} OB/GYNs are also particularly likely to be absent from counties served by critical access hospitals.¹⁰ FPs are the most widely distributed and accessible clinicians equipped to offer maternity care in rural areas.¹² One multistate study found that 63% of all physicians who provided maternity care in rural hospitals were FPs, although this number varied by state.¹³

The percentage of United States medical school graduates entering Family Medicine has remained flat at around eight to ten percent for the last 15 years,¹⁴ leading to calls for increasing that percentage to meet population needs and replace FPs who are retiring.^{15,16} Compounding the issue, current metrics do not accurately predict the

percentage of medical school graduates going into primary care, making workforce planning difficult.¹⁷

The shortage of medical graduates entering family medicine is only part of the issue. The other is the fact that the percentage of FPs offering intrapartum maternity care has decreased from 44% in the 1980s.¹⁸ Current estimates vary from 17% of practicing family physicians,¹⁸ to 13% of new graduates based on surveys conducted by the American Academy of Family Physicians,¹⁹ to single digits based on data from the American Board of Family Medicine at time of recertification examination.²⁰ Family Medicine residency programs train graduates to perform vaginal deliveries. However, the number of cesarean births performed in the United States has increased dramatically over the past 50 years, from 5.5% in 1970²⁰ to 32.0% in 2017.²¹ Cesarean births and other complex births require more extensive surgical skill, which most Family Medicine programs do not provide without additional training,²² which may be obtained in additional fellowship after completion of a Family Medicine residency.²³

The goal of this study was to determine the impact of FPs on access to maternity care in a variety of rural areas throughout the United States. This study considered the availability of prenatal care, vaginal and cesarean birth, and the impact on the distance that pregnant people and their families would have to travel for care should FPs not provide maternity care locally.

2 | METHODS

Faculty members from 22 universities were invited to participate in the study; faculty from seven universities agreed. Faculty invited were mostly members of the National Rural Health Association's Rural Medical Educator's group. Participating faculty then identified the rural and/or critical access hospitals in their state and/or region and administered a short survey, via phone or print, to those hospitals (see Appendix 1). University faculty were invited to participate under the assumption that they would have the interest and capacity to perform the data collection. The survey included questions about the size of the hospital, types of maternity services provided, whether OB/GYNs, FPs, or CNMs provided those services, and the total number of births per year over the study period (2013-2017). If a hospital provided vaginal birth services but not cesarean or VBAC, the distance to the nearest hospital providing those services was solicited. The survey questions were based on two previous pilot studies of access to maternity care in rural Colorado²⁴ and Montana.²⁵ Missing data from the surveys were supplemented with publicly available data from state and local health departments. This study was determined to not be human

TABLE 1 Rural hospitals (n = 185) from participating states (n = 10) and maternity care descriptions

State	No. of hospitals in study sample	Average no. of beds per hospital (range)	No. of critical access hospitals in study sample	%(N) of hospitals where FPs and other physicians deliver	%(N) of hospitals where FPs are the only delivering physicians
Alaska	13	27 (11-74)	9	92.3% (12)	38.5% (5)
Colorado	19	37 (9-100)	11	73.7% (14)	21.1% (4)
Idaho	7	22 (15-25)	7	85.7% (6)	57.1% (4)
Minnesota ^a	38	23 (12-25)	38	97.4% (37)	42.1% (16)
Missouri	24	74 (18-244)	7	54.2% (13)	8.3% (2)
North Carolina	37	137 (21-452)	9	16.2% (6)	5.4% (2)
Oregon	22	45 (21-176)	14	59.1% (13)	18.2% (4)
Utah	13	25 (9-54)	9	92.3% (12)	46.2% (6)
Washington ^a	10	25 (.)	10	90.0% (9)	70.0% (7)
Wyoming	2	25 (.)	2	100.0% (2)	0.0% (0)
Overall	185	57 (9-452)	116	67.0% (124)	27.0% (50)

^aMinnesota and Washington provided data for critical access hospitals only.

subjects research by the Colorado Multiple Institutional Review Board (Protocol #17-0476).

The ratio of deliveries at each hospital by FPs was calculated as the number performed by FPs over the total number of deliveries. In addition, the proportion of rural hospitals with FPs available to perform maternity services was calculated. To calculate the distance patients would have to travel from a hospital where FPs are the only physicians providing care, we used the distance from that hospital to the nearest hospital that provides delivery services. SAS 9.4²⁶ and Microsoft Excel were used for statistical analyses.

2.1 | Definitions

Rural hospitals were defined as those located in a county or census tract designated as rural by the Health Resources & Services Administration (HRSA).²⁷ Critical access hospitals are a subset of rural hospitals with no more than 25 inpatient hospital beds, located more than 35 miles from the nearest other hospital (15 miles if by mountainous or secondary roads), with an average length of stay no more than 96 hours, offering 24/7 emergency services.²⁸

3 | RESULTS

The initial study cohort consisted of 216 rural and critical access hospitals in 10 states that intentionally deliver babies (Alaska, Colorado, Idaho, Minnesota, Missouri, North Carolina, Oregon, Utah, Washington, and Wyoming). We received survey responses from 161 rural hospitals (response rate of 74.5%) and obtained information from supplementary sources on an additional 26 hospitals. Two hospitals were excluded because of insufficient information. The final study population consisted of 185 of the 216 target cohort hospitals (85.6%).

Of the 185 rural hospitals in the final study cohort, 116 were designated as critical access (Table 1). The percentage of hospitals by state where FPs delivered babies ranged from under 20% (North Carolina) to over 90% (Alaska, Minnesota, Utah, Washington, and Wyoming). The percentage of hospitals by state where FPs were the only physicians delivering babies ranged from 0% (Wyoming) to 70% (Washington). Overall, FPs delivered babies in 67% of the hospitals in this study, and FPs were the only physicians who delivered babies in 27% of the hospitals in this study.

The number of babies delivered by clinician type was available for 77 hospitals, or about 42% of the study population (Table 2). The percentage of all births delivered by FPs differed by state and ranged

TABLE 2 Proportion of total births performed by family physicians in rural hospitals where data were available (N = 77)

State	No. of hospitals	Total no. of births, 2013	No. of births delivered by FPs, 2013	% of babies delivered by FPs, 2013	Total no. of births, 2014	No. of births delivered by FPs, 2014	% of babies delivered by FPs, 2014	Total no. of births, 2015
Alaska	5	365	365	100.00%	350	350	100.00%	346
Colorado	14	2758	1246	45.18%	2855	1177	41.23%	2806
Idaho	5	389	307	78.92%	365	259	70.96%	360
Minnesota	20	2401	1496	62.31%	2358	1377	58.40%	2428
Missouri	5	1776	882	49.66%	1526	876	57.40%	1485
North Carolina	5	1467	563	38.38%	1378	536	38.90%	1293
Oregon	6	1366	500	36.60%	1226	502	40.95%	1138
Utah	9	1266	904	71.41%	1255	857	68.29%	1237
Washington	7	1361	1018	74.80%	1417	1142	80.59%	1409
Wyoming	1	158	124	78.48%	168	97	57.74%	177
Overall	77	13307	7405	55.65%	12 898	7173	55.61%	12679

from 34.9% to 100.0% between 2013 and 2017. The overall percentage of babies delivered by FPs remained approximately 54%-56% in each year of the 5-year study period.

Overall, about 42% of the hospitals in this study offered VBACs, and FPs performed VBACs at about 18% of hospitals (Table 3). About 92% of all hospitals performed cesareans, and about 46% of hospitals had FPs performing cesareans. The percentage of hospitals offering

VBACs by state ranged from about 16% (Colorado) to 60% (Washington). The percentage of hospitals with FPs performing VBACs ranged from 0% (Wyoming) to about 46% (Utah). The percentage of hospitals performing cesareans by state ranged from about 62% (Alaska) to 100% (Colorado, Idaho, Missouri, Utah, and Wyoming). The percentage of hospitals with FPs performing cesareans by state ranged from about 11% (North Carolina) to 100% (Wyoming).

TABLE 3 Rural hospitals (n = 185) from participating states (n = 10) and VBAC and cesarean availability

State	No. of hospitals	% (N) of hospitals offering VBAC	% (N) of hospitals with FPs performing VBACs	% (N) of hospitals offering cesareans	% (N) of hospitals with FPs performing cesareans
Alaska ^a	13	30.8% (4)	15.4% (2)	61.5% (8)	46.2% (6)
Colorado ^b	19	15.8% (3)	5.3% (1)	100.0% (19)	47.4% (9)
Idaho ^c	7	42.9% (3)	28.6% (2)	100.0% (7)	42.9% (3)
Minnesota ^d	38	36.8% (14)	26.3% (10)	92.1% (35)	63.2% (24)
Missouri	24	58.3% (14)	25.0% (6)	100.0% (24)	37.5% (9)
North Carolina ^e	37	56.8% (21)	2.7% (1)	91.9% (34)	10.8% (4)
Oregon ^f	22	18.2% (4)	4.5% (1)	95.5% (21)	45.5% (10)
Utah	13	53.9% (7)	46.2% (6)	100.0% (13)	84.6% (11)
Washington ^g	10	60.0% (6)	40.0% (4)	80.0% (8)	70.0% (7)
Wyoming	2	50.0% (1)	0.0% (0)	100.0% (2)	100.0% (2)
Overall	185	41.6% (77)	17.8% (33)	92.4% (171)	45.9% (85)

^aVBAC information missing for two hospitals; cesarean information missing for two hospitals.

^bCesarean provider information missing for two hospitals.

^cVBAC provider information missing for one hospital.

^dVBAC provider information missing for two hospitals; cesarean provider information missing for one hospital.

^eVBAC provider information missing for three hospitals; cesarean information missing for three hospitals.

^fVBAC information missing for one hospital.

^gVBAC practitioner information missing for one hospital; cesarean information missing for two hospitals.

No. of births delivered by FPs, 2015	% of babies delivered by FPs, 2015	Total no. of births, 2016	No. of births delivered by FPs, 2016	% of babies delivered by FPs, 2016	Total no. of births, 2017	No. of births delivered by FPs, 2017	% of babies delivered by FPs, 2017
346	100.00%	366	366	100.00%	300	300	100.00%
1134	40.41%	2802	1146	40.90%	2537	1011	39.85%
263	73.06%	399	306	76.69%	340	250	73.53%
1300	53.54%	2402	1259	52.41%	2349	1240	52.79%
800	53.87%	1330	698	52.48%	1326	687	51.81%
581	44.93%	1094	544	49.73%	1185	566	47.76%
434	38.14%	1137	397	34.92%	1101	386	35.06%
859	69.44%	1158	795	68.65%	1157	813	70.27%
1111	78.85%	1341	1023	76.29%	1353	1024	75.68%
92	51.98%	154	103	66.88%	107	72	67.29%
6920	54.58%	12183	6637	54.48%	11755	6349	54.01%

Hospitals that did not offer VBACs or cesareans were asked the one-way distance to the nearest hospital that provided those services (results not shown). Among hospitals that did not offer VBAC ($N = 100$), 15% were 0-25 miles from a hospital that offers VBAC, 32% were 26-50 miles, 31% were 51-100 miles, and 22% were more than 100 miles away. Among hospitals that did not offer cesareans ($N = 5$), 20% were 51-100 miles from a hospital that offers cesareans, and 80% were more than 100 miles away.

4 | DISCUSSION

In this study population, FPs provided significant and often the main or only access to maternity care in rural areas. This included vaginal delivery, cesarean delivery, and VBAC. Of the 185 rural hospitals in this study, FPs delivered at 124 hospitals, providing care for almost 6900 people each year.

Even more significantly, in 50 of the 124 hospitals where FPs delivered (~40%), FPs were the only type of physicians providing maternity care. Despite a declining overall trend in the number of babies delivered by rural hospitals observed in our subanalysis of proportion of births by practitioner type, the proportion of babies delivered by FPs remained stable, around 50%. These findings support the sustained importance of FPs for providing maternity care, even as population demographics change. Furthermore, FPs provide VBAC and cesarean birth services at many rural hospitals, although there are wide geographic differences. In eight of the hospitals in which Family Physicians were the sole physicians, they collaborated with certified nurse-midwives.

We determined the automobile driving impact on patients and their families if FPs did not provide care in hospitals where FPs were the only providing physician. Of the 50 hospitals that fit this criterion, we had specific hospital names and locations for 34. Five very remote Alaska hospitals, where the one-way distances were between 103 and 725 miles, were excluded, leaving 29 for this automobile driving analysis. In those 29 instances, the average one-way distance ranged from only 15 miles to 108 miles and averaged 43 miles one way (86 miles round-trip), involving an average number of 2958 babies per year. If each expectant mother has eight visits for prenatal care and delivery (low estimate), there would be $8 \times 2958 = 23,664$ annual automobile round-trips for prenatal care and delivery. If each round-trip is an average of 86 miles, those trips produce 2,035,104 annual miles of driving. At 25 miles per gallon, that is 81,404 gallons of gasoline per year. At 58 cents per mile transportation cost (Federal rate), that is \$1,180,360 in annual transportation cost. In addition, every time a person leaves their hometown for medical care, additional money leaves for other purchases, negatively impacting the economy of a rural town.²⁹

We found that in the great majority of critical access hospitals, FPs were the sole practitioners of maternity care. In the distance to alternative care analysis above, the nearest hospital where maternity care could be obtained was also a critical access hospital, demonstrating the importance of these facilities. There are 1350 critical access hospitals in the United States as of 2019²⁸ with about half providing maternity services.³⁰ If the problem of “maternity care deserts” is to be addressed, FPs are key to availability of local maternity care, and the ability of the entire hospital to survive and prosper.³¹

It was not within the purpose of our study to examine outcomes or quality of rural versus urban hospitals or of care by FPs. Previous studies have documented that rural maternity care quality outcomes are comparable to urban³⁰ and pregnant people and their infants cared for by FPs experience outcomes equivalent to, and sometimes better than outcomes by OB/GYNs including cesarean birth.³⁵ Achievement and maintenance of high quality in low-volume settings can be aided by a variety of educational and care strategies, such as the Advanced Life Support in Obstetrics program.^{36,37}

It was also not the purpose of our study to analyze the role that hospital credentialing processes play in enabling or blocking qualified FPs to provide maternity care services. Credentialing processes that objectively evaluate knowledge and skills without regard to physician specialty can provide rural communities with greater provider choice and access to care.³⁸

The critical importance of FPs in providing access to maternity care in rural areas begs the questions of training, recruitment, and retention. Although a detailed discussion of these topics is beyond the scope of this description of our study, several strategies are well documented. First, medical schools must do better at admitting and supporting students who are interested in practicing rural Family Medicine.^{17,39,40,41} Second, family medicine residencies must continue to provide training in care of both uncomplicated and complicated maternity care. Where training volumes are scarce, those training opportunities should be targeted to residents destined for rural practice, including additional fellowship training if necessary.⁴² Third, recruitment and retention of FPs with the skill and desire to provide rural maternity care must be a priority of rural hospital administrators and workforce planners who recognize FPs' community health and economic value.⁴³

4.1 | Limitations

Our study includes 10 states and 5 years of data. In this sample, we were able to study less than ten percent of the over 1800 rural hospitals in the United States. A larger and more geographically diverse sample would certainly add to the generalizability of our findings and better show the extent of the contribution of FPs to maternity care across the United States. Data were further limited in the subanalysis looking at the proportion of births delivered by FPs. A larger sample would improve the generalizability of these results, but the difficulty in collecting these data may reflect larger challenges in how birth data are collected and managed in smaller hospital systems. Additionally, there may be considerable variation within

subsets of rural hospitals (eg, rural vs. critical access). It was not the goal of this paper to distinguish between types of rural hospitals.

To account for some missing data (n = 26 hospitals, 14.1% of study population), publicly available data from state public health departments were used. The use of alternative data sources may have potentially introduced variation into the data for those hospitals.

This survey was administered to individuals at hospitals with differing job titles (eg, CEO, nurse, OB/GYNs, or other MDs). There may have been variability in the knowledge base of survey respondents. A future study looking at objective data sources would be recommended to verify the findings.

5 | CONCLUSIONS

We conclude that FPs are essential providers of maternity care to rural people for vaginal and cesarean delivery. We further conclude Family Medicine residency programs should identify trainees interested in rural practice and provide them with the maternity care training required to confidently perform vaginal and cesarean births. Since OB/GYNs do not commonly locate at rural and critical access hospitals,⁴⁴ their training programs should collaborate with the training of FPs to provide those services.⁴⁵ Further study should examine how to alleviate barriers encountered by FPs in providing maternity care^{23,46} and how rural hospitals that have stopped providing maternity care could re-establish maternity care.⁴⁷ Although collaboration between FPs and CNMs was found in only eight of the hospitals in this study, that model could increase the rural maternity care workforce by both providing prenatal care and attended vaginal births, with FPs possessing surgical skills being available for more complicated care.⁴⁸⁻⁵⁰

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

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APPENDIX 1

Section 1. Rural or Critical Access Demographic Information**Section 1: Rural or Critical Access Demographic Information**

Hospital Name: _____			
City: _____	State: _____	Zip: _____	
Number of Hospital Beds: _____	Rural: <u>yes / no</u>	Critical Access <u>yes / no</u>	

Section 2. Maternity Care Provided

Section 2: Maternity Care Provided

Q1. Did you intentionally deliver infants at your facility in any of the years 2013-2017?

- Yes No

If 'No' please go to question 1b.

If 'Yes' please go to question 2.

Q1b. Do you provide prenatal care in your town:

- Yes No

If 'Yes' please **Stop. We thank you for providing information on your hospital.**

If 'No' please go to question 1c.

Q1c. If 'no' please write the name of nearest facility that provides prenatal care:

(Name, Facility Address)

Q1d. How far in distance and time is the above named facility?

- 0 - 25 Miles
 26 - 50 Miles
 51 - 100 Miles
 Greater than 100 Miles

STOP: Thank you for providing information on this hospital

Q2. Please list the number of infants delivered at the above named facility for each year is listed below

2013 _____ 2014 _____ 2015 _____

2016 _____ 2017 _____

Q2b. Please enter the number of home births in the service area for the above hospital/facility between 2013-2017

If you stopped delivering infants in any year during this time please continue with question 2c otherwise, please continue to question 3.

Q2c. Please list the reasons the above facility stopped delivering infants:

- Lack of volume
- No delivering provider
- Lack of anesthesia
- Not economically feasible
- Liability concerns
- Other: _____

Please continue to question 3.

Q3. Please provide the number of infants delivered by provider type at the above named facility for each year:

Provider type	2013	2014	2015	2016	2017
Family Physician					
OB-Gyn					
Nurse Midwife					
Nurse Practitioner					
Physician Assistant					
General Surgeon					
General Practitioner					
Other					

Please continue to question 4.

Alternatively, if you are unable to provide number of births for each provider type, please select below all providers that deliver babies at the above facility.

Q3b. What are the specialties of providers who deliver(ed) babies at your facility? (check all that apply)

- Family Physician
- Obstetrics and Gynecologist (OB-Gyn)
- General Surgeon
- Nurse Midwife
- Nurse Practitioner
- Physician Assistant
- Other (_____)

Please continue to question 4.

Section 3. Obstetric Procedures: Vaginal birth after previous Cesarean

Q4i. # Cesareans _____
 Q4ii. # total births _____

Q5. Does/did above named facility allow vaginal birth after previous Cesarean (VBAC)?

- Yes No

If 'yes' please go to question 5a

If 'no' please go to question 5b

5a. Who performs/ed VBAC?

- Family Physician
- Physician Assistant
- OB-Gyn
- General Surgeon
- Nurse Midwife
- Nurse Practitioner
- General Practitioner
- Other (_____)

Section 3. Obstetric Procedures: Vaginal birth after previous Cesarean

5b. Please write the name of nearest facility that provides VBACs:

(Name, Facility Address)

5c. How far in distance and time is the above named facility?

0 - 25 Miles

26 - 50 Miles

51 - 100 Miles

Greater than 100 Miles

Please continue to question 6

Section 4. Obstetric Procedures: Cesarean birth

Section 4. Obstetric Procedures: Cesarean birth

6. Does/did the above named facility perform Cesarean delivery?

Yes No

If 'yes' please go to question 5a

If 'no' please go to question 5b

6a. Who performs/ed Cesarean delivery?

- Family Physician
- Physician Assistant
- OB-Gyn
- General Surgeon
- Nurse Midwife
- Nurse Practitioner
- General Practitioner
- Other (_____)

6b. Please write the name of nearest facility that performs Cesarean delivery:

(Name, Facility Address)

6c. How far in distance and time is the above named facility?

- 0 - 25 Miles
- 26 - 50 Miles
- 51 - 100 Miles
- Greater than 100 Miles

Please continue to question 7

Section 5. Anesthetic Procedures

This concludes the data collection, Thank you for your participation

Section 5. Anesthetic Procedures

7. What type of anesthesia is/was provided for childbirth at your facility?

- Sedation – Intravenous or inhaled delivery route
- Spinal (Intrathecal) delivery route
- Nitrous oxide delivered via inhalation
- Epidural delivery of medication
- Pudendal nerve block by injection
- Cervical nerve block by injection
- Other _____
- None provided

Please continue to question 8.

8. Who performs/ed anesthesia for childbirth at your facility?

- Delivering Provider
- Nurse Anesthetist
- Anesthesiologist
- Another provider

This concludes the data collection, Thank you for your participation