

Access to Obstetric Care in Rural Areas: Effect on Birth Outcomes

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Abstract: Hospital discharge data from 33 rural hospital service areas in Washington State were categorized by the extent to which patients left their local communities for obstetrical services. Women from communities with relatively few obstetrical providers in proportion to number of births were less likely to deliver in their local community hospital than women in rural communities with greater

numbers of physicians practicing obstetrics in proportion to number of births. Women from these high-outflow communities had a greater proportion of complicated deliveries, higher rates of prematurity, and higher costs of neonatal care than women from communities where most patients delivered in the local hospital. (*Am J Public Health* 1990; 80:814-818.)

Introduction

A fundamental precept of modern obstetrics is that adequate prenatal care leads to improved perinatal outcomes for mothers and infants particularly for high risk populations.¹⁻³ For pregnant women to obtain timely and appropriate perinatal care, they must establish relationships with individual providers: obstetricians, family physicians, midwives, or public health nurses.

In the rural United States—accounting for 23 percent of the nation's population⁵—two-thirds of the obstetrical providers are family or general practitioners.⁶ There has been a precipitous decline over the past several years in the number and proportion of family physicians offering obstetrical services in the United States. In 1988, only 29 percent of the members of the American Academy of Family Physicians were offering routine obstetrical care, down from an estimated 40 percent just two years previously.^{7,8} Although approximately 43 percent of rural family physicians continued to offer obstetrics, this constitutes a 23 percent decline in their participation since 1980.^{7,9} The Institute of Medicine reports that thousands of rural physicians stopped offering obstetrical care, leaving hundreds of rural counties without any local source of obstetrical services.⁶ Although the cause of physicians eliminating obstetrical care from their practices is multifactorial, the cost of liability insurance and the fear of suits appear to play a major role in their decisions.^{6,8-13}

Even in communities with adequate obstetrical care, a certain proportion of women either choose to leave these communities for obstetrical care, or are referred to different physicians or facilities because of specific complications of pregnancy. However, in towns with little or no obstetrical capacity, most women must travel to secure basic prenatal care as well as delivery. As a consequence it becomes less likely that those women will obtain adequate prenatal care.¹⁴ Delays in care of early labor complications may also result.

This study investigates the extent to which local availability of obstetrics is related to perinatal outcomes. We seek to answer the following questions:

- What are the characteristics of rural communities in which the majority of women deliver at a facility other than their local hospital (outflow)?
- Using outflow as a proxy for access to care, is there any difference in the outcome or cost of care for women living in communities with diminished obstetrical access as compared to women who have ready access to local obstetrical care?

Methods

Population Studied

The study was based on all deliveries of women whose primary residence was in a rural area of Washington State and who gave birth during calendar year 1986. The following definitions were used:

- *Rural hospitals* were defined as all non-federal, short-stay, acute care, inpatient facilities of fewer than 50 beds and located more than 15 miles from a city of 30,000 population or greater. Thirty-three of Washington's 90 hospitals met these criteria.
- A *rural area* was defined as the medical service catchment area served by these hospitals.
- A *catchment area* was the aggregate of all zip code areas whose center was closer to a specific rural hospital by public road than to any other hospital facility.
- Distances were based on figures supplied by the Washington State Department of Transportation.

Stratification of Rural Areas by Location of Delivery

A file of all hospital discharges from non-federal, short-stay hospitals in the State of Washington includes data on the place of residence of the patient, hospital of discharge, the DRG (diagnosis related group), and hospital charges. Maternal residence was used to identify all patients living within the 33 rural medical service catchment areas. By comparing the place of residence with the location of the hospital of delivery, we could determine what proportion of all obstetrical deliveries occurred in facilities outside a woman's local hospital catchment area.

The 33 rural areas were stratified into three groups on the basis of these determinations. Areas in which more than two-thirds of deliveries occurred in the local hospital were designated as "low-outflow" communities. "High-outflow" communities were those in which fewer than one-third of deliveries to local women occurred in the local hospital.

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“Medium-outflow” communities were those between these two extremes.

Availability of Obstetrical Services

The availability of obstetrical services in each of the 33 communities was determined through telephone surveys of hospital administrators and directors of nursing. The response rate was 100 percent. Information was obtained as to the number and specialty of all physicians providing obstetrical services in each hospital during the study period (1986), as well as in 1985 and early in 1988. A physician was considered as providing obstetrical services if, in the opinion of the administrator and directors of nursing, the physician was routinely doing deliveries in the hospital; this excluded physicians who delivered only on an emergency basis.

Determining Pregnancy Outcome and Costs

DRGs were used as proxies for obstetrical outcome (Appendix). Maternal complications were defined as all discharges with DRGs 370 or 372. These DRGs are used to designate deliveries—both cesarean section and vaginal—associated with major intrapartum complications, as well as other conditions such as pregnancy-induced hypertension, diabetes, and anemia. The balance of the deliveries were assumed to be uncomplicated for the purposes of this study and included DRG 371 (uncomplicated C-section), 373 (normal vaginal delivery), and 374 and 375 (vaginal delivery with an operating room procedure, such as sterilization). Premature births were defined as babies discharged with DRG codes 386, 387, or 388 all of which referred to premature delivery. DRGs 389, 390, and 391 were defined as full term births.

Hospital charges for neonatal care, as well as source of payment, were also evaluated from the hospital discharge abstracts.

Statistical Analysis

Differences in outcomes between outflow groups were evaluated using chi-square for trend for each outcome measure. Hospital charges for newborns were evaluated by comparing the means of high and low outflow communities, and the confidence interval of the difference between them. In addition, for the same groups, the proportion of newborns with charges greater than \$5,000 were compared using the

associated 95 percent confidence interval of the difference between those proportions.

Results

Characteristics of Study Communities

Approximately 350,000 people, 8 percent of the population of Washington State, live in the 33 rural medical service areas defined by this study. The 33 hospitals serving these areas represent 37 percent of the 90 acute, short-term, general hospitals in Washington State, but account for only 8 percent of the total licensed acute care beds. These service areas are dispersed throughout the state; 23 of Washington's 39 counties encompass one or more of the study areas. The 5,554 births which occurred to residents of these areas in 1986 represent 8.1 percent of all births to residents of the state during that year. There were 108 physicians practicing obstetrics in the 33 communities during 1986, 93 percent of whom were family or general practitioners; there were eight obstetricians practicing in two low-outflow communities and two medium-outflow communities.

As can be seen from Table 1, both the rural communities and the hospitals that serve them are quite small, with the average service area encompassing 10,592 people and the average hospital having 32 beds. High-outflow communities—those in which more than two-third of all births to local residents did not occur in the local hospital—were smaller than communities where larger proportions of pregnant women delivered in their local community hospital. These high-outflow communities were also somewhat closer to other more sophisticated perinatal facilities, although even for this group the average distance to a Level II facility was 41 miles. Conventional measures of socioeconomic status, such as unemployment rate and the proportion of obstetrical patients enrolled in Medicaid, did not meaningfully differ among the three groups of communities.

The most striking difference between the communities in the outflow groups was the local availability of obstetrical care. By the end of the study period in 1986, only eight of the 13 high-outflow community hospitals still offered routine obstetrical services, with four of the closures occurring since mid-1984. Additionally, three of the eight hospitals which offered obstetrical services in 1986 suspended these services

TABLE 1—Characteristics of Study Communities Stratified by Differential Obstetrical Outflow, Washington State, 1986

Characteristics	Low Outflow (<33%) N = 8	Medium Outflow (33–67%) N = 12	High Outflow (>67%) N = 13	All Communities N = 33
Total number of hospital births to residents of service areas	1,155	2,781	1,618	5,554
Percent of births occurring outside community	19.9	48.8	80	52
Mean miles to Level II nursery	79	63	41	58
Mean beds in local hospital	37	33	27	32
Mean population of hospital service area	11,029	12,318	8,731	10,592
Mean percent of obstetrical patients enrolled in Medicaid	31.3	28	27.4	28.8
Mean percent county unemployment rate (1985)	12.6	11.8	11.1	11.7
Percent of births to women under 18 or over 35 (1986)	9.4	11.0	8.8	9.7
Infant Mortality Rates/1000 births (County rates 1980–83)	11.6	11.8	10.5	11.2

in either 1987 or 1988. The reason given in essentially all of these cases was the decision of local physicians to discontinue offering obstetrics. All of the low and medium-outflow communities continued to offer obstetrics. Figure 1 shows that high-outflow communities had relatively fewer obstetrically active physicians in the year before the study, and that this disparity has become more pronounced during the study year and in the succeeding year. By contrast, there was no significant attrition in obstetric availability in the comparison communities.

Obstetrical Outcomes

Obstetrical outcomes differed systematically across the three groups of communities. As Figure 2 demonstrates, there is a strong association between the proportion of deliveries that occur outside of the community and the rate of complications associated with childbirth. Women living in high-outflow communities were 34 percent more likely to experience birth-associated complications or comorbidity than women from medium-outflow communities, and 67 percent more likely than women from low-outflow communities.

Children of women from high-outflow communities have higher rates of prematurity, a trend significant at the .001 level. Neonatal length of stay—a measure presumably correlated with neonatal outcome—also shows a significant trend across community type.

Access to Care and Perinatal Costs

Table 2 illustrates the difference in hospital charges for newborns used as a proxy for cost for neonatal care across the three community groups. Newborn patients from high-outflow communities have dramatically higher average charges than their counterparts in better served communities.

Although the differences are impressive without regard to insurance type, it appears these differences are mainly the result of patients enrolled in the Medicaid program. It should be noted, however, that infants of lower income women with adverse birth outcomes generating high hospital charges are more likely to be encouraged, and even assisted in enrolling in Medicaid.

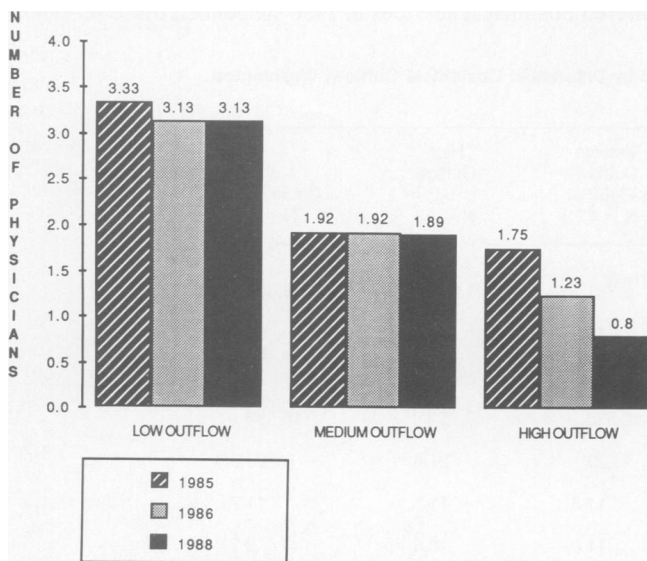


FIGURE 1—Physicians Practicing Obstetrics per 100 Births to Local Women by Community Outflow by Selected Year

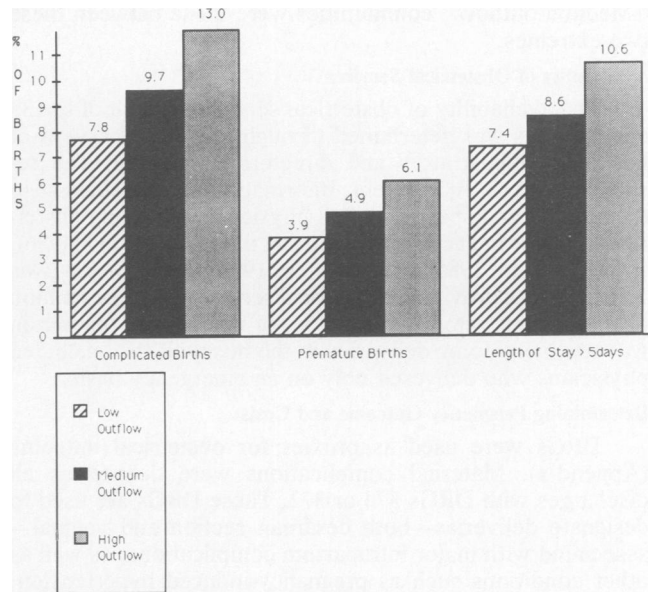


FIGURE 2—Percent of Adverse Birth Outcomes to Rural Washington State Residents by Community Outflow

TABLE 2—Newborn Hospital Charges to Rural Washington Residents Stratified by Community Outflow for Obstetrical Care and Payor Type

	Mean Charges		
	High Outflow N = 1587	Low Outflow N = 1210	Difference (95% CI)
All payors	\$2,103	\$1,046	\$1057 (-\$125, \$2,239)
Medicaid	\$4,627	\$1,014	\$3613 (-\$422, \$7,648)
Non-Medicaid	\$1,128	\$1,061	\$67 (-\$368, \$502)
	Proportion of Newborns with Charges > \$5,000		
	High Outflow N = 1587	Low Outflow N = 1210	Difference (95% CI)
All payors	3.6	1.7	1.9 (0.66, 3.14)
Medicaid	6.3	2.1	4.2 (0.54, 7.9)
Non-Medicaid	2.7	1.4	1.3 (-.03, 2.57)

Although a few outliers can generate enormous charges, dramatically increasing the mean, and they undoubtedly had an effect here, newborns with higher charges clearly occurred more frequently in high outflow community populations. As shown in Table 2, there are three times as many babies on Medicaid with charges exceeding \$5,000 in the high-outflow communities compared to the low-outflow communities—a measure less affected than average charges by the influence of extreme outliers.

Discussion

The declining proportion of practitioners offering obstetrical services has had a disproportionate impact on rural areas. First, rural areas have fewer physicians per capita than urban regions and thus are more susceptible to changes in the spectrum of clinical services offered by those physicians who

do practice in rural America. Second, a larger proportion of deliveries in rural areas have been provided by general and family physicians, a group that has experienced a high rate of attrition from obstetrics.^{6,7-13,15}

Out data demonstrate that women living in rural Washington state communities with little or no obstetrical care available locally tend to deliver in hospitals outside the community. These women are more likely to have complicated labor and premature deliveries, and their infants are more likely to have longer and more expensive hospital stays than the children of their rural counterparts who deliver in local facilities communities with greater access to care.

The design of this study does not permit us to conclude that there is a causal relation between impaired access to rural obstetrical care and adverse perinatal outcome, although this appears to be a tenable hypothesis. There are several possible mechanisms which could account for a causal relation between access to care and outcome, however. First, women living in communities without obstetrical services must travel to obtain routine prenatal care, a barrier associated with poorer prenatal compliance.¹⁴ Women on marginal incomes or women without adequate transportation would be likely to delay or forego prenatal care, and might have more difficulty getting to all their prenatal visits. Even if these patients are able to arrange for transportation to other communities, they may encounter difficulties in obtaining obstetrical care in a state like Washington where most physicians limit the number of pregnant Medicaid patients for whom they will provide care.¹⁰

Second, obtaining obstetrical care and delivering outside one's local community may in itself constitute a risk factor for adverse outcome, even if obstetrical care has been arranged. Patients from remote, rural communities may have difficulty adhering to prenatal protocols or treatment regimens prescribed by physicians in distant communities. There may be significant delays in presentation to the hospital after the onset of labor. And the increased stress—physiological and psychological—associated with travel and parturition in unfamiliar settings may interfere with the normal process of labor.

Nevertheless, there are alternative explanations for the patterns observed here, the first being the possibility that inappropriate care was delivered by local physicians in high outflow communities. This is an unlikely cause for the results in this study for several reasons. First, there was little care available in these communities; five were without any routine obstetrical services. Second, for the 20 percent of the women from high-outflow communities who did deliver in a local hospital, outcomes were actually superior to local deliveries in medium and low-outflow facilities. Finally, of the non-local complicated births which occurred to women from high outflow communities, less than 5 percent came to those non-local hospitals as the result of a transfer.

A second explanation is that because the data are derived from hospital discharge abstracts, we lack precise information about the prenatal, intrapartum, and neonatal course of the patients in the study. DRGs and costs are used as proxies for outcome, and it is possible that there is a systematic bias in which larger urban hospitals are more likely to intervene medically during the intrapartum period, assign DRG codes denoting increased medical intensity, and keep neonates longer in their nurseries than smaller rural hospitals. Even if such a bias is the cause of the apparent differences in biological outcomes, the increased charges and lengths of stay associated with deliveries outside rural communities are real.

A third alternative explanation for the observed disparities is that women from communities with high-outflow are not comparable to the women living in medium- and low-outflow communities. Perhaps the 13 communities in this group have populations of women with higher risks for adverse perinatal outcomes. However, we found no indications that these high-outflow communities differ systematically from those with lower outflow for obstetrical care. Although the high-outflow communities are slightly smaller than the average rural Washington town or medical service area, the situation regarding previous county infant mortality rates (80-83), county unemployment, and the percent of obstetrical patients on Medicaid from these communities is similar to that of communities with less outflow and better outcomes.

A fourth explanation for these results may be that physicians in communities with increased rates of adverse outcomes transfer those high-risk patients to outside facilities prior to labor, thereby becoming a high-outflow community. However, if one notes that high-outflow communities were those in which more than two-thirds of the patients delivered non-locally, and that these communities had only 13 percent complicated births, it is clear that the transfer of an increased number of complicated patients would not change an otherwise low-outflow community into a high-outflow community.

Despite the limitations of this study, the data suggest that recent declines in the availability of obstetrical care in rural areas are associated with poorer perinatal outcomes. From the experience in Washington State it appears that the pivotal event is the decision by rural family physicians to discontinue providing obstetrical services. In many cases this leads to a substantial curtailment or total discontinuation of obstetrical services in the local hospital, causing women who may have previously delivered in their local hospital to travel to other communities for their obstetric care.

Although in this study loss of local services and associated higher rates of adverse outcomes were observed only in a handful of relatively small communities, this may be the leading edge of a more pervasive phenomenon. Although the problem is more graphic and easily demonstrated in rural populations, impaired obstetrical access may have the same social and biological consequences in urban settings.¹⁶

This study suggests that programs that maintain local availability of obstetrical care may improve perinatal outcomes in a cost effective fashion, since infants from high-outflow rural communities generated hospital charges twice as high as infants from low- and medium-outflow communities. The excess charges were more than \$1.5 million during 1986 alone, most of it paid for by public subsidies through the Medicaid program. This does not include additional costs in the post-hospital period which have been shown to be higher for Medicaid infants whose mothers received inadequate prenatal care.¹⁷

In conclusion, this study demonstrates an association between diminished rural access to obstetrical care and perinatal outcomes for women who travel outside their local communities for that care. If a causal relationship exists, society would benefit both medically and economically from providing a solution to the problems which stem from a diminishing number of obstetrical providers.

ACKNOWLEDGMENT

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APPENDIX

Codification of Diagnosis Related Groups

DRG	Abbreviated Title
Coded as Complicated Birth	
370	Cesarean section with complications or comorbidity
372	Vaginal delivery with complicating diagnosis
Coded as Uncomplicated Birth	
371	Cesarean section without complications or comorbidity
373	Vaginal delivery without complicating diagnoses
374	Vaginal delivery with sterilization and/or D & C
375	Vaginal delivery with operating room procedure except sterilization or D & C
Coded as Premature Neonate	
386	Extremely premature neonate
387	Premature with major complications
388	Premature without major complications
Coded as Term Neonates	
389	Full term neonate with major problems
390	Neonates with other problems
391	Normal newborn

REFERENCES

- Gortmacher SL: The effect of prenatal care upon the health of the newborn. *Am J Public Health* 1979; 69:653-657.
- Moore TR, *et al*: The perinatal and economic impact of prenatal care in a low-socioeconomic population. *Am J Obstet Gynecol* 1986; 154:29-33.
- Institute of Medicine: Preventing Low Birthweight. Washington, DC: National Academy Press, 1985.
- Alan Gutmacher Institute: The Blessed Event and the Bottom Line. New York: Alan Gutmacher Institute, 1987.
- Rosenblatt RA, Moscovice IS: Rural Health Care. New York: John Wiley and Sons, 1982.
- Institute of Medicine: The Effects of Medical Professional Liability and the Delivery of Obstetric Care. Washington, DC: National Academy Press, 1989.
- Schmittling G, Tosu C: Obstetrical privileges for family physicians: A national study. *J Fam Pract* 1989; 29:179-184.
- Bredfeldt R: Present status of obstetrics in family practice and the effect of malpractice issues. *J Fam Pract* 1989; 28:294-297.
- Clinton C, *et al*: Hospital privileges for family physicians: A national study of office based members of the American Academy of Family Physicians. *J Fam Pract* 1981; 13:361-371.
- Rosenblatt RA: The changing pattern of obstetrical practice in Washington State: The impact of tort reform. *Fam Med* 1988; 20:100-107.
- Smucker DR: Obstetrics in family practice in the State of Ohio. *J Fam Pract* 1988; 26:165-167.
- Smith MA, *et al*: Family practice obstetrics in Michigan: Factors affecting physician participation. *J Fam Pract* 1989; 28:433-437.
- Rostow VP, *et al*: Medical professional liability and the delivery of obstetrical care. *N Engl J Med* 1989; 321:1057-1060.
- McDonald TP, Coburn AF: Predictors of prenatal care utilization. *Soc Sci Med* 1988; 27:167-171.
- Changes in Practice of Obstetrics-Gynecologists ANA's Professional Liability Update. Chicago: American College of Obstetricians and Gynecologists, 1988.
- Braveman P, *et al*: Adverse outcomes and lack of health insurance among newborns in an eight-county area of California, 1982 to 1986. *N Engl J Med* 1989; 321:508-513.
- Maternity Care Access, Division of Medical Assistance, Department of Social and Health Services, Office of Analysis and Review, State of Washington Working Paper, October 13, 1987.

'Late Breaker' Session on Injury Control Invites Abstracts

The Injury Control and Emergency Health Services special primary interest group of the American Public Health Association has announced it will again feature a "late breaker" session during the APHA upcoming 118th annual meeting in New York City. The session will be held on Tuesday, October 2, 8:30 am-10:00 am, and will feature work completed within the last few months—after the deadline for consideration in the regular symposia of the APHA annual meeting.

Abstracts of 250 words or less will be accepted by the Injury Control SPIG until August 15, 1990. Please send the abstract, title of the paper, authors' name, address and telephone number to: Richard Waxweiler, Division of Injury Control, Centers for Disease Control, Mail Stop F-36, Atlanta, GA 30333. Tel: 404/488-4695.