

Relationship of Infant Mortality to the Availability of Obstetrical Care in Indiana

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Background. Projects that are currently under way in Indiana to improve access to obstetrical care have not addressed the availability of these services in nonmetropolitan areas. This study was designed to identify all physicians who were providing obstetrical services in every county throughout the state to determine if there is a correlation between the availability of these services and the infant mortality rate in nonmetropolitan counties.

Methods. A state-wide physician profile maintained by the Indiana Academy of Family Physicians was cross-referenced with a telephone survey of all hospitals in the state to identify those physicians providing obstetrical services within each county in Indiana. The number of physicians in each county was then compared with the number of births per year by mothers from that county to determine whether nonmetropolitan counties had sufficient physicians to provide obstetrical services. Finally, these findings were compared

with the most recent infant mortality rate for each nonmetropolitan county.

Results. A total of 610 family physicians, 311 obstetricians, and 75 general practitioners were providing obstetrical care in Indiana. There were 10 counties that did not have a physician who delivered babies practicing in that county. Thirty-two counties had more women who needed obstetrical care than the current number of physicians could serve. There was a negative correlation between physician availability and infant mortality in Indiana's nonmetropolitan counties ($r = -.38$; $P < .02$).

Conclusions. Access to care for pregnant patients is a major problem in rural Indiana and hampers Indiana's ability to reduce its current infant mortality rate.

Key words. Obstetrics; rural health; infant mortality; medically underserved area; Indiana. *J Fam Pract* 1991; 33:609-613.

Indiana has an alarmingly high infant mortality rate; the most current statistic is 10.99 deaths per 1000 live births in 1989.¹ For mothers who obtained the necessary and adequate prenatal care, however, infant mortality rates are very low.¹ An important determinant of adequate participation in prenatal care by expectant mothers is whether they have easy access to that care. In a recent study, McDonald and Coburn² demonstrated that when a long travel time is required to visit a provider, the likelihood of a pregnant woman receiving adequate prenatal care decreases. Nesbitt et al³ found that in counties with proportionately smaller numbers of providers, there were greater proportions of complicated deliveries, higher rates of prematurity, and higher costs for neonatal care.

There has been little discussion about access to physicians' services by Indiana's rural communities; to date, the emphasis has been placed on economic barriers and access to care in urban areas.¹ This study was undertaken to determine whether the current supply of family physicians, general practitioners, and obstetricians in Indiana is sufficient to provide adequate prenatal and obstetrical care in nonmetropolitan counties.

Indiana is primarily a rural state, with 62 of its 92 counties considered nonmetropolitan. The other 30 counties are within a standard metropolitan statistical area (SMSA) and are considered metropolitan. An SMSA is a county or group of counties within which there is at least one city with a population of 50,000 or more. Traditionally, nonmetropolitan obstetrical care has been provided by family physicians and general practitioners. Many of these physicians, however, are no longer providing obstetrical care because of increasing malpractice premiums and heightened fear of litigation.⁴⁻¹² In the period from 1987 to 1990, the percentage of American Academy of Family Physicians members who in-

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cluded obstetrics in their practice decreased from 41% to 29%.^{13,14} Studies done in other states confirm this decrease in family physicians' participation in obstetrics. Smucker¹⁵ documented a decrease in obstetrical practice by Ohio family physicians from 54% in 1975 to 16% in 1989. Similar trends have been demonstrated in Alabama, Arizona, Missouri, Mississippi, Oklahoma, and Oregon.¹⁶⁻²¹ Rosenblatt et al²² found that during a 6-year period (1982 to 1988), 10% of the obstetricians and 32% of family physicians had discontinued obstetrical care but remained in practice in the state of Washington. The decreasing number of family physicians participating in obstetrics as well as the rural character of Indiana may impair a woman's opportunity to receive adequate prenatal care.

Methods

A list of family physicians, general practitioners, and obstetricians currently providing obstetrical care in Indiana was accumulated. The list was assembled through two sources: a "physician profile" created in 1990 by the Indiana Academy of Family Physicians (IAFP), and a survey of Indiana hospitals.

For the IAFP profile, a 1-page questionnaire was mailed to all physicians licensed to practice medicine in Indiana requesting demographic, educational, specialty, and professional practice information. At the time of our study, 84% of Indiana physicians had returned the questionnaire. The nonresponders were similar to the respondents when compared by age and specialty.

Information concerning physicians who responded yes to the question "Do you accept obstetrical patients?" was acquired from the IAFP profile, and an original list of 1288 physicians was compiled. From this information, the physician's county of practice and self-designated specialty were determined. This group was narrowed by removing physicians who did not deliver babies but provided other care for obstetrical patients (eg, radiologists, neurologists, and anesthesiologists). Only physicians in the specialties of family practice, general practice, and obstetrics were counted. The resulting list included 944 physicians.

The second source of physicians was a 1988 list of physicians having obstetrical privileges in Indiana hospitals. This list, provided by Dr David Marrero of the Regenstrief Institute at the Indiana University School of Medicine, was generated by contacting each hospital in Indiana and requesting a list of physicians with obstetrical privileges. This list consisted of 957 physicians.

The two lists of physicians were compared, and physicians whose names appeared on both lists were

considered to be currently providing obstetrical care. The office of each physician whose name appeared on only one of the lists was contacted by telephone to determine whether the physician was still providing obstetrical care; the names of those who were not were removed from the list. An additional 104 physicians were removed from the list because they had retired, their telephone lines had been disconnected, or they had moved out of state. The final list of physicians providing obstetrical care in the state of Indiana consisted of 996 names.

To determine the availability of obstetrical service, the supply of physicians in a county was compared with the number of births by women from that county, regardless of the county in which the delivery occurred. Recognizing that obstetricians, in general, accept more obstetrical patients than family physicians and general practitioners, a weighting system was used. Wide ranges of values for the average number of obstetrical patients that family physicians or general practitioners accept have been reported.^{4,11} Recent information from the American Board of Family Practice indicates that 30.2% of diplomates continue to do obstetrics.²³ Of these, 12.4% perform 24 deliveries or less a year; 11.5% perform 26 to 50 deliveries; and 6.2% perform more than 50 deliveries a year. The mean number of deliveries for this group is 35 per year.²³ An average number of 50 obstetrical patients per year was reported by Wigul et al.¹⁸ This number was near other reported averages^{4,11} and therefore was used for this study. In the same study, Wigul and colleagues reported an average of 200 obstetrical patients per year for obstetricians; this was the value used for our calculations.

The adequacy of obstetrical services in a county was then calculated according to the following formula:

$$[(\#FP + \#GP) \times 50] + [\#OB \times 200]$$

$$- \text{number of live births}$$

$$= \text{excess obstetrical services available}$$

where #FP and #GP denote number of patients of family physicians and general practitioners, and #OB denotes number of obstetricians' patients. If the resulting difference was positive, the supply of physicians in the county was considered sufficient for the number of obstetrical patients. If the difference was negative, the supply of physicians was considered insufficient for the obstetrical patient population of that county. If the difference was between -50 and +50, so that the loss or gain of a single family physician or general practitioner would change the categorization of a county, that county was considered borderline.

The numerical values for physician availability in

nonmetropolitan counties were taken and compared with the latest infant mortality rate for that county. A determination of a county's rate cannot be made until enough births and deaths have occurred to give a statistically significant value. Because of this, 22 of the 62 nonmetropolitan counties did not have a calculated infant mortality rate for the previous 5 years. Only the 40 counties for which an infant mortality rate was available were included in our analysis. As noted previously, the mortality rates were from 1989 and were a summative value of the 1986 to 1988 data. The values were then used to determine a Pearson's r correlation coefficient.

Results

There are currently 996 physicians providing obstetrical care in Indiana: 610 family physicians, 311 obstetricians, and 75 general practitioners. The availability of obstetrical service by county is shown in Figure 1.

In 10 Indiana counties there is no reported physician of any specialty providing obstetrical care. Thirty-two counties have inadequate service; that is, there are more women needing obstetrical care than the current supply of physicians can serve. Sixteen counties have borderline availability of obstetrical care in that the loss of only one family physician or general practitioner would cause service to become inadequate. The remaining 34 counties have an adequate availability of obstetrical care.

The comparison between physician availability and infant mortality is displayed in Figure 2. A Pearson's correlation coefficient of $-.38$ ($P < .02$) was obtained for this graph. An R^2 of 14.44 was determined from this graph. This implies that 14.44% of Indiana's infant mortality in nonmetropolitan counties is explained by a lack of physician availability. The analysis indicated that this relationship was statistically significant using a two-tailed t test ($P < .02$).

Overall, the state does not have a shortage of physicians providing obstetrical service; rather, there is a serious maldistribution of physicians. Populous metropolitan counties have a substantial excess of physician services, while many nonmetropolitan counties are grossly underserved. This particular example of maldistribution is representative of the situation for all physicians in Indiana. Eighty-two percent of Indiana's physicians practice in metropolitan areas,²⁴ whereas, only 68% of the residents live in metropolitan areas.

There is a significant shortage of physicians providing obstetrical care in over 45% (42/92) of Indiana counties. In nonmetropolitan counties the situation is worse in that only 30% (19/62) have sufficient availabil-

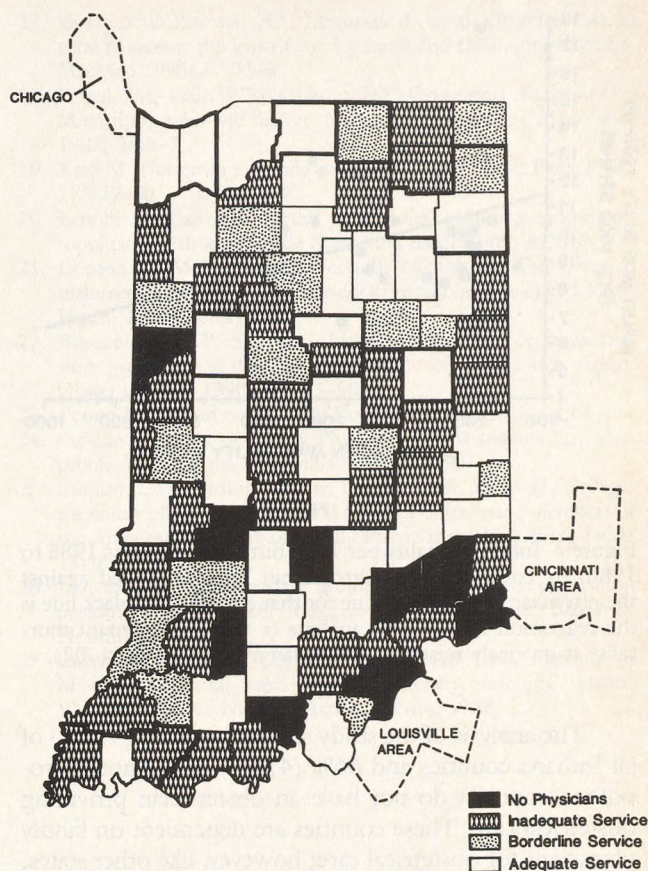


Figure 1. An Indiana map indicating level of obstetrical services by county. Adjacent major metropolitan areas are stippled. Metropolitan statistical areas are outlined in heavy black.

ity of obstetrical services. If the surplus physicians providing obstetrical care in oversupplied counties were redistributed to counties with shortages, every county would have sufficient availability of services. Furthermore, a surplus equal to the obstetrical services provided by 90 obstetricians or 359 family physicians would remain.

Discussion

This study finds that physician availability to provide obstetrical services is related to Indiana's infant mortality. Approximately 14.4% of the variance in infant mortality in nonmetropolitan counties is explained by the measure of physician availability. To effectively address the problem in the state, Indiana must closely examine the flow of physicians in and out of its rural counties. Also, specific programs to encourage physicians to enter family practice in rural counties need to be developed.

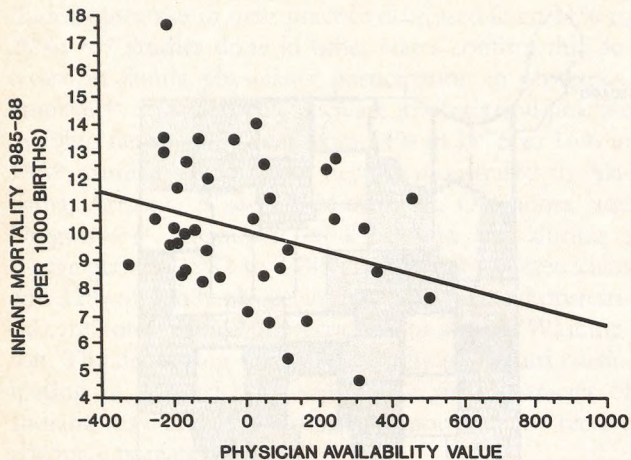


FIGURE 2

Figure 2. Infant mortality per 1000 births for the years 1985 to 1988, by county in nonmetropolitan Indiana plotted against the physician availability value for that county. The black line is the regression line for this analysis ($r = -0.38$). Infant mortality is inversely related to physician availability ($P < .02$).

The analysis of the study shows that 53% (49/92) of all Indiana counties and 66% (41/62) of the nonmetropolitan counties do not have an obstetrician providing obstetrical care. These counties are dependent on family physicians for obstetrical care; however, like other states, Indiana is faced with a decreasing number of family physicians offering this service. In 1980, 45% of family physicians in Indiana included obstetrics in their practice.²⁵ The American Academy of Family Physicians indicates that 39% of family physicians currently practice obstetrics in the census region containing Indiana.¹⁴ According to this study, however, the percentage including obstetrics in Indiana has dropped to 37%. If this decline continues, more nonmetropolitan counties may be without physicians providing these services in the future.

There are inherent problems with this type of survey. The study used 1989 natality data (the most recent natality information available) from the Indiana State Board of Health; however, the supply of physicians by county is calculated with 1990 data. A majority of Indiana counties were expected to experience an increase in population between 1987 and 1990,²⁶ so the results may actually be an underestimation of needed physicians. Also, individual physicians may actually be providing more or less obstetrical care than estimated. National averages were used in this analysis and should reflect the trend in Indiana. Patients may also seek care in a surrounding state; this probably occurs frequently in those areas of Indiana that are within commuting distance to Louisville, Cincinnati, and Chicago.

One problem with the correlation between infant mortality and availability is the inability to determine an infant mortality rate for each nonmetropolitan county. The State of Indiana uses data from several years to determine the infant mortality rate, and this rate is being evaluated against a fixed provider availability in 1990. Also, the correlation between infant mortality and availability may be due to confounding variables such as poverty, since poor communities may not be able to attract physicians. Further analysis that examines these different variables is needed to clarify this issue.

Determining the factors that affect infant mortality is not easy; the problem is complex and multivariate. Obviously, the availability of physicians to deliver babies is only one of the health care problems that face rural America. The socioeconomic factors affecting the people in these communities and the reimbursement issues with which rural hospitals must contend may contribute to the infant mortality but are more difficult to measure.

This study is limited because it took only physician providers into account. There may be a significant number of other practitioners providing care. Indiana requires nurse practitioners to carry malpractice insurance; however, currently there is no provider willing to sell obstetrical malpractice insurance to nurse practitioners, so this option is virtually nonexistent. Nurses may be providing prenatal care under the direction of a physician. There must also be women who give birth at home under the care of a lay midwife. This number has been virtually impossible to determine in Indiana.

The decreasing number of family physicians providing obstetrical care will lessen the quality of care that patients in nonmetropolitan areas receive. A recent Institute of Medicine report states: "Prenatal care should be plentiful enough in a community to enable all women to secure appointments within two weeks with providers close to their homes."²⁷ With the absence of physicians providing obstetrical care in 15% (9/62) of nonmetropolitan counties, shortages in 35% (22/62), and possible shortages in 19% (12/62), the outlook for adequate prenatal care being available close to a patient's home is dim.

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