

Economic and Personal Factors Affecting Women's Use of Nurse-Midwives in Michigan

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Context: *The proportion of American women who use a nurse-midwife rather than an obstetrician to deliver their baby is increasing. Relatively little is known, however, about the determinants of a midwife-assisted birth.*

Methods: *Logistic regression analyses using birth-certificate data on 149,437 Michigan births in 1990 examined the characteristics associated with midwife-attended births.*

Results: *Women who paid for childbirth with Medicaid were 3.5 times more likely than those paying with private insurance to use a certified nurse-midwife, net of controls for maternal characteristics; this effect varied significantly by race, with Medicaid payment increasing the odds of midwife use threefold among whites and nearly fivefold among nonwhites. The effect of education on midwife use also varied by race: A college education significantly increased the likelihood of midwife use among white women (odds ratio of 2.1), but higher education decreased that probability among nonwhite women (odds ratio of 0.74). Father's education and age, were also significantly associated with the likelihood of a midwife-attended birth; the babies of college-educated fathers had higher odds of being delivered by a nurse-midwife, as did the babies of men in their 30s.*

Conclusions: *The relationship between socioeconomic status and the use of midwives may not be as straightforward as previously thought. The patients of nurse-midwives are a diverse group whose socioeconomic characteristics and probable reasons for choosing a midwife over a physician vary widely.*

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The use of midwives in the United States has increased dramatically over the past two decades. The proportion of births that were attended by midwives grew from 1.0% in 1975 to 5.5% in 1994; in that year, more than 200,000 babies were delivered by midwives.¹ The vast majority of midwife-assisted births (94%) are now attended by certified nurse-midwives—licensed registered nurses who have completed an accredited graduate-level program in midwifery and also passed a national certification exam.²

The social and demographic characteristics of women who use the services of midwives are distinct from those of women who use physicians. Midwives disproportionately serve women who are at an increased risk of poor birth outcomes

for social rather than medical reasons—i.e., in terms of their age, education, ethnicity, marital status, inner-city and rural residence and ability to pay for services.³ This patient profile suggests that midwives are primarily being used to fill health care gaps among the economically disadvantaged. New Medicaid reimbursement regulations could be partially responsible for this relationship,⁴ since Medicaid now reimburses for midwife services in all states.⁵

Besides the increased use of midwives among poor women, educated, middle-class women now appear to be using midwives more often than they did in the past.⁶ These women are probably selecting midwives for philosophical rather than economic reasons. Their philosophy stems from the women's health movement of the 1970s, which emphasized reproductive freedom and the avoidance of excessive medical intervention.⁷ Such a "middle-class model" of childbirth is strongly linked to the mother's level of education.⁸

To further study socioeconomic differences associated with use of midwives, this article uses source of payment and education as proxies for the mother's socioeconomic status. The hypothesis is that women of low socioeconomic status (i.e., who pay for services using Medicaid) are more likely than higher-income women (i.e., who pay with private insurance) to

use a certified nurse-midwife, once the effects of other maternal characteristics are controlled. However, since college-educated women appear highly likely to use midwives, the mother's level of education is also used to disentangle differences between working-class and middle-class women, a tactic similar to that used in previous research.⁹ Thus, a second hypothesis is that college-educated women are more likely than high school-educated women to choose a midwife-assisted birth, net of other maternal variables.

Fathers appear to play an increasingly important role in decisions regarding childbirth, and earlier studies have suggested that fathers are especially likely to assume a more active role in alternative birth environments.¹⁰ Consequently, the fathers' demographic characteristics are included in the analyses.

Birth certificate data for a single state, Michigan, serve as the basis for the analysis. While other analyses of trends in midwife utilization have also relied on birth certificate data,¹¹ which routinely record characteristics of both parents, the Michigan data are unusual and especially useful, in that they include the source of expected payment for childbirth services.*

Methodology

Data and Variables

Birth certificate data on all 149,437 births in the state in 1990 were provided by the Michigan Department of Public Health. The analysis was limited to a single state to control for the wide variation in state laws regulating the practice of midwives; this lack of uniformity has been suggested as an important determinant of regional patterns of midwife utilization.¹²

The Michigan birth certificate data categorize the attendant at birth into 10 groups.[†] Because this analysis focuses on the choice of nurse-midwives[‡] over physi-

*The American College of Nurse-Midwives does not list Michigan among the 31 states mandating private insurance reimbursement, although nurse-midwives in the state receive reimbursement from several private insurance companies and from Blue Cross/Blue Shield (see reference 22).

†Medical doctors, doctors of osteopathy, nurses, midwives, nurse-midwives, husbands, physician's assistants, others, unknown and no attendant.

‡Births attended by noncertified midwives (i.e., traditional, direct-entry or "lay" midwives) were not considered in the analysis; however, fewer than 500 such births occurred in Michigan in 1990. Noncertified midwives are generally trained through apprenticeship or less formal mechanisms and primarily attend births in nonhospital settings (i.e., home births).

Table 1. Percentage distribution of births, by selected characteristics, according to type of attendant, Michigan, 1990

Characteristic	Physician (N=146,794)	Nurse- midwife (N=2,643)
Source of payment		
Private insurance	64.4	32.7
Medicaid	31.5	63.5
Other	4.1	3.8
Mother's education		
<high school	19.6	31.6
Completed high school	41.6	37.5
Some college	23.2	18.3
≥college degree	15.6	12.6
Mother's race		
White	77.9	55.2
Nonwhite	22.1	44.8
Mother's age		
<20	13.3	27.0
20–29	58.0	53.1
30–39	27.8	19.1
≥40	0.9	0.9
Parity		
1	40.0	43.6
2	32.4	30.3
≥3	27.6	26.1
Father's education		
<high school	8.1	8.9
Completed high school	30.8	21.3
Some college	16.0	9.7
≥college degree	18.5	13.5
Unknown	26.6	46.7
Father's race		
White	65.9	42.5
Nonwhite	7.9	10.9
Unknown	26.3	46.7
Father's age		
<20	1.8	2.6
20–29	35.6	26.1
30–39	32.6	22.0
≥40	4.3	3.0
Unknown	25.8	46.4
Total	100.0	100.0

Note: Birth certificates that lacked data on any of the mother's characteristics were removed from all analyses.

cians (who together are responsible for more than 99% of all births), the remaining categories were excluded from the analysis. Thus, the dependent variable was dichotomized into "midwife" (a certified nurse-midwife) or "physician" (either a medical doctor or a doctor of osteopathy).

The expected source of payment and educational attainment were the key independent variables used to test the relationship between socioeconomic status and the probability of a midwife-attended birth, with other maternal characteristics (race, age and parity) acting primarily as controls. Those certificates that were missing data on any maternal characteristic (fewer than 2% of the birth certificates examined) were removed from the analysis.

The source of payment was divided into

three categories—private insurance, Medicaid and other payment (including "other," self-paying and unknown). Educational attainment was coded as less than high school, completion of high school, some college, and college degree and beyond. Race was dichotomized as white and nonwhite. Mother's age was categorized as younger than 20, 20–29, 30–39 and 40 or older. Parity (either one, two or three or more) was calculated from data on the mother's total number of live births.

Unfortunately, mother's marital status was not recorded on Michigan birth certificates in 1990. (National trends suggest that certified nurse-midwives are more likely than physicians to serve unmarried women.¹³) However, the presence or absence of paternal data served as a proxy for marital status, since unmarried women are far less likely to include such information on the birth certificate than are married women. Information on the newborn's father's education and age (which were coded in the same manner as mother's age and education) was analyzed, and categories created for women whose certificates were missing this information. Father's race was dropped from the analysis because of collinearity with mother's race.

Analytic Approach

Logistic regression was used to estimate the likelihood that a birth was attended by a certified nurse-midwife, according to whether childbirth services were expected to be paid for with private insurance, Medicaid or some other source. The odds ratios are the exponential values of the logistic regression coefficients, which indicate the relative probability that a birth was attended by either a certified nurse-midwife or a physician.

The analytic strategy for assessing the relationship between socioeconomic status and a midwife-attended delivery was to consecutively add controls for different characteristics. The first model included only the effect of expected source of payment on the odds of midwife use; the second added controls for mother's education and other maternal characteristics; the third incorporated the father's characteristics. Also, the effects of interactions between source of payment and race and between mother's education and race on the likelihood of midwife use are examined.

Results

Descriptive Analysis

The pattern of midwife use in Michigan in 1990 indicates that certified nurse-midwives primarily served disadvantaged

populations (Table 1). While physicians and certified nurse-midwives each had both Medicaid and privately insured patients, nurse-midwives had twice the proportion of Medicaid patients as did physicians (64% vs. 33%).

Overall, certified nurse-midwives disproportionately served less-educated mothers: Women with less than a high school education represented almost one-third of the maternity patients served by nurse-midwives, compared with fewer than 20% of patients who used physicians. Concomitantly, 31% of patients of certified nurse-midwives had had some college or a college degree, compared with 39% of physicians' patients.

The maternity patients of certified nurse-midwives were twice as likely to be nonwhite as were the patients of physicians (45% vs. 22%). Certified nurse-midwives also had a higher proportion of patients who were teenage mothers than did physicians (27% vs. 13%). The parity levels of patients of both physicians and midwives were similar, although midwives were slightly more likely than physicians to serve women who were giving birth for the first time.

Almost half of the birth certificates for midwife-attended births were missing information on the characteristics of the father, making comparison of such characteristics by the health professional who attended the birth difficult to carry out.

Multivariate Analyses

Table 2 presents the results of the logistic regression analyses estimating the likelihood that a Michigan birth would be attended by a certified nurse-midwife. In the first analysis, which examined whether source of payment alone was associated with type of birth attendant, private insurance was established as the reference category. The first column of the table shows that the odds of using a midwife were nearly four times higher among women who paid for their delivery with Medicaid than among those paying with private insurance (p<.001). Odds of midwife use were 84% higher among women who expected to pay in some other way than among those paying with private insurance (p<.001). These findings support the idea that a midwife-attended birth is not necessarily a choice for many women, but may be related to Medicaid funding, to lack of private insurance or to insurance regulations.

In the analysis that controlled for characteristics of the mother as well (education, race, age and parity), source of payment remained a significant predictor of

midwife use: The addition of controls for maternal characteristics slightly reduced the odds of midwife use for mothers paying with Medicaid, but very slightly increased that probability among women paying by some method other than Medicaid or private insurance.

The results of a likelihood-ratio test (the difference in chi-squares between models with and without the additional coefficients¹⁴) show that some of the mother's characteristics significantly predicted midwife use (difference in χ^2 s of 397.607, $df=9$, $p<.001$). Specifically, the mother's education was positively related to midwife use, net of source of payment and other maternal characteristics (i.e., race, age and parity). For example, compared with women who had completed high school, those with some college and those who had a degree had 17% and 88% higher odds, respectively, of having their baby delivered by a midwife. This association supports the idea that middle-class women, as defined by educational attainment, may be actively seeking out midwives to fulfill ideological desires about childbirth.

The pregnant woman's race and age were also associated with her likelihood of using a midwife. Nonwhite women had 93% higher odds of a midwife-assisted delivery compared with white women, and teenagers had 53% higher odds compared with women who were in their 20s.

Adjustment for the newborn's father's education and age also significantly affected the likelihood of midwife use (a difference in χ^2 s of 25.816, $df=8$, $p<.01$). However, these findings should be considered exploratory, because such a large proportion of the birth certificates were missing information on the father. Women whose partners were older and better educated appear to have higher odds of using a midwife. Controlling for paternal characteristics did not greatly affect the magnitude of the other coefficients related to source of payment or the mothers' characteristics, and the overall relationships remained the same.

The addition of interaction terms for source of payment and race revealed that including the interaction of payment and race significantly added to the prediction of midwife use (a difference in χ^2 s of 22.234, $df=2$, $p<.001$). This indicates that the source of payment for childbirth services affected midwife utilization differently by race: Among whites, women who paid for their delivery with Medicaid were more than three times as likely to use a midwife as were those who had private insurance (odds ratio of 3.085); among nonwhites, women who paid with Med-

Table 2. Odds ratios (and 95% confidence intervals) from logistic regressions showing the likelihood that a birth would be attended by a midwife, by set of variables included in analysis, according to characteristic

Characteristic	Source of payment only	Plus maternal factors	Plus paternal factors	Plus payment-race interaction	Plus education-race interaction
Source of payment					
Private insurance	1.000	1.000	1.000	1.000	1.000
Medicaid	3.977***	3.505***	3.647***	3.085***	3.325*** (2.902, 3.808)
Other	1.843***	1.970***	2.013***	1.895***	1.965*** (1.551, 2.489)
Mother's education					
<high school	na	1.010	1.005	1.015	1.123 (0.967, 1.305)
Completed high school	na	1.000	1.000	1.000	1.000
Some college	na	1.165**	1.137*	1.137*	1.404*** (1.207, 1.633)
≥college degree	na	1.884***	1.622***	1.616***	2.061*** (1.714, 2.478)
Mother's race					
White	na	1.000	1.000	1.000	1.000
Nonwhite	na	1.925***	1.928***	1.359***	2.002*** (1.606, 2.496)
Mother's age					
<20	na	1.526***	1.524***	1.527***	1.499*** (1.337, 1.681)
20-29	na	1.000	1.000	1.000	1.000
30-39	na	0.939	0.873*	0.868*	0.873* (0.773, 0.986)
≥40	na	1.280	1.230	1.234	1.248 (0.811, 1.918)
Parity					
1	na	1.000	1.000	1.000	1.000
2	na	0.983	0.976	0.973	0.967 (0.879, 1.064)
≥3	na	0.937	0.927	0.928	0.913 (0.818, 1.020)
Father's education					
<high school	na	na	1.038	1.070	1.056 (0.897, 1.244)
Completed high school	na	na	1.000	1.000	1.000
Some college	na	na	1.009	0.999	0.975 (0.833, 1.140)
≥college degree	na	na	1.285**	1.251**	1.194* (1.008, 1.415)
Unknown	na	na	0.649*	0.654*	0.640* (0.438, 0.933)
Father's age					
<20	na	na	1.023	1.031	1.024 (0.785, 1.337)
20-29	na	na	1.000	1.000	1.000
30-39	na	na	1.196**	1.186**	1.190** (1.047, 1.353)
≥40	na	na	1.070	1.073	1.070 (0.827, 1.385)
Unknown	na	na	1.671**	1.659**	1.635* (1.122, 2.382)
Interaction terms					
Medicaid x nonwhite	na	na	na	1.611***	1.325* (1.063, 1.651)
Other payment x nonwhite	na	na	na	1.277	1.148 (0.683, 1.929)
<high school x nonwhite	na	na	na	na	0.808* (0.666, 0.981)
Some college x nonwhite	na	na	na	na	0.613*** (0.486, 0.772)
≥college degree x nonwhite	na	na	na	na	0.357*** (0.238, 0.536)
<i>Intercept</i>	0.009***	0.007***	0.006***	0.007***	0.006***
<i>Model χ^2</i>	1,146.417	1,544.024	1,569.840	1,592.074	1,629.854
<i>df</i>	2	11	19	21	24

* $p<.05$. ** $p<.01$. *** $p<.001$. Note: All model chi-squares are significant at $p<.001$. na=not applicable.

icaid were nearly five times more likely to use a midwife than were those with private insurance (3.085 multiplied by the interaction term, or 4.970). Moreover, white women who paid with some method other than public or private insurance, or who paid themselves, were 90% more likely to use a midwife than were those with private insurance; nonwhite women who paid with some other method or paid themselves were more than twice as likely as privately insured nonwhite women to use a midwife (1.9 multiplied by the interaction term, or 2.4).

The relationship between mother's education and midwife use also varied by race. Including the interaction between ed-

ucation and race significantly added to the prediction of midwife use (a difference in χ^2 s of 37.780, $df=3$, $p<.001$). That is, education affected the probability of midwife use differently among whites and nonwhites. For example, compared with white women who had no more than a high school education, white women with some college had 40% higher odds of using a midwife, and those who had completed college had more than double the odds. However, the association was reversed among nonwhite women, as higher educational attainment lowered the probability of midwife use: Nonwhite women with some college and who had at least a college degree had 14% lower odds and 26% lower odds, respec-

tively, of having their baby delivered by a midwife than nonwhite women who had only a high school education.

Discussion

Although the Midwest region had a lower level of midwife utilization in 1990 than the United States overall (2% of births in Michigan vs. 5% of births nationally¹⁵), birth certificate data indicate that the characteristics of Michigan women who use midwives are similar to those of all U.S. women who do so.¹⁶ Michigan women whose delivery was paid for through Medicaid and other sources were significantly more likely to use a midwife than were privately insured maternity patients, even after the effects of maternal characteristics (education, race, age and parity) and paternal characteristics (education and age) were taken into account.

Also, college-educated women were significantly more likely to have a midwife deliver their baby than were high school-educated mothers. The simple bivariate analysis, which showed a trend toward less midwife use with increasing education past high school, apparently masked a relationship between education and the choice of a midwife that was uncovered by the multivariate analysis.

Multivariate analyses also showed clear racial differences in the relationship between payment and education and the use of midwives. Socioeconomic status may lead white women to have different reasons for using a midwife rather than a physician. For example, the positive relationship between paying with Medicaid and midwife use reinforces the hypothesis that disadvantaged women may use midwives because midwife-assisted births incur lower costs to health care payers. These lower costs relative to physician-assisted births result from less medical intervention (e.g., far lower rates of cesarean births), shorter hospital stays and lower payroll costs (for health management organizations).¹⁷ On the other hand, college-educated white women were more than twice as likely as high school-educated white women to use a midwife, suggesting that the differential use of midwives, at least among whites, may stem from the "middle-class model" of childbirth associated with higher educational levels.

Among nonwhites, however, the relationship between education and midwife choice is less complex. Nonwhite women with a college education were less likely to use a midwife than were nonwhite women with only a high school education, and the

likelihood of a midwife-attended birth declined with increasing education after high school. This educational differential by race implies that the use of midwives may not be part of an ideology of childbirth for educated, middle-class nonwhites.

These findings echo those of an earlier study, which found that although white women were the least likely among all races to use a midwife, the rate of increase of midwife-attended births among white women in the 1980s was higher than that among blacks, Hispanics or Asians,¹⁸ that research suggested that the acceptance of midwives may have increased more rapidly in recent years among whites than among women of other races.

This analysis, which used expanded birth certificate data on source of payment and paternal characteristics, suggests that the relationship between socioeconomic status and the use of midwives may not be as straightforward as previously thought. Further, the fact that the father's characteristics significantly affected the probability of midwife use implies that couple-level analyses might be needed to fully understand the factors behind the choice of a midwife.

Two important limitations plague research on the use of midwives. The first concerns the variation in state laws that regulate the autonomy of nurse-midwives, since states vary in whether they permit nurse-midwives to prescribe medication, to admit patients to hospitals and to accept third-party reimbursement.¹⁹ Although restricting data collection to a single state should reduce this source of variation, ambiguous wording still allows some variation between hospitals, even within the same state. An example of this in-state variation in nurse-midwife autonomy is that some hospitals could require that midwives be supervised while others do not. Moreover, some hospitals might have protocols mandating the use of intravenous lines and electronic fetal monitoring during obstetric procedures;²⁰ these protocols can hamper a midwife's ability to provide an intervention-free birth, thereby affecting women's decisions about their birth experience.

A second limitation concerns women's geographic access to midwife services, physicians and hospitals. The use of birth certificate data does not allow the researcher to control for the geographic distribution of health facilities and population density, which might be important in predicting utilization.²¹ Similarly, the geographic distribution of college-educated women within a state may also affect the findings.

However, the data presented here are un-

likely to suffer from such differential access. According to data provided by the American College of Nurse-Midwives (ACNM),²² certified nurse-midwives practice in a variety of settings in Michigan, including in hospitals, in collaborative practices with physicians, in their own private practices and at birthing centers; as of 1997, there were 35 certified nurse-midwife practice sites throughout the state. Additional ACNM data indicate that in the central ACNM region composed of 11 states,* all areas of residence are represented among nurse-midwife patients—34% live in the inner city, 28% reside in suburban neighborhoods, 21% in urban areas and 18% in rural areas.²³

This analysis of 1990 birth certificate data from Michigan suggests that reliance on Medicaid or the absence of health insurance are important determinants of the use of midwives among disadvantaged women. However, white, college-educated women's higher odds of midwife use imply that nurse-midwives have a very diverse patient profile, spanning a wide socioeconomic spectrum. As increasing numbers of women in the United States use midwives rather than a conventional medical doctor for childbirth, further research should continue to examine the factors that are associated with their choice of a birth attendant.

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