Characteristics of Inner-City Women Giving Birth with Little or No Prenatal Care: A Case-Control Study

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Lack of prenatal care has been identified as an important risk factor for poor perinatal outcomes. A case-control study was conducted to identify risk factors for inadequate prenatal care. Records of women giving birth at an inner-city hospital who had fewer than three prenatal visits (cases) were compared with those of women giving birth at the same hospital who had more adequate prenatal care (controls). The final sample contained 120 women in each group. Women in the case group were more likely to be multiparous, to be less educated, and to have no telephone in the home. Tobacco and drug abuse were recorded significantly more often among these women. There was no difference in racial distribution between the case and control groups. Infants of women with minimal or no prenatal care had a lower mean birthweight and a higher frequency of prematurity. In logistic regression analysis, higher parity, age less than 30 years, single status, smoking, drug abuse, and residence in one of two statistical planning areas in the city were independently associated with increased odds of not receiving prenatal care. To be effective, prenatal outreach programs for inner-city women must be based on knowledge of the characteristics and needs of this population. *J Fam Pract 1991; 32:283-288.*

Women who receive little or no prenatal care are a difficult group to locate and study. Research that has identified inadequate prenatal care as an important risk factor for poor perinatal outcomes has been based largely on birth and death certificate data or on computerized hospital databases. In these studies the relative risk of low birthweight and perinatal mortality is roughly double among women who receive little or no prenatal care.[1–4] The marked increase in infant mortality noted in Boston in 1982 has also been associated with inadequate prenatal care.[5] Birth certificates provide few data, however, on the characteristics of the population of women with inadequate or no prenatal care.

The few published studies that examine in greater depth the distinguishing characteristics of women who receive inadequate prenatal care give inconsistent conclusions. A 1971 study done at a public hospital in Atlanta found that patients without prenatal care were more likely to be white, older, and of higher parity and lower educational level than the prenatal clinic population at the same hospital.[6] A limited chart review of women giving birth without prenatal care suggested that internal (psychological) barriers to care may be more important than external (economic, practical) barriers.[7] A small uncontrolled study from Detroit has suggested that drug abuse (primarily heroin), financial barriers to care, attitude toward pregnancy, and attitude toward health professionals may be important determinants of whether women seek out prenatal care.[8] In New York City, in a larger study of women presenting for childbirth who had no prenatal care, it was found that cocaine abuse was very common and was associated with increased perinatal morbidity.[9] Findings of a large study based on birth certificate data from a low-risk health maintenance organization population indicated that despite apparently equal access to care, black women had fewer prenatal visits than white women.[4]

A recent Institute of Medicine report summarized results of published and unpublished studies on barriers to prenatal care.[10] Financial barriers, lack of awareness of the need for prenatal care, poor links to the health care

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system, and negative attitudes toward health care providers stood out as factors identified in many studies.

Although several factors related to low socioeconomic status have been associated with lack of prenatal care, many poor women successfully seek prenatal care. A study conducted at a University of Tennessee clinic that compared a sample of early registrants for care with late registrants was unable to identify any clear factors distinguishing late registrants.[11] A study comparing early with late registrants for prenatal care in Harlem found that living with a husband or boyfriend and experiencing more than one stressful event in the previous year were positively associated with early registration.[12]

The study reported here addresses the following question: Within a low-income inner-city population, what distinguishes women who receive minimal or no prenatal care from other women who manage to obtain more adequate prenatal care? The relatively large number of minimal care patients in this study and the use of a control group drawn from the same county hospital population provided a new opportunity to examine these issues. The study also sought to verify the risk of poor outcomes in the infants of mothers with inadequate prenatal care.

The study hypotheses were that women with little or no prenatal care would be more likely to be black, older, and of higher parity; to have no medical insurance (including Medicaid); to abuse tobacco, alcohol, or drugs; to have lower levels of education; to live in statistical planning areas of the city linked to high infant mortality rates; and to have maternal and neonatal morbidity and low-birthweight (<2500 g) infants.

Methods

Women in the case group were identified consecutively in a computerized database as all women (N=143) who gave birth in the 6-month period from January to June 1988 at MetroHealth Medical Center and had had two or fewer prenatal visits. The control group consisted of an equal number of women who had had three or more prenatal visits and who were delivered nearest in time (within 2 days) to a woman who gave birth in the case group. The computerized database had been compiled from abstracting forms completed by the clinician at the time of delivery. Subjects were excluded if, on review of the medical record, they had been misclassified in the database on the number of prenatal visits (39 subjects), if they had twins (6 subjects), or if the medical record could not be located (1 subject). The final number of subjects in each group was 120.

MetroHealth Medical Center (the county hospital for Cuyahoga County) serves an ethnically and racially diverse low-income inner-city community. During the 6-month time frame from which the sample was selected, there were 1816 deliveries. Of these women giving birth, 7.8% were identified as having two or fewer prenatal visits. Approximately 40% of the maternity population is black, 7% Hispanic, and 48% non-Hispanic white.

Table 1. Distribution of Prenatal Care, by Case and Control Status

Prenatal Care*	Case No. (%)	Control No. (%)
Trimester care began		
First	3 (2)	39 (32)
Second	14 (12)	58 (48)
Third	41 (34)	18 (15)
No care	42 (35)	0 (0)
Missing	20 (17)	5 (5)
Total	120 (100)	120 (100)

**Mean number of prenatal visits: case group = 0.93; control group = 9.2.*

Medical records of case and control groups were reviewed by a trained medical record abstractor. Variables for which quantitative information was not consistently present, such as the amount of alcohol or drug use, were recorded as categorical variables.

The case group was compared with the control group using Student's *t* test for continuous variables and chi-square for categorical variables. Apgar scores were compared with the Mann-Whitney *U* test. To control for potential confounders and identify independent risk factors, logistic regression was performed using demographic and social characteristics as independent variables to estimate the odds of receiving little or no prenatal care. Logistic regression was done with the LOGISTIC program[13] using backward stepwise elimination. All other analyses were performed with the SPSS-PC statistical package.[14]

Results

Women in the case group, as expected, had a mean of 0.9 prenatal visits, whereas the mean for the control group was 9.2 visits. The majority of women in the case group received care only in the third trimester or not at all, whereas 80% of women in the control group started care in the first or second trimester (Table 1). There was no difference in mean age or age distribution between case and control groups. The racial distribution of the case group was strikingly similar to that of the control group and to that of the maternity population giving birth at MetroHealth Medical Center during the same period: 45% black, 42% white, and 7% Hispanic.

Most women in both groups were unemployed and

Table 2. Comparison of Demographic and Social Characteristics Between Cases and Controls

Characteristics	Cases (n=120) No. (%)	Controls (n=120) No. (%)
Age (years)	23.3	23.7
Parity	2.1*	1.2
Single	83 (72)	71 (59)
Unemployed	112 (95)	108 (93)
No telephone at home	31 (26)	14 (12)
Education (number of years)	10.6†	11.3
Tobacco use	76 (74)*	57 (50)
Drug use	23 (23)*	7 (6)
Alcohol use	18 (19)	11 (10)
Insurance		
Medicaid	108 (92)	97 (81)
Other	6 (5)	13 (11)
None	3 (3)	4 (3)
Residence in statistical planning area 3 or 7	34 (28)*	9 (7)

NOTE: *Percentages exclude missing data.*
*P < .01.
†P < .05.

on Medicaid at the time of delivery. Women in the case group were more likely to be of higher parity, to have no telephone, to have less education, and to use tobacco or illicit drugs. Women in the case group were also more often single and alcohol users, but these trends did not reach statistical significance (Table 2).

Missing data occurred more often for women in the case group, particularly for social characteristics. The amount of missing data was significantly different between the case and control groups for tobacco use, drug and alcohol abuse, and years of education. Repeating the analysis after assigning extreme values to missing data (for example, all smokers or all nonsmokers), however, did not change the direction of any of the relationships in the data. Statistical significance was not affected except in the case of alcohol use. If all women for whom data were missing had been alcohol users, the difference between the case group and the control group would have been statistically significant. Thus, the data presented represent a conservative perspective on the differences between the case and control groups.

Based on the difference between the case and control groups in distribution by census tract of residence plotted on a city map, two statistical planning areas were selected as high-risk areas for inadequate prenatal care. A dichotomous variable was created to describe residence in either of these areas in comparison with residence in the rest of the city. Women in the case group were much more likely than those in the control group to reside in one of these statistical planning areas (Table 2).

Reasons for not receiving care were available in the medical records of 34 of 42 patients with no prenatal visits, all of whom were interviewed by hospital social workers. In 22 out of 34 cases where a reason was noted, reasons for not receiving care seemed to derive from emotional considerations: fear or denial of pregnancy (11), lack of awareness of the need for prenatal care (6), dislike of physicians and examinations (4), and family problems (1) were the reasons given for not receiving care. The remainder noted more tangible barriers: transportation problems (5), transient living patterns (4), preoccupation with other children (2), and financial problems (1).

Table 3. Maternal Complications, by Case and Control Groups

Maternal Complications	Case (n=120) No. (%)	Control (n=120) No. (%)
Types of delivery		
Normal spontaneous vaginal delivery	100 (84)	93 (78)
Forceps or vacuum assisted	3 (3)	6 (5)
Cesarean section	16 (13)	20 (17)
Preeclampsia	3 (2)	3 (2)
Premature rupture of membranes	11 (9)	7 (6)
Infection	11 (9)	16 (13)
Postpartum hemorrhage	0	2 (2)
Placental abruption	6 (5)	2 (2)

NOTE: *Percentages exclude missing data (less than 2% for all variables).*

Type of delivery (vaginal vs cesarean section) did not differ between the case group and the control group, even when stratified by parity. Maternal complications were rare in both groups and showed a similar distribution, with the exception of placental abruption, which occurred more commonly in the case group (Table 3).

Infants of women in the case group had a significantly lower mean birthweight and a higher frequency of low birthweight (<2500 g). Very low birthweight (<1500 g) infants were born more often to women in the case group, but the overall number was small. Infants born to the case group had a significantly lower mean gestational age, and a higher proportion were born before 36 weeks' gestation. There was no significant difference in Apgar scores, the frequency of resuscitation at birth, or frequency of transfer to the neonatal intensive care unit. Stillbirth and neonatal death clustered notably in the case group (Table 4). To detect a doubling of risk for these rare outcomes at the $P < .05$ level would have required a sample size of at least 500 in each group.

Logistic regression analysis was performed using backward stepwise elimination at $P < .10$ to estimate the odds of not receiving prenatal care as determined by the following independent variables: age, parity, single status, years of education, telephone in the home, drug use, tobacco use, and statistical planning area of residence. Variables were selected for the model based on statistical significance in bivariate analysis or to evaluate potential

Table 4. Neonatal Complications Comparing Cases and Controls

Neonatal Complications	Case (n=120) No. (%)	Control (n=120) No. (%)
Mean birthweight (g)	2816*	3164
Birthweight <2500 g	34 (28)	11 (9)
Birthweight <1500 g	8 (7)	3 (2)
Mean gestational age (wk)	37.4*	38.8
Gestation <36 wk	25 (22)*	5 (4)
Mean Apgar score		
1 min	7.3	7.6
5 min	8.4	8.7
Resuscitation at birth		
Oxygen	17 (15)	15 (13)
Intubation	16 (14)	14 (12)
Cardiopulmonary resuscitation	1 (1)	4 (3)
Transfer to neonatal intensive care unit	26 (24)	19 (17)
Stillbirth	2 (2)	0 (0)
Neonatal death	5 (4)	1 (1)

NOTE: Percentages exclude missing data.
*P < .01.

confounders. Age was initially categorized as <19 years, 19 to 29 years, and >30 years, with the middle group used as the reference group. Women over 30 years were at significantly lower risk of inadequate care, while the youngest group of women did not appear to be at increased risk of inadequate care, so a dichotomous variable was created: age <30 years and >30 years. Parity was categorized as p = 0, p = 1 or 2, and p ≥ 3. Higher parity, single status, drug use, smoking, and residence in two specific statistical planning areas remained associated with lack of prenatal care. Single, multiparous women smokers under the age of 30 years who used drugs and lived in certain areas of the city were at greatest risk not to receive prenatal care (Table 5).

The classification of prenatal care in the study was determined by the limitations of the computerized database from which the sample was drawn. Reclassification of the sample using the more standard Kessner index[15] into adequate, intermediate, and inadequate care groups showed minimal crossover between the two extreme groups. Ninety-two percent of women in the case group were categorized as receiving inadequate care by the index, and none received adequate care. Fifty-two percent of the control group fell into the adequate category, 36% were categorized as intermediate, and 12% as inadequate.

Table 5. Logistic Regression Predicting Odds of Inadequate Prenatal Care

Variable	Odds Ratio	(95% CI)
Parity > 3	7.0	1.6-19.1
Parity 1 or 2	2.4	1.2-5.0
Statistical planning area 3 or 7	4.3	1.6-11.8
Age <30 years	4.0	1.4-11.3
Tobacco use	2.6	1.3-5.1
Drug use	2.4	.9-6.5
Single	1.8	.9-3.6

CI denotes confidence interval.

Because the Kessner classification controls for women who deliver at earlier gestational ages having fewer prenatal visits, the distribution of premature deliveries was reanalyzed after reclassification of the sample. Women with inadequate care still had a significantly higher proportion of premature infants ($\chi^2 = 16.48, P < .001$).

Discussion

Results of bivariate analysis confirmed many of the initial hypotheses. Women with minimal or no prenatal care were more likely to be of higher parity, to abuse tobacco and illicit drugs, to be less educated, and to have low-birthweight infants.

Multivariable analysis confirmed higher parity, tobacco use, and drug abuse as important independent factors associated with lack of prenatal care. It is probable that age did not appear as a significant associated factor in bivariate analysis because it was confounded by parity: multiparous women are more likely to be older. Risk of inadequate care was greatest for women with three or more children. Younger women of high parity may constitute a particular high-risk group to whom specific interventions could be targeted. This group of women may not seek care because of the belief that a previous successful pregnancy eliminates the need for prenatal care.

Following high parity, residence in two specific statistical planning areas showed the strongest association with lack of prenatal care. As anticipated, one of these is the area with the highest infant mortality rate in the city. It is known to be an area where extreme poverty and drug abuse are concentrated, and has already been targeted by outreach programs for prenatal services. The second statistical planning area, however, while in a low-income section of the city, has not been previously identified as having poor access to prenatal care or a very high infant mortality rate. It may be that this study identified an area undergoing changes in population or economic status that have not yet been picked up by standard indicators.

Why should location of home have such a strong association with lack of prenatal care when other signif-

icant, potentially confounding variables are controlled? While both case and control groups were drawn from a low-income population, it may be that residence in these areas indicates a very low income group. A component of drug abuse that was not identified by the chart audit may also contribute to the strength of this association. Difficulty with travel to clinics providing care may also be involved, though both areas are relatively close to clinics that provide prenatal services to low-income women. Adjacent statistical planning areas equally distant from prenatal care services do not show this association with inadequate care.

Although the particular geographic areas identified in this study have no relevance to other cities, the technique of mapping out such areas may be extremely useful in designing outreach programs. That one of these statistical areas yielded an unexpected finding emphasizes the importance of gathering data directly related to a specific high-risk population.

Also noteworthy are those hypotheses not confirmed by this study. It is clear that women younger than 30 years are at higher risk not to receive prenatal care, but because of confounding by parity, the importance of younger age is apparent only through multivariable analysis. Race seems to have no relationship to the risk of not receiving care, possibly because all the women in this study were drawn from a low-income population, controlling for the unequal distribution of low socioeconomic status by race. This finding is consistent with the conclusions of the Institute of Medicine report on prenatal care: when socioeconomic status, education, and other variables were included in multivariate analysis, race or ethnic status was not a significant risk factor for inadequate prenatal care.[10]

Because nearly all patients in this study qualified for Medicaid, the degree to which lack of Medicaid coverage creates a barrier to prenatal care could not be evaluated. It was not possible to determine from chart review at what point in their pregnancies patients received Medicaid coverage. It may be that women in the case group met with more obstacles than women in the control group in the application process.

This study reconfirms the findings of other workers[1–5] that women who receive little or no prenatal care are at high risk to have low birthweight and premature infants. It may be that health behaviors such as smoking, drug use, poor nutrition, and lack of awareness of the early signs of premature labor are important determinants of the poor outcomes that cluster in patients who do not receive prenatal care.

A chart review is limited by the information that admitting clerks, nurses, physicians, and social workers write in the medical chart. It may be that knowledge of prior prenatal care status biased the information recorded with regard to health habits. This bias may be particularly important for alcohol and drug abuse. This study did not find a significant increase in alcohol users among the case group, however. This study is the first to note an association between smoking and lack of prenatal care, and it is doubtful that medical care providers were biased to record a higher frequency of smoking among women in the case group.

It is possible that some factors not found to be significantly more frequent among women in the case group, such as alcohol use, would have been so had the data been more complete. A recent study of patient report of drug use as compared with urine drug-screening results in the maternity care setting found significant underreporting of drug use by patients.[16] It is likely that underreporting was a problem in both the case and control groups, but urine drug-screening data from this population are not available for verification.

More research is needed to explore the issues raised by this preliminary study. Why some low-income inner-city women receive adequate care while others do not may be best determined by asking directly in an interview study. Further work is also needed to evaluate which barriers to care are most amenable to intervention, and to determine which components of prenatal care actually influence perinatal outcome.

It is clear both from the qualitative and quantitative data presented here that in this inner-city population, simply providing Medicaid eligibility, while a crucial first step, was not sufficient to bring women who needed it in for prenatal care. Residence in particular neighborhoods was strongly associated with the risk of inadequate care in this study. Identification of high-risk neighborhoods based on prenatal care data could be a useful tool in designing interventions. Future research will help to target specific groups to whom outreach is needed and to identify the type of outreach that may be most successful.

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