Sociodemographic Factors and the Quality of Prenatal Care

ABSTRACT

Background: In this study, maternal sociodemographic factors are examined in relationship to the quality of prenatal health services US women receive.

Methods: Data from the 1980 National Natality Survey and 1980 Fetal Mortality Survey were used for the analysis. Indicator variables for prenatal care quality are the percentages of prenatal visits at which blood pressure and urine were tested, the performance of hemoglobin or hematocrit tests, and the presence or absence of advice regarding salt restriction and diuretics usage during pregnancy.

Results: Distribution of the basic examinations in prenatal care vary according to marital status, parity, education, and residence in a metropolitan or nonmetropolitan county. The advice received concerning salt and diuretics usage was also influenced by sociodemographic variables.

Conclusions: The analyses reveal that prenatal care is not of even minimally acceptable quality for many women. (*Am J Public Health.* 1991;81:1023–1028)

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Introduction

Numerous efforts have been made to assess the adequacy of prenatal care obtained by pregnant women in the United States. The adequacy of prenatal care can be measured by examining two components: (1) the timing and quantity of visits and (2) the quality of health services. With little exception to date,[1] studies of the adequacy of prenatal care have concentrated on the first component. Researchers have found that about one third of pregnant women obtain too few prenatal visits or start prenatal care too late. The groups getting the most inadequate care are teenagers, minorities, the least educated, the unmarried, and the poor[2–5] (P. J. Placek, unpublished manuscript, May 15, 1987; a more extensive report on this topic was prepared for the Institute of Medicine by Paul Placek, PhD in his private capacity, with appropriate clearances, and no official support or endorsement by his employer is intended or inferred.) Based upon data from the 1980 National Natality Survey (NNS) and the 1980 National Fetal Mortality Survey (NFMS), this research adds measures of quality to the study of the adequacy of prenatal care in the United States.

Women have varying degrees of control over the timing and quantity of prenatal health services they obtain, because sociodemographic attributes and health beliefs affect their utilization patterns. (When asked about barriers to obtaining adequate prenatal care, 39% of the Medicaid recipients and uninsured women interviewed by the US General Accounting Office cited attitudinal barriers, e.g., not wanting to tell others, being afraid of the pregnancy, and being afraid of the medical tests.)[6] Once a woman has chosen her physician, control over the quality of her health care shifts almost completely to the provider. Theoretically, the woman's sociodemographic attributes should not affect the quality of the services received.

The specific research questions to be answered are whether prenatal care recipients obtain basic examinations recommended by the American College of Obstetrics and Gynecology (ACOG), whether women receive appropriate medical advice concerning the use of salt and diuretics during pregnancy, and whether variability in the quality measures (surveillance and advice) corresponds to maternal sociodemographic characteristics.

ACOG recommends that all pregnant women receive both blood pressure examinations and urine tests, for protein and sugar, at every visit and that hematocrit and hemoglobin levels be assessed at least once during prenatal care.[7] Actual practices are compared to these standards of care.

Although attitudes about salt use in pregnancy had changed over time, by 1977 the ACOG had set the standard that normal women should use salt at the level preferred.[7,8] In other words, physicians should not normally advise salt restriction. Administration of diuretics during pregnancy may be acceptable treatment of underlying hypertensive disease but is not approved for normal pregnancy or for preeclampsia.[9,10] The kinds of advice

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TABLE 1—Explanatory Variables Included in the Regression Models[a]

Variables	Explanation
Maternal sociodemographic factors	
Age	Number of years of age at delivery
Non-Hispanic White[b]	Non-Hispanic White racial-ethnic group
Black[b]	Black racial group
Native American[b]	Native American Indian racial-ethnic group
Asian/Pacific Islander[b]	Asian or Pacific Islander racial-ethnic group
Education	Number of years of education with final value of 17 or more years[c]
Graduate	17 or more years of education
Married	Married at delivery
Parity	Number parity at start of current pregnancy
Metropolitan	Lived in metropolitan county at time of delivery
Prenatal care (PC) quantity and timing measures[d]	
Month PC begun	Month of pregnancy that first prenatal visit made
Number visits	Number of prenatal visits with final value of 30 or more visits[e]
Top visits	30 or more visits made
Maternal health status factors[f]	
High BPs %	Percent of prenatal visits at which blood pressures were above 140/90
Any complications	One or more of a list of complications were noted by the physician
Hypertension	Physician-identified hypertension
Preeclampsia	Physician-identified preeclampsia
CV–renal disease	Physician-identified cardiovascular–renal disease
Prepregnancy weight	Physician-reported maternal weight before pregnancy

[a]Variables are dichotomous (0 = no; 1 = yes), except as indicated.
[b]Compared with Hispanic White (the omitted category).
[c]The NNS and NFMS collapsed the top values to 17 or more years.
[d]Included as controls in the regressions of blood testing, advice about salt restriction, and advice about diuretics usage.
[e]The NNS and NFMS collapsed the top values to 30 or more visits.
[f]Included as controls in the regressions of advice about salt restriction and diuretics usage.

given by physicians regarding salt restriction and diuretics usage are compared with these expert recommendations.

Taffel and Keppel,[11] using the 1980 NNS, examined advice given by physicians about weight gain. They found that the majority of married mothers were given no weight gain limit or were advised to gain less than the amount currently recommended by nutritional experts. The advice varied according to race, educational background, parity, and prepregnancy weight.

Methods

Data

The National Center for Health Statistics based the NNS and NFMS on a complex random sample of 9941 live births and 6386 late fetal deaths that occurred in the United States during 1980.[12] Late fetal deaths are defined as fetal deaths with gestations of 28 weeks or more, or delivery weights of 1000 g or more. To adjust for the oversampling of fetal deaths, deflated sampling weights were attached to all observations for this research, resulting in a nationally representative sample. (Deflated sampling weights were calculated as the original sample weight times the sample size divided by the sum of weights.) The 2.3% of women who made no prenatal visits were excluded from these analyses.

Unimputed data were used from the live birth and fetal death records and from the follow-back questionnaires to the providers of prenatal care and the administrators of the hospitals where deliveries occurred. The prenatal care providers and the hospital administrators (hereafter referred to as the medical source) were asked to refer to medical records to answer detailed questionnaires about the prenatal care given to the women. The NNS and NFMS data have been described in detail elsewhere.[12,13]

Missing medical data may be due to the medical record being incomplete or invalid or it may be that the survey respondent did not fully transcribe the medical record. Donabedian argued that medical record keeping is one dimension of the quality of performance as well as the medium for evaluating other dimensions of care.[14] Also, two sources were asked to transcribe the medical information. Because of these factors, missing data were counted as missing examinations.

Variables

For the entire prenatal period, the medical sources recorded whether hematocrit and hemoglobin levels were obtained. For each prenatal visit, the medical sources recorded blood pressure and result of the urine test for protein. These data were transformed into the percentage of prenatal visits at which blood pressure was measured and the percentage of prenatal visits at which urine was checked for protein. The medical sources were also asked whether physicians advised women to restrict salt or to use diuretics during pregnancy.

The percentage of visits at which urine was tested is skewed to both ends of the range. Therefore, the variable was transformed into a dichotomous variable: whether urine was tested at no visits or at some percentage of visits greater than zero.

Table 1 lists the explanatory variables used in the analyses. The variables, "graduate" and "top visits" are indicator variables representing the top values of the "education" and "number visits" variables. "Graduate" and "top visits" were tested for an effect in each model but were only left in if they improved the model fit (Table 1).

The month of pregnancy that prenatal care was begun and the number of visits that the woman made were entered as controls in the blood test and advice models (Table 1). A provider does not expect to check hemoglobin and hematocrit levels or give particular pieces of advice more than a couple of times and may wait until

TABLE 2—Distribution of Prenatal Care Quality Variables

	Percentage Women
% of visits at which blood pressure was recorded	
None	12.9
1–24	3.5
25–99	16.4
100	67.2
% of visits at which urine tests were recorded	
None	33.7
1–49	6.3
50–99	35.2
100	24.8
Hemoglobin or hematocrit	
Not tested	6.6
Tested	93.4
Salt restriction	
Advised	14.9
Not advised	85.1
Diuretics usage	
Advised	2.6
Not advised	97.4

TABLE 3—Multiple Linear Regression of the Percentage of Visits at Which Blood Pressures Were Recorded on Maternal Sociodemographic Factors

Covariate	Regression Coefficient	Standard Error	Significance Level
Age	0.096	0.070	
Education	0.687	0.146	***
Non-Hispanic White	9.781	2.124	***
Black	−0.168	2.238	
Native American	1.615	3.683	
Asian/Pacific Islander	9.544	3.171	**
Married	4.040	0.918	***
Parity	−1.108	0.235	***
Metropolitan	−1.748	0.623	**

Note: F value = 44.029***; weighted frequency = 13 915. Covariates explained in Table 1.
**$P < .01$.
***$P < .001$.

TABLE 4—Multiple Logistic Regression of Urine Testing for Protein and Sugar on Maternal Sociodemographic Factors

Covariate	Regression Coefficient	Standard Error	Significance Level
Age	0.007	0.004	
Education	0.049	0.010	***
Graduate	0.081	0.108	
Non-Hispanic White	0.644	0.121	***
Black	0.070	0.127	
Native American	0.044	0.209	
Asian/Pacific Islander	0.456	0.187	*
Married	0.225	0.054	***
Parity	−0.071	0.014	***
Metropolitan	−0.085	0.038	*

Note: Likelihood ratio model $\chi^2 = 425.36$ ***; weighted frequency = 14 155; urine never tested (0) = 4480, urine tested (1) = 9675. Covariates explained in Table 1.
*$P < .05$.
***$P < .001$.

after the first visit to do so. If the woman does not return for further visits after the first, or skips the visit when the test or counseling was scheduled, she may be less likely to receive these services at all.

The maternal health status factors listed in Table 1 were included as controls in the advice models because of their possible relationship with the sociodemographic and advice variables.

Statistics

Multiple linear regression analysis as implemented on the Statistical Analysis System (SAS)[15] was done in order to determine the statistical significance of sociodemographic factors in explaining the level of blood pressure monitoring during prenatal care. Logistic regression analysis using SAS[16] was used to estimate the effect of the sociodemographic factors on the occurrence of urine testing, blood testing, and the giving of appropriate advice.

Results

Prenatal Surveillance

During 1980, nearly one third of the women who obtained prenatal care (32.8%) did not receive blood pressure examinations at all of their prenatal visits. Providers skipped all blood pressure examinations on 12.9% of prenatal care recipients (Table 2). Over three quarters of women did not have urine tests for protein at all of the visits they made. One third of prenatal care recipients had no urine tests done during prenatal visits (Table 2). Prenatal care providers obtained no blood test for hemoglobin or hematocrit on 6.6% of the women who were prenatal care recipients (Table 2).

The set of sociodemographic factors (i.e., age, education, race or ethnicity, marital status, parity, and county of residence) explains only a minimal amount of the variance in the percentage of visits at which blood pressures were taken ($R^2 = .027$).[17] Nonetheless, most of the sociodemographic factors are statistically significant in the regression. For each additional year of education, there is an increase of two thirds of a percent in the number of visits at which blood pressure was taken. Non-Hispanic Whites and Asians and Pacific Islanders received blood pressure exams at almost 10% more of their visits than Hispanic White women (the excluded group). Native American and Black women did not differ in a statistically significant way from Hispanic White women. Married women had blood pressures taken at 4% more of their prenatal visits than unmarried women. For each additional level of parity, women had blood pressure checked at 1% fewer of the visits they made. Finally, women living in metropolitan counties had blood pressures taken at almost 2% fewer of the visits than did women living in nonmetropolitan counties (Table 3).

Turning to the urine test regression, the model χ^2 statistic shows that the set of sociodemographic variables are useful in classifying women in the test or no-test groups ($P < .001$).[17] The maximum likelihood estimate χ^2 statistic for the individual parameters tests the hypothesis that the parameter equals zero. According to this test, women with higher education

TABLE 5—Multiple Logistic Regression of Blood Testing for Hemoglobin (Hgb) or Hematocrit (Hct) on Maternal Sociodemographic Factors

Covariate	Regression Coefficient	Standard Error	Significance Level
Age	0.018	0.008	*
Education	0.013	0.183	
Graduate	1.349	0.393	***
Non-Hispanic White	0.211	0.224	
Black	−0.001	0.233	
Native American	−0.295	0.343	
Asian/Pacific Islander	0.563	0.433	
Married	0.552	0.094	***
Parity	−0.114	0.025	***
Metropolitan	−0.123	0.074	

Note: Likelihood ratio model $\chi^2 = 266.59$***; weighted frequency = 14 155; Hgb or Hct not tested (0) = 869, Hgb or Hct tested (1) = 14 155. Control variables are month prenatal care began, number visits, and top visits. Covariates are explained in Table 1.
*$P < .05$.
***$P < .001$.

TABLE 6—Multiple Logistic Regression of the Advice Regarding Salt Restriction Given by the Physician on Maternal Factors

Covariate	Regression Coefficient	Standard Error	Significance Level
Age	−0.000	0.397	
Education	0.015	0.017	
Graduate	−0.155	0.161	
Non-Hispanic White	0.253	0.280	
Black	0.160	0.294	
Native American	−0.209	0.470	
Asian/Pacific Islander	0.007	0.386	
Married	0.297	0.109	**
Parity	−0.058	0.026	*
Metropolitan	−0.222	0.062	***

Note: Likelihood ratio model $\chi^2 = 364.99$***; weighted frequency = 7577; salt restricted (1) = 1407, not restricted (0) = 6169. Control variables are month prenatal care began, number visits, top visits, hypertension, preeclampsia, % high BPs, and pre-pregnant wt. Covariates are explained in Table 1.
*$P < .05$.
**$P < .01$.
***$P < .001$.

were more likely than women with less education to receive urine tests at their prenatal visits. This was also true for non-Hispanic Whites and Asians or Pacific Islanders relative to Hispanic Whites. Married women were more likely to be tested at visits than unmarried women. Lower parity women were more likely than high-parity women to receive urine testing. And again, nonmetropolitan dwellers were at an advantage over metropolitan dwellers (Table 4).

As shown in Table 5, the sociodemographic variables are useful in classifying women as recipients of the blood test for hemoglobin or hematocrit ($P < .001$). Of the independent factors, maternal age, a graduate education, marital status, and parity are statistically significant. The likelihood that a woman would receive a blood test increased with age, as it did for married women and women of lower parity. Women with 17 or more years of education received blood tests for hemoglobin or hematocrit significantly more often than less educated women (Table 5).

Advice Concerning Salt Restriction and Diuretics Usage

Physicians reported advising salt restriction for 34.5% of hypertensive women, 36.7% of preeclamptic women, and 13.4% of women who were free of any physician-identified complications. Fifteen percent of the overall sample were advised to restrict salt (Table 2).

As shown in Table 6, the set of sociodemographic, health status, and prenatal care factors is useful in classifying women according to the kind of advice that they received regarding salt restriction ($P < .001$). The sociodemographic attributes that decrease the log-likelihood of being advised to restrict salt are being unmarried, having higher parity, and residing in a metropolitan county.

The final logistic regression shows that the set of sociodemographic and control variables is useful in classifying women according to whether they received advice to use diuretics ($P < .001$). Physicians were less likely to advise the use of diuretics for women who had higher parity, were younger, more educated, unmarried, or living in metropolitan counties (Table 7).

Discussion

Although these data are somewhat dated, it was deemed essential to use a nationally representative sample to analyze this health policy topic. Prenatal care data from the National Maternal and Infant Health Survey, the more recent version of the NNS and NFMS, will not be available for analysis until early 1992.

These results point to the importance of including quality of care measures in examining the adequacy of prenatal care. Prenatal care is far from being of even minimally acceptable quality for many women who have made the effort to engage the prenatal care system. High proportions of women were not tested, or not regularly tested, for the basics in prenatal care: blood pressure, urine, hemoglobin, and hematocrit. The advice that many women received concerning salt restriction and the use of diuretics was not congruent with current practice.

Distribution of the tests done to monitor the health of pregnant women varied substantially according to sociodemographic factors, as did the kinds of prenatal advice given. However, the groups of women who were likely to receive poor surveillance were mainly different from the groups likely to receive poor advice. These inconsistencies mean that physicians who provided prenatal care that was of good quality in terms of basic surveillance frequently gave advice that did not follow current recommendations.

The explanation for these inconsistencies may lie in the large percentage of variation in quality that is left unexplained by these models (Table 3). The setting of the health care practice is one variable that could be important. For example, physicians practicing in academic medical centers may have been aware of and followed new advice guidelines before physicians

TABLE 7—Multiple Logistic Regression of the Advice Given by the Physician Regarding Diuretic Use on Maternal Predictors

Covariate	Regression Coefficient	Standard Error	Significance Level
Age	0.034	0.017	*
Education	−0.147	0.039	***
Graduate	−1.320	0.794	
Non-Hispanic White	0.457	0.779	
Black	0.383	0.813	
Native American	−6.385	21.748	
Asian/Pacific Islander	0.361	1.069	
Married	0.916	0.292	**
Parity	−0.220	0.067	**
Metropolitan	−0.336	0.156	*

Note: Likelihood ratio model $\chi^2 = 318.86$***; weighted frequency = 7384; advised to use drug (1) = 203, not advised to use (0) = 7181. Control variables are month prenatal care began, top visits, any complications, hypertension, cardiovascular–renal disease, preeclampsia, % high BPs, and prepregnancy wt. Covariates are explained in Table 1.

*$P < .05$.
**$P < .01$.
***$P < .001$.

in private practice. At the same time, those busy centers may have been settings where surveillance was missed. Without downplaying these inconsistencies, it seems best to concentrate most upon the surveillance results. The theories about optimal behavior in the areas of salt and diuretics usage had undergone recent revision in 1980. Well-qualified physicians may have known, but been unconvinced, that the recent changes in recommendations about salt and diuretics usage were sound. As pointed out by Hemminki,[1] disregarding changes in medical guidelines may in fact serve the best interests of the patient. She gives the example of x-rays, which were recommended during pregnancy and then found to be dangerous and rescinded.

The variability in quality of care according to maternal sociodemographic attributes may be explained in two ways. First, physicians allow their clinical judgment to be significantly affected by the nonmedical characteristics of the woman they are treating. Second, women of different sociodemographic backgrounds are obtaining health services from providers of substantially different quality. Although these data contain no information on the provider of prenatal care, we know that unmarried women would have higher likelihood of being on Medicaid.

Overall, the groups found to be in a relatively deprived position in terms of surveillance are already known to be the groups who obtain care later in pregnancy and in apparently inadequate quantity. It is possible that socially disadvantaged women discover early in life the low quality of the health services provided for them and decide that the costs of making visits (e.g., child care, transportation, opportunity costs of time spent) exceed the benefits.

From a policy perspective, this finding means that the prenatal care problem in this country rests as much with the quality of care delivered to disadvantaged women in particular as with this group's failure to seek the care that is available. Several approaches to the problem are apparent. We need to ascertain, first, that protocols for prenatal care at public facilities match the ACOG guidelines and, second, that these protocols are being followed by physicians and hospital staff. Third, we need to develop a quality control system for private providers. Federal and state funders of prenatal care should make quality assurance an integral part of their evaluation protocol. Finally, low reimbursement rates for prenatal care may contribute to the differences in surveillance outlined here. Providers of services to Medicaid recipients have an incentive to take shortcuts because of the low payment received for such services. Also, the training of the private providers of prenatal services to the poor may be poorer than that of providers to women with higher reimbursement potential.

On the other hand, women need information about the standard components of prenatal care. Most public education has been directed at the necessity for early prenatal care. The assumption has been that once the woman is integrated into the system, it will provide for her needs adequately. It is clear that for many women, this is an inaccurate portrayal of the situation. Basic information about the normal components of prenatal care could be incorporated in the educational campaign that promotes participation in the prenatal care system. Undoubtedly, well-informed and socially advantaged women not only choose better providers, but place demands on providers to deliver more services. Although women, especially socially disadvantaged women, cannot be expected to act as powerful enforcers of medical standards, they may at least be able to change providers if they are dissatisfied. □

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The Centers for Disease Control, the Association of State and Territorial Health Officials, and the Association of State and Territorial Chronic Disease Program Directors are the cosponsors of the Sixth National Conference on Chronic Disease Prevention and Control entitled "Making Prevention a Reality." The conference will be held October 22 to 24, 1991, in Washington, DC, and is open to the public

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