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# The Impact of Sociodemographic, Health Care System, and Family Function Variables on Prenatal Care Utilization in a Military Setting

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**Background.** Appropriate use of prenatal care is associated with more favorable perinatal outcomes. This study examines patient characteristics that influence the use of prenatal care in a total reimbursement setting.

**Methods.** A cohort analysis was conducted with 368 new obstetric registrants in a military community hospital. The protocol involved the completion of a family function scale and prenatal care survey at the onset of care and a record review at the completion of pregnancy.

**Results.** Several socioeconomic variables were highly associated with low utilization of prenatal care: low income, difficulty in finding child care, lower educational levels, and difficulty in getting transportation. The

method of health care delivery, ie, care in the obstetric clinic vs family practice clinic, was also significantly associated with inadequate utilization. Finally, there appeared to be a negative association of cohesion and overall family function scores with the level of prenatal care use ( $P < .05$ ).

**Conclusions.** Multiple economic factors influence the use of prenatal care even in a system with total reimbursement. Family practice care is associated with better utilization patterns; family dysfunction is associated with less prenatal care utilization.

**Key words.** Prenatal care; utilization review; family; military medicine; family practice. (*J Fam Pract* 1993; 37:143-147)

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The association between prenatal care and perinatal outcome has been extensively examined in several studies.<sup>1-6</sup> Lower levels of prenatal care utilization have been associated with higher risks of low birthweight and neonatal mortality. This relationship has been demonstrated in multiple health care settings, including the US military.<sup>5,7</sup> Furthermore, interventions to improve access to and use of prenatal care have been associated with improved perinatal outcome.<sup>1,3,4,6</sup>

Prenatal care utilization has also been assessed as an outcome in its own right,<sup>7-14</sup> and several barriers have

been identified as predictors of low (less than adequate) utilization. The Institute of Medicine<sup>13</sup> grouped these factors into four major categories: (1) financial barriers, (2) inadequate system capacity, (3) institutional barriers, and (4) cultural and personal barriers. Only one study has examined prenatal care access in the military setting,<sup>7</sup> a setting in which financial and system capacity barriers to care are designed to be absent or minimal.

Few studies have examined the potential relationship of family function and prenatal care use in any setting. In addition, there are few data on prenatal care utilization that compare family practice models that provide comprehensive care to the family unit with the traditional obstetrics clinic model. Two studies<sup>15,16</sup> have examined perinatal outcomes and family function. Both revealed a relationship between low birthweight and adverse family function, as well as other psychosocial stressors. The literature suggests a potential link between family function and perinatal outcome. A logical place to

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search for that link may be in the area of prenatal care utilization behavior.

In this cohort analysis the following hypotheses were tested: (1) that within a military system there are identifiable demographic, social, and institutional risk factors for less than adequate care utilization that are similar to those found in other settings; (2) that a family practice model for delivering care, characterized by continuity and comprehensive family care, can result in better levels of prenatal care utilization than an obstetrics clinic model; and (3) that families characterized by less cohesion and less adaptability to stress seek less than adequate prenatal care.

## Methods

The setting for this study was a medium-sized army community hospital (135 beds) with a family practice residency program (18 residents). Obstetric care was provided by an obstetrics clinic managed by obstetricians and by two family practice clinics, one in the hospital's residency program and one in an outlying clinic. Patients were enrolled voluntarily in the family practice clinics on a space-available basis. In the obstetrics clinic (during the study period), patients were not assigned a specific physician and often saw a different provider during each visit. Other members of the family were not cared for in that clinic, and children were generally not allowed to accompany the mother to prenatal care visits. In the family practice clinics, the patients were assigned a physician whom they usually saw. Children were seen in the same clinic, usually by the same provider, and were allowed to accompany the mother to prenatal visits. A small percentage of military dependents use civilian obstetric care and were not included in the study.

All new obstetric registrants ( $N = 818$ ) between February and July 1989 were approached for enrollment in the study. Registrants were qualified for enrollment if they anticipated giving birth at the army hospital and if their medical records were available for review. Five hundred four patients consented to take part in the study. Of these, 112 left the area, 12 went on CHAMPUS (the Civilian Health and Medical Program of the Uniformed Services), and 12 were transferred to another medical facility. This left 368 patients who consented to complete a prenatal survey and a FACES III (Family Adaptability and Cohesiveness Evaluation Scale) family function assessment.<sup>17</sup> The subjects were followed until delivery, at which time a full prenatal chart review was conducted.

The prenatal survey included questions on access to transportation, appointment scheduling, access to a telephone, and child care. It also requested information on

educational and employment status and a measure of attitude toward prenatal care in general.

The FACES III is a well-validated instrument that measures family function as varying levels of cohesion and adaptability in a family system. Low levels (scores) of cohesion and adaptability are considered more indicative of potential family dysfunction than higher scores. Separate cohesion and adaptability scores are combined to calculate an overall family function score. Scores are further categorized into four possible levels of family function: balanced (optimal, highest score), moderately balanced, midrange, and extreme (most dysfunctional, lowest score). The FACES III scores can be analyzed as interval, ordinal, and categorical data.

The prenatal chart review included demographic information on age, race, rank (income measure), parity, residence (distance from hospital), and marital status. The week during which prenatal care began, the total number of prenatal visits, the infant's gestational age at delivery, and the clinic at which care was received (ie, family practice clinics vs obstetric clinic) were also determined.

Prenatal care utilization was measured using Kessner's index,<sup>18</sup> a frequently used method that adjusts for gestational age at delivery, the week that prenatal care began, and total number of prenatal visits. The index is used to calculate three levels of utilization: adequate, intermediate, and inadequate. The three calculated levels of care were analyzed as ordinal data in comparisons with the family function scores. Other various postulated risk factors were analyzed as categorical data in comparisons of inadequate levels of prenatal care with combined intermediate and adequate levels.

Statistical analysis was conducted on a SPSS/PC<sup>19</sup> system file and the Epi-Info<sup>20</sup> statistical calculating program. The analysis used relative percentages, risk ratios, and chi-squares for categorical data. It used Spearman's correlation coefficient for comparisons of ordinal data. Stratification analysis was conducted using the Mantel-Haenszel weighted risk ratio, 95% confidence interval, and calculated  $P$  value from the Mantel-Haenszel chi-square. Multivariate analysis was conducted using logistic regression methods.<sup>21</sup> Independent variables were tested as dichotomous dummy variables. Backward elimination and forward stepwise methods were used with the final model built by forward regression. Final odds ratios were calculated for dummy variables remaining in the model. Statistical significance was assumed for  $P$  values  $< .05$ .

## Results

Of the 368 women who completed the questionnaire and the FACES III, 174 (47%) had an adequate level of

Table 1. Risk-Factor Analysis of Inadequate Levels of Prenatal Care Utilization

Risk Factor	Relative Risk	95% CI	P Value
<b>Demographics</b>			
Age < 21y	1.5	(.7-3.2)	NS
Parity > 0	2.1	(.9-4.8)	.060
Black race	1.4	(.6-3.3)	NS
Hispanic	1.8	(.6-5.6)	NS
Asian/Pacific	1.7	(.5-5.2)	NS
<b>Social and institutional factors</b>			
Low income	9.5	(3.0-29.7)	<.001
Not married	—	—	NS*
Obstetrics clinic	6.4	(1.9-21.5)	.003
> 10 miles from hospital	2.0	(.7-5.5)	NS
Any transportation problem	2.9	(1.4-5.9)	.004
Any appointment problem	1.2	(.5-2.6)	NS
Any telephone problem	1.1	(.4-3.6)	NS
Any child care problem	4.2	(1.3-14.1)	.009
High school education or less	3.5	(1.6-8.1)	.003
Not employed	2.0	(.9-4.5)	.070
<b>Personal and family function factors</b>			
Prenatal values < very important	2.1	(.8-5.3)	NS
Lower cohesion (those disengaged and separated)	1.7	(.8-3.7)	NS
Low adaptability (rigid)	2.2	(1.0-4.8)	.083
Less functional family type (those extreme and midrange)	1.4	(.6-3.1)	NS

\*Because of 0 single mothers in inadequate category, a Fisher's exact test was used to calculate P value.

CI denotes confidence interval.

prenatal care utilization, 169 (46%) had an intermediate level of utilization, and 25 (7%) had an inadequate level of utilization.

As shown in Table 1, low income (lower enlisted rank), care in the obstetrics clinic (vs family practice clinics), any problem accessing transportation, any problem accessing child care, and low educational status (high school or less) were all clearly associated with inadequate levels of prenatal care utilization. Multiparity, maternal unemployment, less positive attitude toward prenatal care, less family cohesion, and a less adaptable family structure were not significant, but had borderline 95% confidence intervals, indicating possible trends. Maternal age, race, marital status, distance from care, appointment access, telephone access, and overall family function were clearly not associated with higher risks for inadequate utilization.

A correlation analysis between family function and prenatal care utilization was performed. It revealed that negative correlations appear to exist between optimal prenatal utilization and dysfunctional family scores. While adaptability did not appear to correlate with utilization, lower scores for family cohesion ( $P = .009$ ) and the combined family function score ( $P = .024$ ) were statistically associated with lower levels of utilization. Although the results of the correlation analysis were

statistically significant, the degree of relationship was not particularly strong as illustrated by the calculated risk ratios given in Table 1. Correlational analysis was also performed for other ordinal data variables. Significant but not surprising information from this additional analysis was the negative correlations of perceived value of prenatal care, income, and educational status with level of utilization.

The distribution of characteristics of the patients followed in the obstetrics clinic was compared with that of those followed in the family practice clinics. The obstetrics clinic patients tended to be of lower rank, less educated, more likely to be unemployed, and to have more problems with transportation. As a consequence, these variables were assessed for confounding in the stratification analysis.

For those five variables identified as statistically significant risk factors, a limited stratification analysis was conducted to assess for the impact from other variables with potential interaction. The particular interaction variables for the stratification analysis were selected because either their distribution with the independent variable of interest was a concern (eg, the potential predominance of risk factors in the obstetrics clinic patients) or because it made sense that a particular interaction could exist (eg, income and distance from care could likely have an impact on transportation as a risk factor). However, we found that all five variables were relatively independent (Table 2).

Finally, a multivariate analysis using logistic regression methods was conducted for the following independent variables that were found to be significant ( $P < .05$ ) or bordering on significant ( $P < .25$ ): multiparity, low income (according to military rank), care in obstetrics clinic, transportation problem, child care problem, maternal unemployment, low educational status, lower values for prenatal care, low cohesion, and low adaptability. Inadequate level of prenatal care was analyzed as the dependent variable. The dummy variable derived odds ratios and  $P$  values from the logistic regression given in Table 3. Low income, care in the obstetrics clinic, and child care problems remain in the final forward regression equation.

## Discussion

Four conclusions can be reached from this study that are not readily apparent elsewhere in the literature.

First, even in a setting where financial and system capacity barriers are minimized, apparently there are still economic influences that have an impact on access. The income variable was the strongest risk factor, even after

Table 2. Limited Stratification Analysis of Selected Risk Factors for Inadequate Utilization of Prenatal Care

Risk Factor	Weighted Risk		P Value*
	Ratio	95% CI	
Low income controlling for			
Education	7.7	(1.7-33.7)	.002
Child care	9.3	(2.3-38.8)	<.001
Transportation	8.3	(2.0-33.9)	<.001
Child care and transportation	10.6	(2.7-41.8)	<.001
Education controlling for income	2.5	(1.03-6.2)	.050
Care in obstetrics clinic controlling for			
Income	5.5	(1.3-22.3)	.017
Education	4.9	(1.3-19.0)	.017
Child care	4.3	(1.0-13.3)	.050
Income and education	4.7	(1.2-18.3)	.022
Transportation	6.3	(1.34-38.3)	.013
Employment	8.5	(2.0-61.3)	.001
Transportation controlling for			
Income	2.4	(1.2-5.0)	.030
Distance > 10 miles	2.8	(1.3-6.15)	.011
Child care controlling for income	4.2	(1.3-13.5)	.014

\*P value derived from Mantel-Haenszel chi-square.  
CI denotes confidence interval.

multivariate analysis. No medical care is truly free to the consumer. Any scarce resource rations itself. In a managed care or fully reimbursed setting, the rationing often results from the inconvenience or time off from work required for the patient to receive care. Those with scarce economic resources, therefore, are most affected. Add to this the difficulty of obtaining child care and transportation, and it is clear that economic considerations play a prominent role in determining utilization even if care is provided free.

Second, race, age, appointment access, telephone access, and marital status did not significantly affect utilization in this study. Black race, clearly established as a risk factor in other studies,<sup>7,9,12</sup> was not significant. Single marital status, also a significant risk factor found in other studies,<sup>2,9</sup> did not influence utilization. This may be because most of the single mothers were active duty

Table 3. Logistic Regression Analysis for Identified Risk Factors for Inadequate Utilization of Prenatal Care

Risk Factor	Odds Ratio	P Value
Parity > 0	.8	NS
Low income	10.3	.004
Obstetrics clinic	6.5	.021
Any transportation problem	1.3	NS
Any child care problem	6.9	.007
Not employed	1.1	.057
High school education or less	2.5	NS
Prenatal values < very important	1.1	NS
Low cohesion	1.9	NS
Low adaptability	1.2	NS

personnel, a subgroup that seemed to have excellent access to prenatal care (only a 3% inadequate utilization rate among active duty mothers). Lack of problems with appointment and telephone access suggested that system capacity barriers were minimal.

Third, an institutional variable, care in the obstetric clinic, was clearly associated with a higher risk for low utilization. Stratification and multivariate analysis suggested that this effect was not caused by other known risk factors such as income or educational status. It must be pointed out, however, that there was not a random assignment of patients to family practice or obstetrics. Patients had an opportunity to select either clinic. Clearly an unmeasured patient characteristic, such as motivation for continuity and access, could explain the difference. Nonetheless, the findings do suggest that a family practice model based on continuity and care for the entire family may yield higher levels of utilization.

Finally, this is the first study to examine family function at the onset of pregnancy and subsequent prenatal care utilization. While the relationship does not appear to be as prominent as other risk factors, there is, nonetheless, some evidence that an association between family function and prenatal care utilization may exist. These findings are consistent with a 1984 study discussed by Ramsey,<sup>22</sup> who found more unplanned pregnancies in families that scored at the extremes of cohesion or adaptability on FACES. It may be that women who perceive their families as less cohesive, more rigid, and less functional at the onset of pregnancy are more likely not to plan pregnancies and to underutilize prenatal care. In particular, a perceived pattern of function (low cohesion) characterized by less familial closeness and more isolation of family members may represent a distinct group at risk for underutilization.

An obvious limitation in this study is the relatively small proportion of sampled new obstetric registrants (368 of 818). Also, a large number of families were assumed to have moved from the area because a substantial number of soldiers were deployed during the 1989 Panama crisis. Many of the women of these families would have been in the high-risk group (spouses of lower-rank enlisted men). As a result, the number of patients with lower utilization rates of prenatal care may have been somewhat underrepresented. Demographic data from the county<sup>23</sup> for all births in the hospital in 1988 revealed that age, parity, and racial distributions were similar to the study cohort. Although a number of women did not consent to the study or moved away from the area, we believe the cohort studied was representative of the community's obstetric population. In addition, the patterns of prenatal care utilization found in this study, as well as in the prior military study,<sup>7</sup> were similar to the

patterns described in a study of a health maintenance organization,<sup>24</sup> with adequate utilization rates of 47% to 49% in all three study groups.

Transportation problems, child care problems, low income status, low educational status, and less value placed on prenatal care have all been described as risk factors for prenatal access and utilization in other settings.<sup>7-9,12,13</sup> This study illustrates that a military care setting is not immune to the problems of settings that have more difficult financial access. However, the presence of a newly discovered institutional variable (ie, the family practice health care model for delivering prenatal care) offers a potential solution for all settings seeking a comprehensive model to deal with financial and nonfinancial barriers to prenatal care. Further studies are indicated to test the hypothesis that this model can truly meet the expectations of a nation sorely in need of improved access to and continuity of prenatal care.

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