

Racial Disparities in Reported Prenatal Care Advice from Health Care Providers

ABSTRACT

Objectives. The relationship between certain maternal behaviors and adverse pregnancy outcomes has been well documented. One method to alter these behaviors is through the advice of women's health care providers. Advice from providers may be particularly important in minority populations, who have higher rates of infant mortality and prematurity. This study examines racial disparities according to women's self-report of advice received from health care providers during pregnancy in four areas: tobacco use, alcohol consumption, drug use, and breast-feeding.

Methods. Health care providers' advice to 8310 White non-Hispanic and Black women was obtained from the National Maternal and Infant Health Survey.

Results. After controlling for sociodemographic, utilization, and medical factors, Black women were more likely to report not receiving advice from their prenatal care providers about smoking cessation and alcohol use. The difference between Blacks and Whites also approached significance for breast-feeding. No overall difference was noted in advice regarding cessation of drug use, although there was a significant interaction between race and marital status.

Conclusions. These data suggest that Black women may be at greater risk for not receiving information that could reduce their chances of having an adverse pregnancy outcome. (*Am J Public Health*. 1994;84:82-88)

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Introduction

The relationship between maternal health risk behaviors during pregnancy (such as smoking, alcohol consumption, or illegal drug use) and adverse outcomes has been well documented. Maternal smoking has been associated with an increased risk of low birthweight, impaired fetal growth, fetal death, obstetric complications, and infant mortality.¹⁻⁴ Heavy alcohol consumption has been linked to a group of anomalies known as fetal alcohol syndrome.⁵ Moderate or low alcohol consumption during pregnancy has been related to increased risks for preterm delivery, reduced birthweight, and spontaneous abortions.⁶⁻⁸ Although it has been suggested that the evidence for linking moderate or low alcohol consumption with adverse outcomes is not conclusive,⁹ health education messages continue to advise prudence in or abstinence from alcohol consumption during pregnancy. Illegal drug use, particularly use of cocaine or crack cocaine, has been associated with elevated risks for small-for-gestational-age births, premature births, abruptio placentae, and perinatal deaths.^{10,11}

One way to alter these behaviors is through the advice and encouragement of women's health care providers. Most women are seen during the first trimester, when cessation of these behaviors could lower their risk of an adverse reproductive outcome.¹² As such, providers are in an advantageous position to identify pregnant women who are smoking, drinking, or using drugs and to initiate a health education program.¹³ Studies have indicated that smokers are more likely to quit after receiving advice from a physician.^{14,15}

Advice from providers may be particularly important in minority populations, who have higher rates of low-birth-

weight infants, premature births, fetal mortality, sudden infant death syndrome, and all-cause infant mortality.¹⁶⁻¹⁸ There have been indications that Black women at high risk of giving birth to a low-birthweight infant may derive more important benefits from prenatal interventions.¹⁹

Analysis of racial disparities in prenatal care heretofore implicitly assumed that all prenatal care is the same. Yet the content of prenatal care may not be identical for all populations. The equivalency of the content of prenatal care has yet to be demonstrated, especially for all racial groups. Differential prenatal care may lead to differential efficacy and could be a factor in the large differential rates of birth outcomes by race seen in the United States.

Prenatal care interventions may be an important source of ameliorating racial disparities in maternal risk status and ultimately may be important for birth outcomes. A report by the US Public Health Service advocated examining the content of prenatal care.²⁰ Perceived maternal advice has not yet been extensively examined, especially by race.

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The objectives of this study were to (1) examine the percentages of Black and non-Hispanic White women who reported receiving advice from health care providers during pregnancy in four areas: tobacco use, alcohol consumption, drug use, and breast-feeding; and (2) determine whether any observed racial disparities were the result of other contributing factors.

Methods

These objectives were explored with data collected from the 1988 National Maternal and Infant Health Survey conducted by the National Center for Health Statistics. This was a follow-back survey consisting of three groups: 9953 women who had a live birth in 1988, 5332 women who suffered an infant death in 1988, and 3309 women who had a 1988 fetal loss. The survey was designed to be nationally representative and was drawn from the 1988 vital records of 48 states and the District of Columbia (South Dakota and Montana were not included). It included an oversampling of Blacks and low-birthweight infants. Approximately 50% of the respondents were Black, and 30% of the infants in the live birth sample had a low birthweight. Both married and unmarried women were included in the sample.

To adjust for this sampling frame, all live births were sorted into sampling strata formed by information taken from the birth certificate: mother's age and marital status and child's race and birthweight. To ensure an adequate sample size for analysis, different sampling rates were applied to each stratum. The same strata were used as nonresponse adjustment cells. The sample was then adjusted by post-stratification to once again be representative of the United States. A more complete description of the design of the 1988 National Maternal and Infant Health Survey has been published elsewhere.²¹

The National Maternal and Infant Health Survey used a mixed-mode methodology (mail, phone, or personal interview) to collect information from respondents. The response rate for women in the live birth cohort was 74.4%. With respect to birth certificate information, nonresponders were slightly more likely than responders to be Black and unmarried (data not shown).

This investigation included only women in the live birth cohort on the supposition that women with fetal deaths may not have been in care long enough to receive certain types of advice from their

providers and that women with infant deaths may recall their prenatal care experiences differently. The study was also limited to White and Black women who reported receiving some prenatal care: 98% of the population. After other racial groups and women who classified themselves as Hispanic were excluded, 8310 women who had a live birth in 1988 were available for analysis. The study population is nationally representative for non-Hispanic White and Black live births only.

The outcome measures used in the present study included the mothers' responses (yes/no) to a series of questions regarding the receipt of any advice or instructions during any of their prenatal visits on (1) trying to breast-feed their baby; (2) reducing or eliminating consumption of alcohol; (3) reducing or eliminating use of tobacco; and (4) not using illegal drugs such as marijuana, cocaine, or crack cocaine.

Maternal race, education, household income, and marital status was determined from the mothers' responses to the questionnaire. Maternal age and the trimester that women began prenatal care was drawn from the birth certificate.

Respondents were asked where they went for most of their prenatal care. They were given a choice of private doctor's or nurse-midwife's office, county or city health department, community health center, health maintenance organization (HMO), work or school clinic, hospital clinic, hospital emergency room, or other site. In the analysis, county or city health department and community health center were combined into a variable called publicly funded sites of care. Work or school clinic and hospital emergency room were included in the "other" category because of small numbers (<1%).

Women were asked how their prenatal care was paid for. The choices were the respondent's or her partner's own income, insurance that the respondent carried or was carried for her, Medicaid, government assistance other than Medicaid (state or local), or other. Women were also asked whether they had received assistance from the Women, Infants, and Children's (WIC) program because women participating in the WIC program are supposed to receive advice on nutrition and health habits.

Information regarding the use of tobacco or alcoholic beverages in the 12 months before the respondents' infants were born was taken from the National Maternal and Infant Health Survey responses. Data on reported drug use were not included because of the known unreli-

ability of such data. The National Maternal and Infant Health Survey did not inquire whether prior infants were breast-fed.

On the supposition that women who had a previous adverse outcome would be more likely to obtain or seek advice, a variable was created that categorized women into three risk groups based on their response to pregnancy history questions: women who did not report a previous pregnancy; women who had a previous pregnancy without an adverse outcome; and women whose previous pregnancy ended in either a stillbirth, miscarriage, abortion, or infant death.

Analysis

Because of the complex sampling method used in the National Maternal and Infant Health Survey, all analyses were weighted to be representative of the US national distribution for non-Hispanic Whites and Blacks.²¹

The data presentation is composed of three sections. First, demographics by race are presented descriptively. Second, the bivariate racial disparities are noted for the four outcome measures, as well as for the covariates. Third, logistic regressions were run to isolate the contributions of race.

Scaled weights were used to perform all analyses. The scaling factor was the reciprocal of the mean weight; the sum of all the scaled weights is the same as the actual number of observations.

The logistic regression analysis controlled for age, marital status, education, income, site of prenatal care, type of payment, maternal health behaviors, trimester that care began, and prior adverse pregnancy outcomes. In addition, interaction terms were examined in the multivariate models. The logistic regression analyses were conducted with the Survey Data Analysis software program.²² This program was developed specifically for calculating variances in complex sample surveys. Adjusted odds ratios (ORs) and 95% confidence intervals were computed by using the beta coefficients and standard errors obtained from the logistic analyses.

Results

Table 1 shows the characteristics, by race, of the sample of 8310 women from the 1988 National Maternal and Infant Health Survey on all study sociodemographic, health system, health behaviors, and medical history variables, weighted to reflect their real population distributions.

TABLE 1—Characteristics of the Sample of 8310 Women from the 1988 National Maternal and Infant Health Survey, by Race

	Percentage of Weighted Sample ^a		
	White (n = 6782)	Black (n = 1532)	Total (n = 8310)
Race			
Black	18.4
White	81.6
Marital status			
Married	83.4	32.1	74.0
Divorced or separated	7.2	11.2	7.9
Single	9.4	56.6	18.1
Maternal education			
<12 y	12.1	27.0	14.8
High school graduate	40.3	43.1	40.8
>12 y	47.6	29.9	44.3
Maternal age, y			
15–19	9.4	22.6	11.8
20–29	59.2	58.6	59.1
30–34	23.2	13.5	21.4
35+	8.2	5.3	7.7
Income			
<\$6 000	7.7	32.3	12.2
\$6 000–\$11 999	10.2	22.4	12.5
\$12 000–\$17 999	11.1	13.3	11.5
\$18 000–\$29 999	24.0	15.0	22.4
\$30 000–\$59 999	36.3	14.6	32.3
\$60 000+	10.6	2.5	9.1
Prenatal care payment^b			
Medicaid	12.5	47.7	18.9
Private insurance	68.2	31.2	61.4
Own money	38.8	15.3	34.5
Other government help	4.5	10.4	5.6
Other type of payment	6.8	8.4	7.1
Site of prenatal care			
Private office	73.5	39.9	67.4
Publicly funded site	8.5	26.5	11.8
Health maintenance organization	4.9	5.6	5.0
Hospital clinic	9.1	24.1	11.9
Other site of care	4.0	4.0	4.0
Received Women, Infants, and Children program assistance	20.0	58.2	27.0
Smoked in the year before delivery	34.1	25.3	32.4
Drank any alcohol in the year before delivery	55.4	26.3	50.0
Previous pregnancy history			
No previous pregnancy	35.4	36.5	35.6
Previous pregnancy with no adverse outcome	44.5	47.2	44.9
Previous pregnancy with adverse outcome	20.1	16.3	19.4
Trimester that prenatal care began			
First	85.1	64.1	81.4
Second	12.4	29.2	15.4
Third	2.5	6.6	3.2

^aFor all analyses, the figures given are the weighted-sample figures.

^bWomen could provide more than one source of payment.

Demographically, Black women giving birth in 1988 were distinct from White women giving birth in 1988. Black women were more frequently single, were less likely to be educated beyond high school, were younger, and had lower incomes. Black women also utilized publicly funded sites of care, the WIC program, and Med-

icaid programs more frequently than White women. Black women also reported better smoking and drinking health behaviors than White women.

Table 2 shows the bivariate association of race and all study covariates with the four health behavior advice variables. In all four areas, substantial numbers of

women did not report receiving health behavior advice. Smoking cessation was the most common advice reported (69.5%), closely followed by cessation of alcohol consumption (68.4%). Receiving breast-feeding advice was reported by only 51% of all women in the United States.

White women reported receiving more prenatal advice on alcohol, smoking, and breast-feeding than did Black women. The disparity was greatest for avoidance of alcohol: only 60% of Blacks reported that they received advice on alcohol avoidance from their prenatal care provider compared with 70% of Whites.

For cessation of alcohol consumption, advice was, in general, substantial for all subgroups, but significantly more frequent for women of higher socioeconomic status (e.g., more often married, more than 12 years of education, and more income). Advice increased with age, through 30–34 years. Not surprisingly, advice on cessation of alcohol consumption was highest for alcohol users (76.1%), but even in those cases, 23.9% of alcohol users did not get advice. Although not presented in Table 2, the racial disparity remained after controlling for drinking status: 76.8% of White women who said they had drunk some alcohol in the 12 months before their delivery reported that they received advice compared with 69.7% of Black drinkers. Disparities across education and income groups seemed slightly stronger than disparities by race.

Advice on smoking cessation appeared to follow a different trend than advice on cessation of alcohol consumption. Demographically, younger women and women with less than 12 years of education received more advice. Income and marital status were less significant. Hospital clinics and other sites of prenatal care were the most likely to give advice; private offices were the least likely. Smoking advice was given to 90.4% of smokers and 59.5% of nonsmokers. Smoking status was, by far, the strongest predictor of smoking advice. Again, though not shown in the data presented, the racial disparity remained after controlling for the behavior status: 91.0% of White women who smoked in the year before delivery reported receiving advice compared with 86.5% of Black women who smoked. Disparities across age, WIC status, and smoking status seemed stronger than disparities by race.

Racial disparities were not noted for advice on cessation of drug use in the bivariate analysis. In general, advice about

cessation of drug use followed a pattern similar to that of smoking advice, with women of poorer socioeconomic status receiving more advice. Advice on cessation of illegal drug use was significantly more frequent for single, less educated, younger, and poorer women. Public clinics gave more advice than private sources of care.

Advice promoting breast-feeding was the advice reported least often. In general, there was some tendency for women of higher socioeconomic status to get more breast-feeding advice. Breast-feeding advice was more frequent in Whites, married women, and women with more than 12 years of education; it was least frequent in the lowest-income women. Site of prenatal care presents a complex picture, with HMOs and publicly funded clinics the most frequent providers of breast-feeding information. WIC participants reported only a 54.7% rate of receiving breast-feeding advice from their health care providers.

Table 3 shows the unadjusted and adjusted ORs (controlling for all variables in the logistic model) for not reporting receipt of advice on each of the four health behaviors, by race. Before adjustment, Black women were significantly more likely to report not receiving advice on cessation of alcohol consumption, smoking cessation, and breast-feeding promotion. After adjustment, a significant racial disparity in advice for alcohol and smoking cessation still remained. Breast-feeding promotion just missed reaching significance and was similarly skewed towards more advice for White women. The unadjusted OR for race in the analysis of drug use cessation was 0.99. When race was analyzed with the covariates, before interaction terms were assessed, the adjusted OR became significant (1.28), indicating that racial disparities were masked in the bivariate analysis. However, there was a significant interaction between race and marital status: Black single women were 1.4 times more likely than White single women not to receive advice on drug use cessation, whereas there were no racial differences among married women.

Table 4 presents the full logistic analysis for each of the outcome variables. For advice on cessation of alcohol consumption, only six variables were significant: drinkers were more likely to be given advice; and older women (>35 years), women with less than 12 years of education, Black women, WIC nonparticipants, and women who began prenatal care after

TABLE 2—The Association of Prenatal Care Advice with Race and Selected Covariates among the Sample of 8310 Respondents in the 1988 National Maternal and Infant Health Survey

	% Reporting Advice Received about Alcohol	χ^2	% Reporting Advice Received about Smoking	χ^2	% Reporting Advice Received about Drugs	χ^2	% Reporting Advice Received about Breast- feeding	χ^2
Race								
Black	60.2		64.2		66.1		47.3	
White	70.3	59.11***	70.7	25.17***	65.8	0.03	52.4	12.80***
Marital status								
Married	69.8		69.3		64.6		53.0	
Divorced or separated	66.1		69.0		67.3		50.4	
Single	63.9	21.45***	70.4	0.76	70.4	18.96***	45.4	28.23***
Maternal education								
<12 y	60.3		73.2		67.7		47.0	
High school graduate	67.5		70.7		66.3		51.3	
>12 y	72.1	61.89***	67.2	19.63***	64.9	3.65	53.1	13.94**
Maternal age, y								
15-19	61.8		71.4		71.1		50.6	
20-29	69.8		71.4		67.9		52.0	
30-34	71.8		67.2		61.5		50.4	
35+	59.1	59.52***	58.2	53.07***	55.5	65.94***	51.4	1.67
Household income								
<\$6 000	63.7		70.8		69.9		45.9	
\$6 000-\$11 999	63.1		70.2		67.8		50.9	
\$12 000-\$17 999	64.7		68.5		67.1		55.1	
\$18 000-\$29 999	69.0		71.1		64.6		53.6	
\$30 000-\$59 999	71.0		68.7		64.6		51.0	
\$60 000+	76.4	61.52***	67.1	6.62	64.2	13.95*	51.4	21.62**
Prenatal care payment ^a								
Medicaid	62.0		71.0		70.0		49.9	
Private insurance	70.3		68.2		64.0		50.5	
Own money	70.0		68.9		64.8		53.6	
Other government help	69.1		74.6		73.2		52.8	
Other type of payment	69.2		75.9		71.7		53.3	
Site of prenatal care								
Private office	68.3		68.6		63.4		50.6	
Publicly funded site	66.0		69.9		71.7		56.2	
Health maintenance organization	72.3		70.0		67.7		56.7	
Hospital clinic	68.4		71.7		70.8		49.0	
Other site of care	73.2	8.93	76.0	10.84*	74.1	51.52***	53.4	18.05**
Trimester that prenatal care began								
First	70.0		69.6		65.8		52.3	
Second	62.5		69.9		66.1		48.1	
Third	64.3	30.63***	64.0	3.83	67.6	0.43	49.4	7.80*
Received Women, Infants, and Children program assistance	65.9		74.3		71.6		54.7	
Did not receive Women, Infants, and Children program assistance	69.4	9.08**	67.7	32.81***	63.8	44.69***	50.2	13.13**
Drank alcohol in year before delivery	76.1							
Did not drink alcohol in year before delivery	60.8	225.33***						
Smoked in year before delivery			90.4					
Did not smoke in year before delivery			59.5	822.27***				

^aWomen could provide more than one source of payment; therefore, no χ^2 value was calculated.
* $P < .05$; ** $P < .01$; *** $P < .001$.

TABLE 3—Unadjusted and Adjusted Odds Ratios Comparing Blacks with Whites on Prenatal Care Advice in the 1988 National Maternal and Infant Health Survey

Outcome	Unadjusted OR (95% CI)	Adjusted OR (95% CI)
Did not receive drinking cessation advice	1.57 (1.41, 1.74)	1.29 (1.10, 1.51)
Did not receive smoking cessation advice	1.35 (1.21, 1.50)	1.20 (1.01, 1.39)
Did not receive advice on breast-feeding	1.22 (1.11, 1.35)	1.15 (0.99, 1.32)
Did not receive advice on illegal drug use	0.99 (0.89, 1.09)	1.28 (1.10, 1.48) ^a 1.01 (0.65, 1.57) ^b

Note. OR = odds ratio; CI = confidence interval.
^aModel without interaction.
^bModel with significant interaction.

the first trimester were all less likely to be given advice.

For advice on smoking cessation, there were seven significant factors. Smokers were substantially more likely than nonsmokers to receive advice. Older and separated women received less smoking cessation advice. Although the bivariate analysis indicated that income was not significant, the multivariate analysis showed that lower-income women with incomes of less than \$6 000, \$6 000–\$11 999, and \$12 000–\$17 999 received less advice than upper-income women. WIC nonparticipants also reported less advice.

For breast-feeding promotion, there were six significant factors, and each was stronger than race. Single women, women with less than 12 years of education, women with the lowest income levels, and WIC nonparticipants received less advice promoting breast-feeding. Women who received most of their prenatal care at publicly funded sites or HMOs or who had no private insurance were more likely to report receiving advice than women who received care at private physicians' offices.

Three factors predicted not receiving drug cessation advice. Race, in the presence of interaction, was not significant. Older women (ages 30–34 and 35+ years) and WIC nonparticipants received less advice; women who used either public prenatal care sites or hospital clinics received more advice than those who received care at private offices. Once again, WIC nonparticipants received less advice.

Interaction terms (with race) were examined for each of the four health behavior outcome measures. They were not significant or informative for smoking, alcohol, or breast-feeding advice. A significant interaction term (race by marital status) was noted for illegal drug use (OR = 1.43).

Discussion

Advice about prenatal health behavior is not a uniform feature of all prenatal care. Regardless of race, one third or more of the women surveyed reported receiving no prenatal advice on alcohol, tobacco, or drug use, and approximately 50% received no prenatal information on breast-feeding. The observation that women who smoked or drank were more likely to report receiving prenatal advice on tobacco or alcohol use is a positive indication that services were being targeted to at-risk groups. Notwithstanding, given the emphasis placed on the importance of providing all women with prenatal advice on substance use and breast-feeding, these findings indicate that much improvement is still needed in the content of prenatal care being provided to women in the United States.

The content of prenatal care is not uniform across racial groups. Compared with White women, Black women receiving prenatal care advice were significantly less likely to report receiving advice on drinking and smoking cessation, and the disparity in breast-feeding advice approached significance. This is the other critical finding of the study.

The current analyses suggest that although race is an important factor in the content of prenatal care, other programmatic and sociodemographic factors are equally, if not more, important. First, advice about two of the behaviors, smoking and drug use, was skewed towards poorer women, whereas advice about alcohol use and breast-feeding was skewed towards wealthier women. Health care providers may be giving advice based on their stereotypes of who is involved in what type of behaviors and not on a principal of equity. Second, the site of prenatal care was important. Advice on illegal drug use was

more common for patients of publicly funded sites and hospital clinics than for private-office patients. Patients of HMOs and publicly funded sites were also found to have a lower risk of not receiving breast-feeding advice compared with private-office patients. Third, participation in the WIC program, which mandates prenatal care advice on these behaviors as part of its basic package of services,^{23,24} had a protective effect in each multivariate analysis, with WIC nonparticipants reporting less prenatal advice. Fourth, older women (>35 years of age) were more likely to report not receiving advice on alcohol, tobacco, and drug use. This finding may reflect a perception on the part of the providers that these women were in less need of this advice because of earlier pregnancies, particularly in the case of illegal drug and alcohol use. Alternatively, providers may have perceived that these messages would be less effective in terms of changing established behaviors (e.g., tobacco use) and consequently may have stressed them to a lesser degree.

Although interactions were explored for each of the outcome measures, a significant interaction between marital status and race was only identified in the analysis of advice on illegal drug use. This finding suggests that White single women were targeted for advice on illegal drug use more often than Black single women or tended to report receiving such advice in greater proportions. These data are insufficient to propose an explanation for these findings. Illegal drug use is a sensitive area of discussion, and further investigation of these findings may need to explore to what extent differences in ethnic and cultural characteristics of providers and patients may inhibit the provision of advice in this area.

This study is limited in that it is based on the self-reports of the women surveyed. It is unclear whether women may be more likely to overestimate or underestimate the actual receipt of prenatal advice or whether error rates vary by type of advice, site of prenatal care, ethnicity of the mother, birth outcome, or other factors. Some studies have found that maternal recall is relatively accurate for birth outcomes,^{25,26} whereas maternal recall of exposures during pregnancy has been mixed.^{27,28} Moreover, patients and providers may have different recall on the content of a visit.²⁹ Nonetheless, it is women's perception, not the providers' report of their practice, that is ultimately most likely to be linked to health behavior changes.

Over the last two decades, considerable emphasis has been placed on the importance of adequate prenatal care for minority populations, who have been identified as having a greater risk of poor pregnancy outcome. To the extent that health care educational messages and campaigns have been effective, one might hypothesize that minority women who do receive prenatal care would be more likely than White women to be given information on these topics. These data indicate that this is not the case and suggest the need for continued and expanded medical education programs to increase provider awareness of the importance of these issues as part of prenatal care services to all women, particularly women at higher risk of poor pregnancy outcome.

The findings that there are variations in the content of prenatal care by ethnicity of the mother, site of care, and age, among other factors, also have implications for the interpretation of investigations focusing on the impact of the adequacy of prenatal care, as measured by the month of initiation of prenatal care and by the number of prenatal care visits. Indices of prenatal care utilization have been used to investigate ethnic differences in pregnancy outcome.^{30,31} Although ethnic variations in prenatal care utilization have been repeatedly uncovered, the magnitude of these variations was insufficient to explain prevailing ethnic disparities in pregnancy outcome measures. The present findings, indicating that the content of prenatal care is not consistent for all ethnic groups, must now be considered as another potential explanation.

However, it should be stressed that although these data suggest that Black women receive less prenatal care advice on alcohol and tobacco use, it would be imprudent to overspeculate on whether these ethnic differences in the content of prenatal care advice are likely to appreciably explain the observed ethnic disparities in pregnancy outcome—given the lower likelihood of Black women's smoking and drinking before delivery. However, the content of prenatal care and the linkage of content and maternal needs in our understanding of the causes of racial disparities in birth outcomes must now be considered.

Conclusion

The present study suggests that large numbers of women of all races do not receive sufficient health behavior modification information as part of the content of their prenatal care. In particular, Black

TABLE 4—The Odds of Not Receiving Advice on Prenatal Care Behaviors during Pregnancy

	Alcohol Cessation OR (95% CI)	Smoking Cessation OR (95% CI)	Breast-feeding OR (95% CI)	Drug Use Cessation OR (95% CI)
Race: Black (vs White)	1.29 (1.10, 1.51)	1.20 (1.01, 1.39)	1.15 (0.99, 1.32)	1.01 (0.65, 1.57)
Marital status				
Single (vs married)	0.92 (0.75, 1.14)	1.02 (0.82, 1.26)	1.40 (1.15, 1.72)	0.76 (0.55, 1.05)
Separated or divorced (vs married)	1.01 (0.78, 1.32)	1.42 (1.07, 1.87)	1.15 (0.90, 1.46)	0.95 (0.73, 1.23)
Household income				
<\$6 000 (vs ≥\$18 000)	1.15 (0.91, 1.45)	1.30 (1.01, 1.66)	1.39 (1.11, 1.74)	1.07 (0.84, 1.36)
\$6 000–\$11 999 (vs ≥\$18 000)	1.23 (0.98, 1.55)	1.39 (1.09, 1.77)	1.17 (0.94, 1.45)	1.11 (0.88, 1.40)
\$12 000–\$17 999 (vs ≥\$18 000)	1.21 (0.97, 1.51)	1.40 (1.11, 1.77)	0.96 (0.78, 1.18)	1.06 (0.85, 1.32)
Maternal education				
<12 y (vs >12 y)	1.32 (1.06, 1.65)	1.21 (0.96, 1.54)	1.42 (1.15, 1.75)	1.16 (0.93, 1.45)
High school grad (vs >12 y)	1.13 (0.97, 1.33)	1.10 (0.94, 1.30)	1.13 (0.98, 1.30)	1.07 (0.92, 1.24)
Maternal age				
≤19 y (vs 20–29 y)	1.13 (0.90, 1.40)	0.93 (0.73, 1.18)	0.90 (0.73, 1.11)	0.91 (0.73, 1.15)
30–34 y (vs 20–29 y)	1.01 (0.85, 1.20)	1.13 (0.95, 1.36)	1.08 (0.92, 1.27)	1.27 (1.08, 1.50)
≥35 y (vs 20–29 y)	1.83 (1.43, 2.35)	1.61 (1.24, 2.08)	1.06 (0.83, 1.35)	1.64 (1.29, 2.09)
Women, Infants, and Children program participation (no vs yes)	1.28 (1.06, 1.55)	1.54 (1.26, 1.89)	1.57 (1.31, 1.88)	1.29 (1.00, 1.68)
Primary site of prenatal care				
Publicly funded site (vs private office)	0.87 (0.72, 1.06)	1.04 (0.77, 1.21)	0.79 (0.65, 0.97)	0.78 (0.62, 0.97)
Hospital clinic (vs private office)	0.84 (0.68, 1.03)	0.97 (0.69, 1.35)	1.05 (0.86, 1.29)	0.78 (0.63, 0.96)
Health maintenance organization (vs private office)	0.82 (0.60, 1.12)	0.86 (0.62, 1.20)	0.75 (0.57, 1.00)	0.75 (0.56, 1.02)
Other sites ^a (vs private office)	0.73 (0.50, 1.06)	0.69 (0.47, 1.00)	0.91 (0.66, 1.26)	0.65 (0.45, 0.94)
Type of payment for care				
Paid with own money (vs did not pay)	1.03 (0.87, 1.21)	1.04 (0.88, 1.24)	1.06 (0.91, 1.24)	1.08 (0.92, 1.27)
No insurance (vs private insurance)	1.00 (0.79, 1.25)	1.01 (0.80, 1.29)	0.75 (0.61, 0.93)	1.10 (0.86, 1.40)
Not paid by Medicaid (vs paid by Medicaid)	0.84 (0.63, 1.12)	0.89 (0.66, 1.19)	0.88 (0.68, 1.14)	1.12 (0.78, 1.60)
Not paid by other government program (vs paid by program)	1.09 (0.78, 1.54)	1.04 (0.72, 1.50)	0.95 (0.74, 1.25)	1.34 (0.95, 1.89)
Not paid by other source (vs paid)	1.07 (0.79, 1.46)	1.33 (0.96, 1.84)	0.96 (0.72, 1.28)	1.28 (0.93, 1.74)
Trimester that prenatal care began: second or third trimester (vs first)	1.13 (1.02, 1.25)	1.08 (0.97, 1.21)	1.06 (0.96, 1.17)	0.94 (0.85, 1.04)
Previous pregnancy history: prior adverse outcome (vs no pregnancy or no adverse outcome)	0.87 (0.73, 1.37)	0.98 (0.83, 1.17)	0.89 (0.75, 1.03)	0.83 (0.68, 1.01)
Drank alcohol in year before delivery (yes vs no)	0.53 (0.46, 0.61)			
Smoked in year before delivery (yes vs no)		0.15 (0.12, 0.18)		
Race by single marital status interaction				1.43 (1.00, 2.04)

Note. Odds are estimated from multiple logistic regression models among the sample of 8310 respondents in the 1988 National Maternal and Infant Health Survey. OR = odds ratio; CI = confidence interval.

^aOther sites of care could be school clinic, work clinic, hospital emergency room, or other unspecified site.

women are more likely not to receive health behavior advice that could reduce their chances of having an adverse pregnancy outcome. Specifically, they are less likely to report receiving smoking and alcohol cessation advice. □

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