

Maternal Determinants of Pediatric Preventive Care Utilization among Blacks and Whites

Amina P. Alio, PhD and Hamisu M. Salihu, MD, PhD
Washington, DC

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Objective: We assessed maternal characteristics that were predictive of preventive care utilization among children 0–5 years and compared black–white differences in preventive care usage.

Method: We used the 1996–2000 series of public use files from the Medical Expenditure Panel Survey (MEPS). Receipt of preventive care was defined as up-to-date immunization coverage of the child and at least one dental visit during the year.

Results: A total of 10,525 children were analyzed consisting of 2,090 blacks (19.9%) and 8,435 whites (80.1%). Black mothers were in general older and less educated. Black households were larger in size and contained a greater number of children. Black mothers earned, on average, much less than their white counterparts even though they tended to be more frequently employed than whites. Despite similar levels of insurance coverage for both racial groups, the overwhelming majority of white mothers were privately insured (73.2%), in contrast to only about half of blacks with private insurance coverage [54.3% ($p < 0.0001$)]. Overall, the level of pediatric preventive services utilization was a paltry 15.4%. Children of black mothers were significantly less likely to receive preventive care than whites (OR=0.78; 95% CI=0.64–0.94). Other determinants of preventive care use were maternal age, insurance coverage, education and family size. Older, educated mothers with insurance coverage and reduced family size were more likely to have their children immunized and have dental visits.

Conclusion: Maternal characteristics are important markers that indicate the risk for underutilization of pediatric preventive care. A particularly important finding with policy implication is the observation that maternal insurance coverage enhances pediatric preventive care use. Health policy planners may consider parallel insurance coverage of both the child and the mother in order to enhance receipt of preventive health services by the child.

Key words: preventive care ■ pediatric ■ maternal determinants ■ black-white disparity

© 2005. From the Council on African American Affairs, Washington, DC (Alio) and the Department of Maternal and Child Health, University of Alabama at Birmingham, Birmingham, AL (Salihu). Send correspondence and reprint requests for *J Natl Med Assoc.* 2005;97:792–797 to: Amina Alio, PhD, Council on African American Affairs, 1115 U St. NW, Suite 201, Washington, DC 20009; phone: (202) 518-5951; fax: (202) 518-8117; e-mail: aalio@AfricanAmericanAffairs.org

INTRODUCTION

Pediatric preventive care utilization is an important part of primary and secondary prevention, and immunization and dental visits represent two major activities that significantly impact child health and well-being, which may be critical in averting subsequent chronic morbidity and premature mortality. Due to its importance and in order to augment childhood preventive care use, several attempts have been made to delineate factors that predict underutilization of these services so that appropriate strategies could be formulated to enhance the level of pediatric preventive care usage. Several characteristics have been identified as influential factors of preventive care use during childhood.^{1–5} Most of these predictors are features that are measured at the level of the child, and information on the role of maternal characteristics on child preventive care utilization is scanty.⁶ Assessment of maternal characteristics that influence preventive care use could identify maternal determinants for preventive pediatric care use because it is well-known that in most instances it is the mother who assumes direct responsibility for ensuring that her children receive proper preventive health services.⁶ For this reason, we undertook this study with the main objective of discerning maternal features that are predictive of up-to-date immunization receipt and dental visits among children aged 0–5 years. As a secondary aim, we also assessed black–white differences in preventive care utilization during childhood.

MATERIALS AND METHODS

Data Source

We used the 1996–2000 series of public use files from the Medical Expenditure Panel Survey (MEPS) for this analysis.⁷ The files provide an extensive data set

on the use of health services and healthcare in the United States. The MEPS data contain nationally representative estimates of healthcare use; expenditure; sources of payment; and insurance coverage of U.S. civilian noninstitutionalized population, including nursing homes and their residents. There are four components to the MEPS: the household component (HC), the medical provider component (MPC), insurance component (IC) and the nursing home component (NHC). The HC collects detailed data at both the person and household levels with respect to demographic characteristics, health conditions, health status, use of medical care services, charges and payments, access to care, satisfaction with care, health insurance coverage, income and employment. The MEPS MPC supplements and validates information on medical care events reported in the MEPS HC by contacting medical providers and pharmacies identified by household responders. The MEPS IC collects data on health insurance plans obtained through employers, unions and other sources.

Description of Variables

We employed two items to construct our outcome variable for preventive care: up-to-date immunization status and dental visits. Up-to-date immunization status was collected at the person level for children ages 0–6. Only children (defined as ≤ 5 years old) were considered in this analysis. For questions about diphtheria, tetanus and pertussis (DTP) or polio immunization, there were follow-up questions that asked about the frequency of shots or drops. For questions related to immunization for measles-mumps-rubella and for hepatitis B, there were no follow-up questions. We defined up-to-date immunization as the receipt of age-appropriate vaccinations as recommended by the immunization schedule in effect during the data collection period. If at the time of the interview the child had not received the age-appropriate and recommended vaccination doses for a specific vaccine, the child was classified as being not up-to-date. For instance, if at the time of the interview, a child aged five years (60 months) had not received the 4:3:1:3 series (for DTP, polio, measles and hepatitis B vaccines), then the child was not up-to-date since the recommended ages are 18 months for four doses of DTP, three doses of polio and three doses of hepatitis B, and 15 months for one dose of the measles vaccine. The dental visits

variable includes those for dental care to general dentists, dental technicians, dental surgeons, orthodontists, endodontists and periodontists. We qualified the child as having received preventive care when the child has received up-to-date immunization coverage and at least one dental visit during the preceding year.

Maternal determinants that were explored as predictors of receipt of pediatric preventive care included sociodemographic characteristics and indicators of financial barriers to healthcare access. Maternal age, marital status, maternal education, family size and number of children in the household were considered. The indicators of financial barriers to healthcare access that were assessed included: total income, employment status and insurance coverage. As a secondary aim, we were interested in determining whether there was a disparity between blacks and whites with respect to preventive care use among children. We therefore, compared differences between the two racial groups in terms of maternal characteristics and indicators of financial barriers to healthcare usage as well as preventive care utilization. The race considered in the analysis was that of the mother, and children of mixed marriages were assigned the race of their mothers.

Statistical Analysis

We compared differences in proportion for univariate analysis by means of the Chi-squared test. Comparison of group means of continuous variables was performed using Student's *t* test. For our multivariable analysis to identify predictors of pediatric preventive care utilization, we employed the logistic regression model. The best model fit was determined by applying the -2 log likelihood ratio test. The Wald's test was utilized to assess whether the estimated variable coefficients were significant. Because the MEPS utilized a complex sample design, we had to apply appropriate statistical techniques to account for this complexity. This was achieved using the *proc surveyfreq* and *surveylogistic* to generate weighted frequency tables and adjusted odds ratios respectively (SAS version 9.1; Cary, NC). Similarly, for computation and group comparison of means of continuous variables, we used the *proc surveymeans* of the same software. Since maternal income correlated strongly with employment status, only the variable coding for the latter

Table 1. Maternal Characteristics of Study Sample (Estimates are Weighted)

Characteristic	Mean	95% Confidence Interval	Range
Maternal age (years)	33.7	33.4–33.9	15–88
Family size	3.8	3.9–4.0	1–18
Number of children	4.0	3.9–4.1	1–19
Total income (in U.S. \$)	19,195	18,606–19,784	0–222,560
Education (years)	12.7	12.6–12.8	0–17

was retained in the adjusted model.

All tests of hypothesis were two-tailed with a type-1 error rate set at 5%. The study was approved by the Institutional Review Board of the University of Alabama at Birmingham.

RESULTS

The sample comprised a total of 10,525 children who were <5 years of age. Characteristics of female parents of these children are given in Table 1. In Table 2, we present the results of the comparison of selected sociodemographic characteristics between black and white female parents of the children. Black mothers tended to be older, especially in the age group beyond 50, where the proportion of blacks was almost twice that of whites. Black households were larger in size and contained a greater number of children. Black mothers were also at a disadvantage in terms of level of educational attainment.

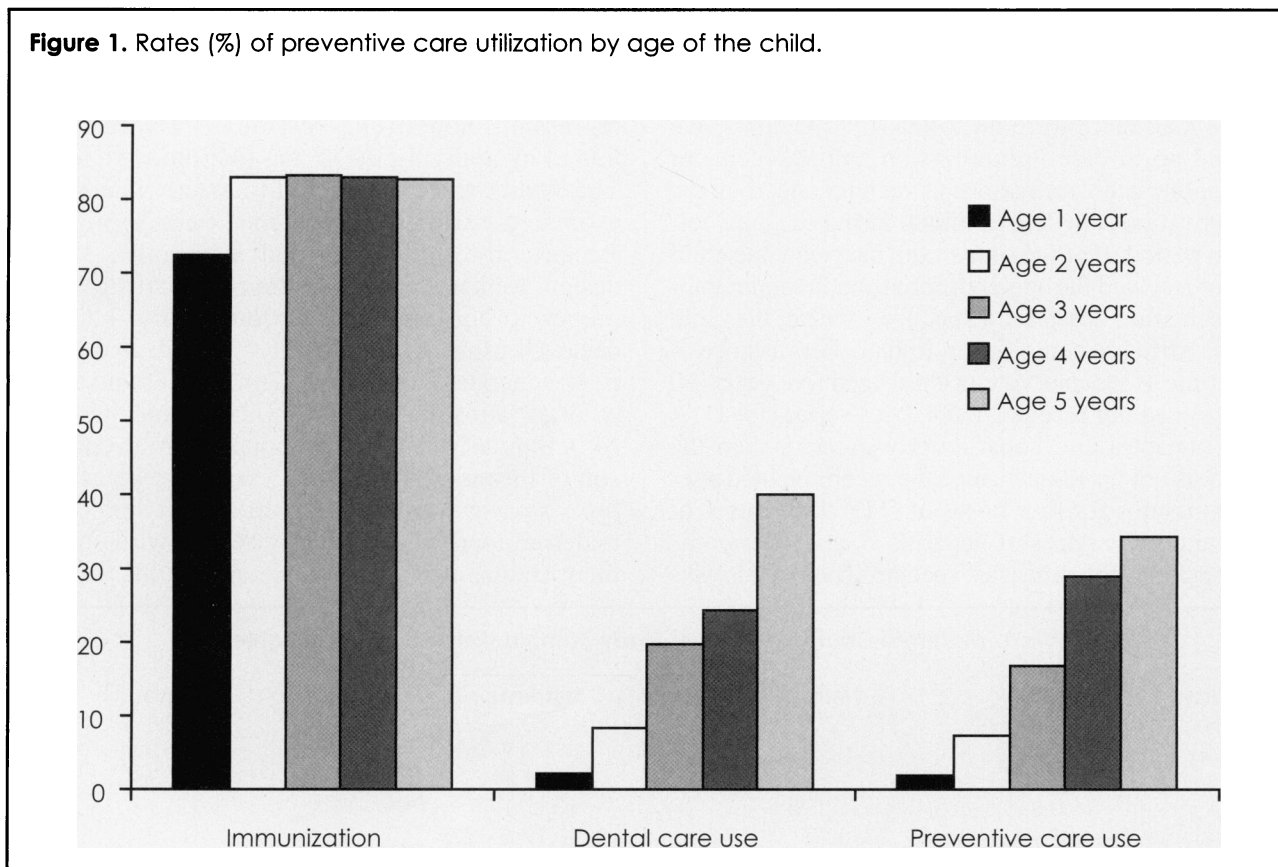
The black-white gap was also apparent with respect to a number of indicators of financial barriers to healthcare access (Table 3). Black mothers earned, on average, much less than their white counterparts even though they tended to be more frequently employed than whites. Although the level of insurance coverage for mothers was similar for both racial groups (86.4% for blacks vs. 87.0% for whites), an important difference existed regarding

the type of health insurance. The overwhelming majority of whites were privately insured, in contrast to only about half of blacks.

Overall, the level of pediatric preventive services utilization was 15.4%. Up-to-date immunization coverage and dental visits were 76.1% and 18.2%, respectively. With the exception of up-to-date immunization receipt, significant differences were noted in these rates by age of the child (Figure 1). For dental visits, the prevalence of at least one visit during the year increased from 2.2% by the age of one completed year to 34.2% by the end of the fifth birthday in a dose-dependent pattern (p for trend <0.001). A similar rising trend with child's age was observed for the composite variable of preventive care. Black children consistently lagged behind their white counterparts in all three indices (immunization: 74.1% vs. 76.6%; dental visit; 15.9% vs. 18.8%; preventive care: 13.0% vs. 16.0%; p value <0.001 in all cases).

Figure 2 illustrates the adjusted estimates for the association between preventive care utilization and maternal predictors. Maternal income was left out of the model because it correlated strongly with employment status and, for that reason only, the variable coding for the latter was retained. Apart from employment status (adjusted odds ratio = 0.96; 95% confidence interval = 0.84-1.09), all the other variables demonstrated an independent association with preventive care use. Visibly,

Figure 1. Rates (%) of preventive care utilization by age of the child.



the strongest predictors of preventive care utilization were maternal age and large family size (≥ 10). From the figure, it is apparent that the relationship between maternal age and preventive care use was inverted U-shaped. As compared to those of younger mothers (< 20 -year-olds), children under the care of young mature mothers (20–29-year-olds) were almost twice as likely to be up-to-date for immunization schedules and to have had at least one dental visit during the year [adjusted odds ratio (AOR)=1.82; 95% confidence interval (CI)=1.06–3.12]. The likelihood more than tripled and described a plateau during the two subsequent decades [30–39 (AOR=3.50; 95% CI=2.05–6.00), and 40–49 (OR=3.30; 95% CI=2.00–5.90)]. Thereafter, the probability of preventive care utilization then dwindled but still remained above the reference threshold so that by around the maternal age of 50 and beyond, the likelihood for preventive care usage by the child was similar as for 20–29-year-old mothers (AOR=1.90; 95% CI=1.05–3.40).

Figure 2 also illustrates that a threshold effect exists between family size and the probability of usage of preventive care by the child. As compared to a family size of < 5 , preventive care did not depict a significant change up to a family size of nine (AOR=0.89; 95% CI=0.77–1.01). Thereafter (a family size of ≥ 10), the likelihood of utilization plummeted. Children in house-

holds with a family size of < 5 members were almost five times as likely to benefit from preventive care as compared to their counterparts in households of ≥ 10 members (AOR=4.54; 95% CI=1.64–14.28). Other predictors of preventive care use were race [black mothers predicted less usage (AOR=0.78; 95% CI=0.64–0.94)], and insurance status of the mother and higher maternal education (predicted greater usage).

DISCUSSION

Our study revealed a significant black–white gap in the use of preventive care among children under-five, and these results are in consonance with other reports in the literature,^{6,8,9} further confirming the notion that race/ethnicity remains an important marker for underutilization of preventive care services. It does appear that current efforts and resources have proven inadequate in addressing the black disadvantage consistently reported by studies because this racial group still lags significantly behind relative to their white counterparts. Augmentation of infused resources as well as prioritizing subgroups of black children that depict higher-than-expected levels of nonuse of preventive care will enhance the effectiveness of strategies that aim to narrow the racial gap.

We also observed a trend between preventive care use and age of the child. The component of preven-

Table 2. Maternal Characteristics by Race (Percentages Are Weighted)

Characteristic	Black (N=2,090) [%]	White (N=8,435) [%]	P Value
<i>Maternal Age (Years) Mean (\pmSE)</i>	34 (\pm 0.4)	33.5 (\pm 0.1)	< 0.0001
<20	2.2	2.0	
20-29	38.8	32.8	
30-39	32.4	45.5	
40-49	15.8	14.1	
50+	10.8	5.6	
<i>Marital Status</i>			< 0.0001
Married	39.8	76.1	
Unmarried	60.2	23.9	
<i>Family Size</i>			0.0006
<5	68.3	71.7	
5-9	31.0	27.7	
10-14	0.7	0.6	
15+	0.0	0.1	
<i>Number of Children</i>			< 0.0001
<5	64.7	71.1	
5-9	29.5	26.2	
10-14	5.5	2.3	
15+	0.3	0.4	
<i>Education (Years) Mean (\pmSE)</i>	12.5 (\pm 0.1)	12.8 (\pm 0.1)	< 0.0001
Less than high school	22.3	21.5	
High school and beyond	77.7	78.5	

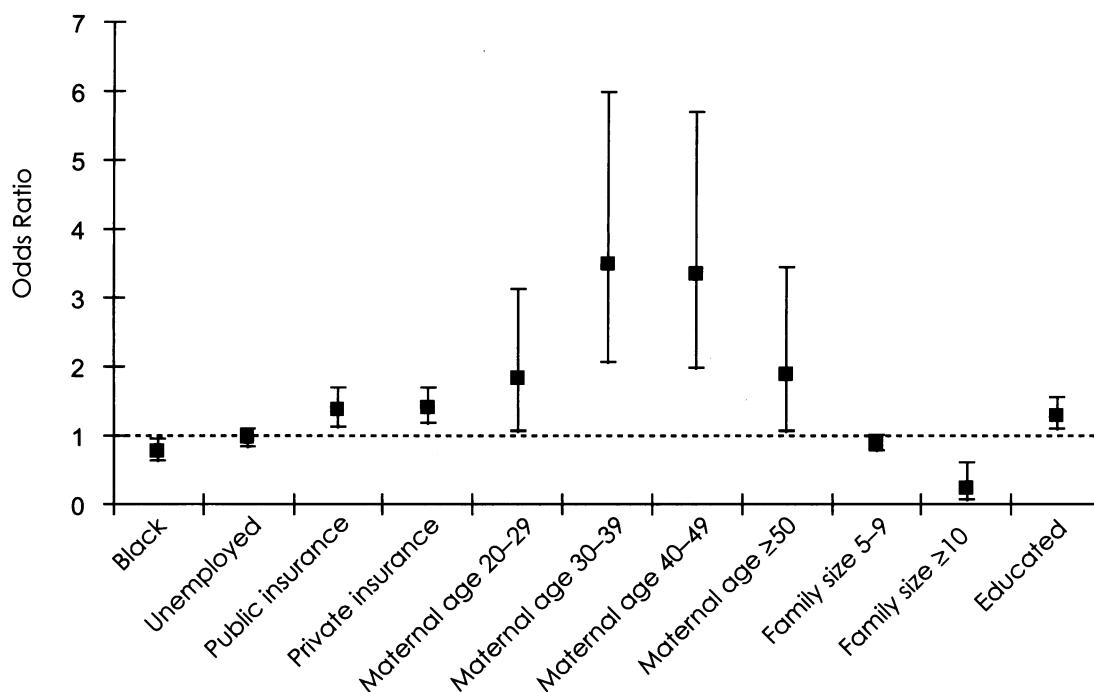
tive care utilization that accounted for this relationship was a dental visit since the immunization component displayed almost a flat association with age. Previous investigators have also detected the same direct relationship between child's age and the probability of a visit to a dentist. In an analysis restricted to components of dental care, Macek et al. in 2001⁴ reported a low level of diagnostic and preventive care use among 0–18-year-old children (39.3%). Similarly, in a cohort study of 0–3-year-old children followed over time, only 2% had a dental visit by one year of age, 11% by two years of age and 19% by three years of age.¹⁰ The increasing trend with age is consistent with the findings of our study.

Interestingly, our results also demonstrated that maternal characteristics (e.g., age and education) influenced the receipt of preventive services by children. Very few studies have examined the influence of maternal characteristics on pediatric use of preventive care. In a recent study that investigated the association between maternal characteristics and vaccination among children aged 19–35 months, the authors found that children of mothers who were black, of low education and who have had multiple children were more likely to be undervaccinated.⁶ In a similar analysis focused on the receipt of recommended well-child and dental visits among children younger than 18 years, it was observed that higher rates of dental visits correlated significantly with

older parental age and high parental education.⁸ The same study also noted significantly low visit rates among children of black parents. These reports are in agreement with our findings.

While the direct association between level of maternal education and receipt of preventive care use by the child can easily be explained, the pathway through which older maternal age mediates enhanced pediatric preventive care utilization is not so obvious. It has been reported that adolescent mothers tend to have a lower level of prenatal care when pregnant,¹¹ and adequacy of prenatal care improves with increasing maternal age.¹² Earlier studies have also observed that children of mothers who have delayed prenatal care are at a high risk for not receiving an adequate number of well-child visits by age two.¹³ It is, therefore, reasonable to speculate that influential factors that interact with maternal age to determine access and use of health services during the period of gestation still play a similar role during the childhood years. With increased age, people tend to be more educated and informed. This will determine their inclination toward use of healthcare services not only for themselves but for the children under their care as well. However, even after accounting for the effect of education in the adjusted model in our analysis, maternal age still portrayed a significant relationship with preventive care use among children. For policy purposes, even though age cannot be modified, it is important to recognize young maternal age as a risk factor for low-

Figure 2. Determinants of preventive care use in the U.S. population. Estimates are adjusted by introducing all the variables in the figure into the model.



er level of pediatric preventive care utilization. Therefore, care providers and those involved with provision of preventive care may need to focus more attention on younger mothers in a bid to improve utilization of preventive health services by their children.

A unique feature of this study is the finding that the insurance status of the mother is also a predictor of pediatric preventive care use. It is well known that children who have health insurance coverage are more likely to have access and to utilize health services.^{14,15} It is poorly known, however, whether coverage for the mother would enhance the use. Interestingly, both public and private insurance coverage demonstrated the same level of prediction. This finding bears an important implication on current public policy concerning insurance coverage for the mother. It suggests that the effectiveness of ongoing programs that target highly needy children through insurance coverage (e.g., the state-run SCHIP programs) can be strengthened by extending the same coverage to their mothers or by instituting a parallel insurance coverage programs for their mothers.

A number of potential limitations to this study deserve mention. In constructing the composite variable for preventive care use, we could not differentiate between preventive versus acute or emergent dental care. It is noteworthy that the American Academy of Pediatric Dentistry (AAPD) and *Bright Futures* recommend two dental visits per year commencing at age one,^{16,17} but we decided to lower the inclusion criterion to a single dental visit since that is more likely to be the common practice.⁸ Despite these potential shortcomings, our analysis provides useful information, especially for constructive national debates regarding the extension of insurance coverage to mothers of disadvantaged children—a step that will enhance pediatric preventive care use.

Finally, the study findings clearly demonstrate that dental visit was a more sensitive parameter for pedi-

atric preventive care than immunization coverage, and a yearly dental visit commencing at age one could be a valid and reliable preventive healthcare indicator.

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Table 3. Indicators of Financial Barriers to Healthcare Access by Race (Percentages Are Weighted)

Barrier	Black	White	P Value
Total Income (in U.S. \$) Mean	16,465	19,810	<0.0001
Employed			<0.0001
Yes	67.1	63.0	
No/uncertain	32.6	36.7	
Not stated	0.3	0.3	
Insurance Coverage			<0.0001
Private	54.3	73.2	
Public	32.1	13.8	
Uninsured	13.6	13.0	

The information in the table refers to the mother of the child.

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