

Differences in Use of Health Services Between White and African American Children Enrolled in Medicaid in North Carolina

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Objectives: Racial differences in health status and use of health services persist in the United States and are not completely explained by differences in socioeconomic status. This study examines differences in use of health services between White and African American children enrolled in Medicaid, controlling for other factors that affect service use. We make comparisons for use of primary preventive services, diagnosis and treatment of selected common childhood illnesses, and Medicaid expenditures. *Methods:* We linked Medicaid enrollment records, Medicaid paid claims data, and data on use of child WIC services to birth certificates for North Carolina children born in 1992 to measure use of health services and Medicaid expenditures by race for children ages 1, 2, 3, and 4. Logistic and Tobit regression models were used to estimate the independent effect of race, controlling for other variables such as low birth weight, WIC participation, and mother's age, education, and marital status. Since all children enrolled in Medicaid are in families of relatively low income, racial differences in socioeconomic status are partially controlled. *Results:* African American children had consistently lower Medicaid expenditures and lower use of health services than did White children, after statistically controlling for other maternal and infant characteristics that affect health service use, including child WIC participation. For example, total annual Medicaid expenditures were \$207–303 less for African American children than for White children, controlling for other variables. African American children were significantly less likely to receive well-child and dental services than were White children. *Conclusions:* African American children enrolled in Medicaid use health services much less than White children, even when controlling for socioeconomic status and other factors that affect service use. Linking state administrative databases can be a cost-effective way of addressing important issues such as racial disparities in health service use.

KEY WORDS: race; children; Medicaid; health service use; health care expenditures.

INTRODUCTION

Racial differences in the use of health services have been widely documented. Members of minority racial groups are often found to have lower use

of many health services, despite an overall higher level of health problems. A pervasive goal of the national Healthy People 2010 program is the elimination of racial disparities in health status and health care utilization.

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To some extent, differences in use of health services reflect differences between racial groups in income, education, and other socioeconomic factors. Often, however, differences remain even after adjusting for socioeconomic status. For example, studies have consistently shown that African Americans are much less likely than Whites to receive invasive treatments for coronary artery disease, after controlling for patient and hospital characteristics (1–5).

A number of studies show large racial differences in children's use of health services. African American children are less likely than White children to receive adequate well-child care (6). Children of minority race and ethnicity are more likely to lack a usual source of primary care (7, 8) and use only about half as many physician services after adjusting for health status (7). African American children enrolled in Medicaid are much less likely than White children enrolled in Medicaid to receive prescriptions for psychotropic medications (9). White children with chronic conditions use ambulatory care services at much higher rates than do African American or Hispanic children, even though minority children appear to experience more severe conditions (10). Despite having worse reported health status, African American adolescents make notably fewer doctor visits in a year than do White adolescents, and are more apt to lack usual sources of routine and acute care as well as continuity between sources of care (11). Most of these studies controlled for family income and other characteristics and still found substantial racial differences in use of health care by children. Such residual differences are sometimes attributed to discrimination or racism (12, 13). For example, visual markers may lead some health care providers to engage in discriminatory behavior that reduces access to health care for minority populations (14).

Some authors question the appropriateness of examining racial differences in health. They argue that race is an arbitrary system of visual classification without biological merit, and that demarcations by race largely reflect racism in our society (15). The position taken here is that, although racial classification is imprecise and often based on self-identification, there is some utility in describing racial differences in health status and health care use. This allows targeting of health improvement programs toward populations most in need. Race is not considered as a biological risk factor, but rather as a social construct. It is generally a descriptive marker of health conditions, although sometimes perceptions of race may have effects such as denial of access to health services.

This study compares White and African American children born in 1992 who were enrolled in Medicaid with regard to use of health services and health care expenditures, for ages 1, 2, 3, and 4. We present new information on racial differences in use of preventive and treatment services within the Medicaid population, including measures of health care expenditures. Since all children enrolled in Medicaid are in families of relatively low income, racial differences in socioeconomic status are partially controlled.

During the period of this study (1992–97), Medicaid in North Carolina was almost entirely a fee-for-service program. Children ages 1–4 were eligible for Medicaid if their household income was less than 133% of the federal poverty level. From 1991 to 1997 a Medicaid-managed care program was initiated and grew to cover one half of North Carolina's counties. In this program, Medicaid recipients were linked to a primary care provider who agreed to provide or arrange for health care services, although payments to providers were still on a fee-for-service basis. The period of this study was prior to the advent of the State Children's Health Insurance Program (SCHIP) in North Carolina.

In categorizing the use of health care, we focus on the public health concepts of primary prevention and secondary prevention. Primary prevention refers to the use of health services (such as well-child care, preventive dental care, or immunizations) to prevent the risk and occurrence of health problems. Secondary prevention refers to the early diagnosis and treatment of preexisting health conditions. Both primary prevention and secondary prevention are critical for young, low-income children, given the prevalence of childhood illnesses and the availability of effective treatments.

This study is part of a larger project, funded by the US Department of Agriculture, to assess the effects of childhood WIC participation on Medicaid costs and use of health services. WIC is the Special Supplemental Nutrition Program for Women, Infants and Children. It is a broad-based food and nutrition assistance program for low-income and nutritionally at-risk pregnant, breast-feeding, and postpartum women; infants; and children up to 5 years of age.

METHODS

We selected Medicaid enrollment records for children who were born in 1992 and enrolled in Medicaid at any time before turning age 5. For each child,

we created a Medicaid enrollment history, indicating Medicaid enrollment (yes/no) for each of the 60 months from birth up to age 5. This Medicaid enrollment information was then matched to 1992 North Carolina birth certificates. The birth certificates contained important data for the statistical analyses that were performed, such as the mother's age, education, and marital status and the infant's birth weight. Among children who were enrolled in Medicaid for all of their first 12 months of life, 98.5% of the Medicaid enrollment records matched to a 1992 North Carolina birth certificate. The overall matching rate was 77%. The lower overall matching rate was due in part to children who were enrolled in Medicaid in North Carolina after birth but were born in another state, and so would not have a North Carolina birth certificate.

We used Medicaid ID numbers from the enrollment records to match the Medicaid-paid claims history files to extract records of all services received by each child from birth up to age 5. We summarized these records into a variety of cost and health service use measures for each year of life, using claim type, diagnosis codes, and procedure codes. We compared the beginning date of service on each Medicaid claim to the child's date of birth on the birth certificate to determine to which year of life to assign the claim. For this study, we examined four age groups, on the basis of completed years of age: 1-year-olds (12–23 months of age), 2-year-olds (24–35 months), 3-year-olds (36–47 months), and 4-year-olds (48–59 months). Infants were not included because the household income eligibility level for infants in 1992 (185% of the federal poverty level) was different from that for children ages 1–4, and because of the very large effect of Neonatal Intensive Care Unit costs on total Medicaid costs for the 1st year of life.

We matched WIC certification records and food redemption files to the birth/Medicaid file to identify children who participated in WIC. We defined four levels of WIC participation on the basis of percentage of months from age 1 through the particular year of age in which food vouchers were redeemed: high (>66%), medium (>33 and ≤66%), low (≤33%), and none. This cumulative measure was considered to be a better gauge of child WIC participation than just WIC participation in the current year of life. Child WIC participation is used as a control variable in examining the effect of race on use of health services. There is evidence that participation in WIC by children enrolled in Medicaid is associated with the use of other child health services (16). One goal of the WIC pro-

gram is referral to other health services. In addition, WIC participation may be a proxy for health-seeking behavior or proficiency in obtaining health services.

Variables used to link the various data files included name, date of birth, gender, county of residence, and social security number (where available). In general, we conducted several deterministic matching steps, with the unmatched records passed to the next step and the matching criteria successively relaxed with each iteration. Details of the linkage procedures are available from the authors.

Children with higher medical risks were excluded from the analysis file. We excluded infant deaths, multiple births, and children who were ever institutionalized (not including hospitalizations). These exclusions represented approximately 7% of the total linked records. The resulting file contained linked birth/Medicaid/WIC records for 49,795 children born in 1992 and enrolled in Medicaid at any time before age 5. From this file, we excluded children from the analyses for any year of life in which they participated in the Child Service Coordination (CSC) program. This program provides tracking and case management services for children with medical, developmental, or social risk factors. Children in this program have medical costs significantly higher than average. The CSC exclusions averaged about 5% of the children at each year of age.

For each age 1 through 4, we examined children who were continuously enrolled in Medicaid, i.e., were enrolled for each of the 12 months of the year. We excluded from the analyses children who were not continuously enrolled in Medicaid for the year since complete cost and service information for them would not be available from the Medicaid-paid claims data. Of the total children enrolled in Medicaid for one or more months during a year, approximately one half were continuously enrolled. Children who were enrolled in a Medicaid HMO after 1996, for whom we did not have complete encounter and cost data, were excluded from the 3- and 4-year-old age groups (about 7% of the children who were continuously enrolled in Medicaid). The resulting numbers of records available for analysis were 20,639 for 1-year-olds, 18,179 for 2-year-olds, 16,415 for 3-year-olds, and 15,840 for 4-year-olds.

We made comparisons between White and African American children; other racial groups were excluded. In North Carolina, African Americans comprised 94% of the children of minority race enrolled in Medicaid who were born in 1992. The numbers of American Indian and Asian American children, for

example, were not large enough to produce statistically meaningful comparisons. Hispanics are a growing ethnic group in North Carolina, but represented only 2.6% of young children enrolled in Medicaid who were born in 1992. Most Hispanics in North Carolina are classified into the White racial group. Race was defined using the race of the mother from the birth certificate. Race on the birth certificate is based on self-identification by the mother, which is likely to be more accurate than observation of race by health care providers.

Through multiple regression analyses, we examined the association of race and selected control variables with Medicaid costs and use of services, separately for each year of life. The primary prevention dependent variables were well-child visits and dental visits. The secondary prevention (disease treatment) dependent variables were diagnosis/treatment for otitis media, asthma, upper respiratory infection, lower respiratory infection, and gastroenteritis; total Medicaid costs; and Medicaid costs for outpatient visits, emergency room visits, and prescription drugs. Because some of the Medicaid cost variables included a large number of zero values, we used a Tobit model to estimate the Medicaid cost equations. Tobit is an estimation procedure that accounts for censored values of the dependent variable. We used logistic regression to estimate the odds of having one or more well-child visits, one or more dental visits, or being diagnosed/treated for a common childhood illness (dichotomous dependent variables), controlling for selected characteristics of the mother and infant. We used SAS statistical software for the multivariate analyses, specifically the LIFEREG and LOGISTIC procedures.

We used the following control variables in the regression models: mother unmarried; mother under age 18; mother's education less than 12 years; Early Periodic Screening, Diagnosis, and Treatment (EPSDT) received in a public health department; mother smoked during pregnancy; low birth weight; cumulative child WIC participation (as defined earlier); and previous prenatal and infant WIC participation. Each of these variables was dichotomous (1 or 0), except child WIC participation, which consisted of three levels (high, medium, and low) with no WIC participation as the reference category. We chose these control variables because of their potential impact on health care use, and most were available from the birth certificate. EPSDT is a complete well-child visit paid for through the Medicaid program. Whether EPSDT was received in a public health de-

partment (yes or no) was used as a control variable because Medicaid reimbursements in North Carolina were sometimes higher for public than for private providers, during the time period of this study. This measure was not used as a control variable in the logistic regression with well-child (EPSDT) visits as the dependent variable, because of the high intercorrelation. We used WIC participation as a control variable because of evidence that participation in WIC is associated with higher use of health services (16), and because it may be a proxy for health-seeking behavior.

Log transformations of the cost variables were performed to make them more normally distributed, but this did not substantially alter the results. Therefore, the regressions using the untransformed dependent variables are presented here.

RESULTS

In 1992 there were nearly 104,000 live births for all North Carolina residents. Approximately 45,000 of these births were for infants enrolled in Medicaid. Table I shows the distribution of the study population by age and race. Fifty-seven percent of the children who were continuously enrolled in Medicaid were White and 43% were African American.

Table II shows the adjusted odds ratios for African Americans for two types of primary preventive services, from the logistic regression analyses. African American children have significantly lower odds of receiving well-child care (EPSDT) and dental care for all but one of the eight age/service categories than do White children. Overall, use of these preventive services was low among these children ages 1–4. Only a little more than one half had a full EPSDT visit during the year (one visit per year is recommended for this age group): 66% for age 1, 46% for age 2, 48% for age 3, and 63% for age 4. The percentages with any dental visit during the year were 5% for age 1, 10% for age 2, 24% for age 3, and 39% for age 4.

Table I. North Carolina White and African American Children Born in 1992 Who Were Continuously Enrolled in Medicaid by Age and Race (Study Population)

	Number	White (%)	African American (%)
Age 1	20,639	55	45
Age 2	18,179	58	42
Age 3	16,415	57	43
Age 4	15,840	58	42

Table II. Use of Primary Preventive Health Care: Adjusted Odds Ratios^a for African American Children Compared to White Children (With 95% CI)

	Completed year of age			
	Age 1	Age 2	Age 3	Age 4
Odds of having one or more full well-child care (EPSDT) visits during the year	0.64 (0.59, 0.69)	0.76 (0.71, 0.83)	0.99 (0.91, 1.07)	0.85 (0.78, 0.92)
Odds of having one or more dental visits during the year	0.63 (0.55, 0.72)	0.53 (0.47, 0.59)	0.78 (0.72, 0.85)	0.91 (0.84, 0.98)

^aFrom logistic regression, controlling for other factors that influence service use: mother unmarried, mother under age 18, mother’s education less than 12 years, EPSDT received in a public health department (for dental model only), mother smoked during pregnancy, low birth weight, cumulative child WIC participation, and previous prenatal and infant WIC participation.

Table III indicates that African American children have lower odds of being diagnosed/treated for otitis media, upper respiratory infection, lower respiratory infection, and gastroenteritis at each year of age. In many cases, the odds of an African American child being diagnosed and treated are only about one-half that for a White child. African American children have a higher odds of being diagnosed/treated for asthma at ages 1 through 4. The prevalence of diagnosis/treatment of common childhood illnesses among children on Medicaid generally decreased with age. Overall, among the 1-year-olds, 61% were diagnosed and treated one or more times during the year for otitis media, 52% for an upper respiratory infection, 26% for a lower respiratory infection, 7% for asthma, and 7% for gastroenteritis. By age 4, rates were 24% for otitis media, 41% for upper respiratory infection, 26% for lower respiratory infection, 6% for asthma, and 3% for gastroenteritis.

Table IV presents the regression coefficients for all variables in the model with total Medicaid costs as the dependent variable. For each age category, African American children have much lower total Medicaid expenditures than do White children, rang-

ing from \$207 at age 3 to \$303 at age 2. All of these coefficients are highly statistically significant. These are substantial effects, given that, overall, the total annual Medicaid expenditure per child in these age groups is approximately \$825. Other variables in the regression model that had a consistently high and statistically significant association with total Medicaid costs were child WIC participation and low birth weight, each of which was associated with higher Medicaid costs. Maternal education less than 12 years was generally associated with significantly lower total Medicaid costs. Receipt of EPSDT in a public health department was associated with significantly higher Medicaid costs only for the 2-year-olds. Maternal age, smoking, and marital status and prenatal/infant WIC participation were not significantly associated with Medicaid costs, after controlling for the other variables in the regression models.

Table V shows the regression coefficients for African Americans for several categories of health services, where dollars paid by Medicaid is the dependent variable. African American children generally have significantly lower Medicaid expenditures for outpatient, emergency room, and prescription drug

Table III. Adjusted Odds^a of Being Diagnosed/Treated for Selected Illnesses for African American Children Compared to White Children (With 95% CI)

	Completed year of age			
	Age 1	Age 2	Age 3	Age 4
Otitis media	0.49 (0.46, 0.52)	0.44 (0.41, 0.47)	0.40 (0.36, 0.43)	0.37 (0.34, 0.41)
Asthma	1.20 (1.05, 1.36)	1.09 (0.94, 1.26)	1.22 (1.05, 1.42)	1.23 (1.05, 1.44)
Upper respiratory infection	0.45 (0.42, 0.48)	0.43 (0.40, 0.46)	0.45 (0.42, 0.48)	0.43 (0.39, 0.46)
Lower respiratory infection	0.71 (0.66, 0.76)	0.61 (0.56, 0.67)	0.65 (0.59, 0.71)	0.66 (0.59, 0.73)
Gastroenteritis	0.42 (0.37, 0.48)	0.47 (0.40, 0.55)	0.44 (0.37, 0.54)	0.54 (0.43, 0.68)

^aFrom logistic regression, controlling for other factors that influence diagnosis and treatment of these conditions: mother unmarried, mother under age 18, mother’s education less than 12 years, EPSDT received in a public health department, mother smoked during pregnancy, low birth weight, cumulative child WIC participation, and previous prenatal and infant WIC participation.

Table IV. Regression Analysis^a for Total Medicaid Costs: Estimated Effects (\$) of African American Race and Other Variables (With 95% CI)

	Completed year of age			
	Age 1	Age 2	Age 3	Age 4
African American ^b	-273 (-232, -314)	-303 (-248, -358)	-207 (-146, -268)	-231 (-137, -325)
Mother's education <12 years	-50 (-10, -90)	-58 (-4, -110)	-61 (-3, -119)	-42 (47, -131)
Low birth weight	147 (80, 214)	140 (52, 227)	227 (129, 319)	57 (-82, 196)
Mother under age 18	46 (-14, 106)	-15 (64, -94)	15 (-71, 101)	-105 (26, -235)
Health department EPSDT	1 (-36, 38)	81 (13, 149)	49 (-27, 125)	55 (-54, 164)
Mother smoked	-34 (9, -77)	24 (-32, 80)	-4 (57, -65)	-23 (71, -117)
Mother unmarried	-37 (6, -80)	-36 (21, -93)	-35 (28, -98)	-40 (57, -137)
Prenatal and infant WIC	51 (10, 92)	44 (-10, 98)	59 (-1, 119)	39 (-53, 131)
High child WIC ^c	161 (115, 207)	198 (132, 264)	205 (126, 284)	349 (220, 476)
Medium child WIC ^c	87 (31, 143)	103 (26, 180)	105 (19, 191)	225 (91, 359)
Low child WIC ^c	64 (-1, 129)	72 (-1, 145)	86 (5, 167)	174 (48, 300)

^aFrom Tobit regression, each coefficient is adjusted for all other variables listed.
^bReference category is White children.
^cReference category is no child WIC participation.

services, than do White children, controlling for the other variables in the regression model.

DISCUSSION

The findings of this study show that, among young children enrolled in Medicaid, African Americans use both primary and secondary preventive health care at a much lower rate than do Whites. Also, Medicaid expenditures for health care are significantly lower for African Americans. This association of race with lower use of health care persists after controlling for other factors that impact service use and cost, such as low birth weight, WIC participation, and several maternal characteristics.

For these children born in 1992, the family income threshold for Medicaid eligibility at ages 1 through 4 was less than 133% of the federal poverty

level. All children in the study were subject to the same income eligibility criteria. Thus racial differences in family income are partially controlled by limiting the study population to children enrolled in Medicaid. Also, including mother's education and marital status in the regression models helps control for racial differences in socioeconomic status within the Medicaid population.

The results of this study suggest that African American children enrolled in Medicaid are less connected to the health care system than are White children. African American children use less primary preventive health care and may, therefore, be more likely to have undiagnosed and untreated illnesses. The fact that all of these children enrolled in Medicaid were below or only slightly above the federal poverty level implies that there is a significant need for health care in this population. The findings of this study suggest that this need is not being met for African American

Table V. Use of Other Categories of Health Services: Adjusted Decrease in Medicaid Costs^a for African American Children Compared to White Children (With 95% CI)

	Completed year of age			
	Age 1	Age 2	Age 3	Age 4
Outpatient costs	\$51 (33, 69)	\$71 (47, 95)	\$107 (81, 133)	\$112 (83, 141)
Emergency room costs	\$1 (-8, 10)	\$10 (-2, 22)	\$33 (20, 46)	\$39 (22, 56)
Prescription drug costs	\$72 (66, 78)	\$162 (134, 190)	\$84 (75, 93)	\$120 (103, 137)

^aCoefficients from Tobit regression, controlling for other factors that influence cost: mother unmarried, mother under age 18, mother's education less than 12 years, EPSDT received in a public health department, mother smoked during pregnancy, low birth weight, cumulative child WIC participation, and previous prenatal and infant WIC participation. These regression coefficients do not measure the differences in average Medicaid costs between the racial groups, but instead measure differences in Medicaid costs conditional on their being one or more claims during the year for the particular type of service (i.e., cost is >\$0).

children. But, in general, we can only infer this since the data used in this study do not allow determination of an adequate or appropriate level of health care use. In the case of EPSDT, however, only about one half of these children ages 1–4 (both races combined) received the recommended one full visit per year.

Factors contributing to the lower use of health services among African American children might include family transportation problems, shortages in the community of health care providers who accept Medicaid patients, lack of culturally appropriate health services, barriers to service accessibility in medical offices (17), and racial discrimination among health care providers (12–14).

The African American children were less likely to be diagnosed with most common childhood illnesses, with the exception of asthma. This higher diagnosis of asthma is consistent with the results from a national survey that showed the prevalence of asthma to be 50% higher among African American children than among White children (18). A study of Michigan Medicaid recipients indicated that the prevalence of asthma among children under 5 years of age was 63% higher among African Americans than among Whites (19). In contrast, a more recent study of North Carolina children enrolled in Medicaid did not find asthma prevalence to be higher among African Americans (20), although this study was for a later time period than the present study and pertained to children ages 0–14 compared to ages 1–4 for the present study.

The results of this study show that participation in the WIC program is associated with significantly higher expenditures for health services among children on Medicaid. One goal of WIC is referral to other child health services (16), and WIC participation may be a proxy for health-seeking behavior or proficiency in obtaining health services. After controlling for this strong correlate of health service use, there is still a significant association of African American race with lower use of and expenditures for child health services.

Limitations of this study are that it is restricted to a single state, and that the findings apply only to children insured through traditional fee-for-service Medicaid coverage. The results apply only to racial differences in service use within the Medicaid population, not among children in families of higher socioeconomic status. There was no information available on the health status of the children in the study, and so we could not control for this important determinant of health care use. The exclusion of higher-risk children such as twins and triplets, children who had been in-

stitutionalized, and children who participated in the Child Service Coordination (CSC) program, means that the results of this study apply only to children with average or lower medical and social risks.

In summary, this study shows that African American children enrolled in Medicaid use all types of health services less and have significantly lower Medicaid expenditures for health services than do White children enrolled in Medicaid. This difference exists after statistically controlling for other measurable factors that impact service use, including WIC participation.

Our analyses show that linking state administrative data bases can be an effective way of addressing important issues such as racial disparities in health service use. Using existing data systems has several advantages over special surveys and more intensive data collection efforts: lower cost, usually a much larger sample size will be available for analyses, and data editing and quality control mechanisms are already built into the data systems.

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