

Medical Care Costs for Diabetes Associated With Health Disparities Among Adult Medicaid Enrollees in North Carolina

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Abstract

Background: Health disparities for many diseases are large and long-standing in North Carolina and the nation. This study examines medical care costs for diabetes associated with health disparities among adults (age, ≥ 18 years) enrolled in Medicaid in North Carolina during state fiscal year (SFY) 2007-2008 (ie, July 1, 2007, through June 30, 2008).

Methods: North Carolina Medicaid paid claims and enrollment data were used to calculate the prevalence of and medical care expenditures for diabetes among adult Medicaid enrollees overall and by white, African American, and American Indian race. The impacts of racial and economic health disparities on medical care costs for diabetes were determined by first calculating the proportionate differences between the diabetes prevalence for whites, African Americans, and American Indians enrolled in Medicaid and the diabetes prevalence among all whites in North Carolina. Then it was assumed that medical care costs for white, African American, and American Indian Medicaid recipients could be reduced by the same proportion if the overall prevalence among whites was achieved.

Results: The diabetes prevalence among adult Medicaid enrollees was 15.7%, compared with 9.1% for all North Carolina adults. During SFY 2007-2008, the state Medicaid program in North Carolina spent \$525 million for diabetes-related medical care and prescription drugs among adults. An estimated \$225 million in diabetes-related expenditures could be saved each year by the North Carolina Medicaid program if both racial and economic disparities in the diabetes prevalence were eliminated.

Limitations: We did not have data on non-Medicaid paid health care expenditures for the Medicaid enrollees in our study. The costs of interventions to eliminate health disparities associated with diabetes are not included in the calculation of the potential savings.

Conclusions: The diabetes prevalence in the Medicaid population is much greater than that for all North Carolinians, and the Medicaid costs associated with this elevated prevalence are large. North Carolina health-policy makers and health-program managers should carefully evaluate investments in interventions to reduce these race- and economic-based differences in diabetes prevalence, which could potentially reduce Medicaid costs.

Keywords: health status disparities; minority health; diabetes mellitus; Medicaid; health care costs

For many diseases, health disparities between races are large and long-standing in North Carolina and the nation. For a few conditions, such as suicide and chronic lung disease, the mortality rate among white individuals is higher than that for African Americans and other minority groups. However, for many health conditions, minority groups have mortality rates that are much higher than those for whites. For example, unpublished data from the State Center for Health Statistics show that the age-adjusted death rate for stroke among African Americans in North Carolina is 1.5

times the rate among whites; among American Indians, it is 1.2 times the rate among whites. For chronic kidney disease, the age-adjusted death rate for African Americans is 2.5 times the rate for whites; for American Indians, it is 1.6 times the rate for whites. Infant death rates among African Americans and American Indians are approximately twice the rate among whites. Homicide death rates among African Americans and American Indians are approximately five times the rate for whites.

We use the term "disparities" in this article to refer to

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differences between minority racial groups and the majority white population and between the Medicaid population and the total population. The term “disparity” implies that the difference is based on a level of unfairness or injustice due primarily to modifiable forces, such as social, economic, or political factors. Not all differences are disparities; for example, differences in disease rates between age groups would not usually be considered disparities.

Disparities in health measures by race are due in part to socioeconomic differences among the racial groups. For example, 7.5% of white families, 25.2% of African American families, and 19.4% of American Indian families in North Carolina lived below the federal poverty line during 2004.¹ Socioeconomic disparities in health status are large and well documented, with people of lower income and education having much higher rates of mortality and other adverse health outcomes.^{2,3} However, some studies showed that racial differences persist even after analyses controlled for socioeconomic status. Factors such as racism and discrimination contribute to these differences.^{3,4}

The prevalence of diabetes has increased steadily in recent years, and it contributes to and complicates a number of other health conditions, such as cardiovascular disease and kidney disease. For diabetes, there are very large health disparities among minority racial groups. Unpublished 2003-2007 data from the State Center for Health Statistics show that, among persons whose primary cause of death was diabetes, the age-adjusted mortality rate was 20.5 deaths per 100,000 population for whites, compared with 53.1 deaths per 100,000 population for African Americans (ie, 2.6 times the rate for whites) and 50.2 deaths per 100,000 population for American Indians (ie, 2.4 times the rate for whites).

Respondents to the North Carolina Behavioral Risk Factor Surveillance System (BRFSS) telephone survey are representative of all adults (age, ≥ 18 years) in North Carolina.⁵ The percentage of 2007 BRFSS respondents reporting that they had diabetes was 9.1%. The prevalence of diabetes was 8.5% for whites, compared with 13.7% for African Americans (ie, 1.6 times the prevalence for whites) and 12.8% for American Indians (ie, 1.5 times that for whites). Obesity is a key risk factor for diabetes. The 2007 BRFSS data revealed that the race-specific pattern of obesity among adults was similar to that for diabetes, with 38.9% of African Americans, 36.5% of American Indians, and 26.4% of whites reporting that they were obese.⁵

One likely reason that the racial disparity ratios for diabetes death rates (~ 2.5) are larger than the disparity ratios for diabetes prevalence (~ 1.5) is that there are race-based differences in the medical management of diabetes. People of minority race who have diabetes may access medical care less frequently than whites because of several factors, including lack of health insurance, residence in an area with fewer primary care physicians, barriers to transportation, and mistrust of the health care system. This could mean

that, among individuals with diabetes, persons of minority race enter primary care later and have less adequate diabetes management than do whites.⁶

There are strong arguments based on fairness and equity for eliminating or reducing health disparities. There has been much less attention given to the effects of health disparities on medical care costs. This study examines medical care costs for diabetes associated with health disparities among adult Medicaid enrollees in North Carolina during state fiscal year (SFY) 2007-2008 (ie, July 1, 2007, through June 30, 2008).

Methods

We selected 5.6 million diabetes-related paid claims for adults (age, ≥ 18 years) during SFY 2007-2008 (of note, more than 75 million total Medicaid claims were paid during this period). We included all claims (eg, medical, hospital, outpatient, and home health claims) for which diabetes was identified using code 250 from the *International Classification of Diseases, Ninth Revision, Clinical Modification* (ICD-9-CM) as either the primary or contributing diagnosis. We also included prescription drug claims for drugs used almost exclusively for the treatment of diabetes (ie, various types of antihyperglycemic medications).

Analyses of these data were performed for whites, African Americans, and American Indians and for total Medicaid enrollees. Hispanic ethnicity (defined as “yes” or “no”) is reported in addition to race in the Medicaid data set. Hispanics were not included as a separate category for our analyses, because data on Hispanic ethnicity were missing in approximately 20% of the Medicaid enrollment records and because the prevalence of diabetes among Hispanics in North Carolina was low (ie, 3.0%) during 2007.⁵ We included persons of Hispanic ethnicity in the total Medicaid enrollee category, as well as in one of the three racial groups if one of these races was reported at the time they enrolled in Medicaid. A total of 71% of adult Medicaid enrollees with Hispanic ethnicity were reported as having an unknown race, and 24% were reported as white.

Race is reported by the client at the time of enrollment in Medicaid. Race is self-reported by the respondent on the telephone when the BRFSS interview is conducted. The options for race were defined by the state Medicaid agency and by the North Carolina BRFSS survey program.

Because we wanted to determine the total cost incurred by the North Carolina Medicaid program for diabetes-related services, all paid claims were included, regardless of an individual's length of enrollment during SFY 2007-2008 and their dual eligibility for Medicare.

The total cost for diabetes-related services, the unduplicated number of persons who received one or more diabetes-related services, and the average expenditure per adult with diabetes are presented for each of the three racial groups and for total Medicaid enrollees. The prevalence of diabetes in the adult Medicaid population overall and

by race is calculated by dividing the unduplicated number of persons who received one or more diabetes services by the unduplicated number of adults enrolled in Medicaid for one or more months during SFY 2007-2008. For example, of 812,717 total Medicaid enrollees during SFY 2007-2008, a total of 127,991 (15.7%) had a paid claim for a diabetes-related service during this period.

Statistically significant differences in the prevalence of diabetes were identified using a binomial difference of proportions test, and statistically significant differences in average expenditures were determined using a difference of means test. A *P* value of < .05 was considered to be statistically significant. All statistical tests were performed using SAS software.

The cost of racial health disparities incurred by the North Carolina Medicaid program was calculated by comparing the actual diabetes-related expenditures for African Americans and American Indians enrolled in Medicaid to the expenditures that they would have had if they had the same diabetes prevalence as whites enrolled in Medicaid. It was assumed that diabetes-associated medical care expenditures would be reduced by the same proportions as the prevalences. Finally, Medicaid cost savings were calculated on the assumption that, if racial and economic disparities were eliminated, the diabetes prevalence for whites, African Americans, and American Indians enrolled in Medicaid (a predominantly low-income population) could be reduced to the diabetes prevalence for all whites in North Carolina.

Results

During SFY 2007-2008, the Medicaid program in North Carolina spent \$524,569,000 for diabetes-related medical care and prescription drugs among adults. A total of 127,991 (15.7%) of 812,727 adult Medicaid enrollees had a diabetes-related paid claim during this fiscal year. The average amount spent for diabetes-related care per adult with diabetes was \$4,098. Table 1 shows these data for the total adult Medicaid population and for the three racial groups of interest.

As shown in Table 1, a total of 17.5% of African American adults enrolled in Medicaid had a diabetes-related paid

claim, compared with 15.0% of American Indians and 14.6% of whites enrolled in Medicaid. Of note, the prevalence of diabetes among whites enrolled in Medicaid was 1.7 times the prevalence among all whites in North Carolina (14.6% vs 8.5%).⁵ This indicates a large socioeconomic disparity, since the Medicaid population in North Carolina has, on average, much lower income than the overall population. The diabetes prevalences for African Americans and American Indians enrolled in Medicaid were approximately 1.2 times the overall prevalences for these groups (13.7% and 12.8%, respectively) in North Carolina during 2007.⁵ The average annual Medicaid expenditure per adult with diabetes was similar for each of the three racial groups, ranging from \$4,027 to \$4,214 (*P* = not significant).

Additional data show that, overall, the largest categories of Medicaid expenditures for diabetes are skilled and intermediate nursing care (30% of all expenditures), physician and other medical services (29%), hospital services (21%), outpatient-clinic services (8%), prescription drugs (6%), and home health care (4%). Of the 127,991 Medicaid enrollees with diabetes, 3% were aged 18-24 years, 18% were aged 25-44 years, 40% were aged 45-64 years, and 39% were aged 65 years or older. Of the claims with a diagnosis of diabetes, 80% had diabetes listed as the primary diagnosis, and 20% had diabetes listed as a contributing condition but another condition specified as the primary diagnosis.

The impact of racial health disparities on medical care costs was determined by first calculating the proportionate differences between the diabetes prevalence for African Americans and American Indians enrolled in Medicaid (ie, 17.5% and 15.0%, respectively) and the diabetes prevalence among whites enrolled in Medicaid (ie, 14.6%). Then it was assumed that the medical care expenditures for African Americans and American Indians could be reduced by the same proportions if the prevalence among whites was achieved. Reducing the African American Medicaid diabetes prevalence rate from 17.5% to 14.6% (relative decrease, 16.6%) would save the North Carolina Medicaid program \$38,782,000 per year in diabetes-related expenditures. Reducing the American Indian Medicaid diabetes prevalence from 15.0% to 14.6% (relative decrease, 2.7%) would save

Table 1.
Diabetes Prevalence and Related Expenditures for Adults Enrolled in the North Carolina Medicaid Program During State Fiscal Year 2007-2008, by Race

Characteristic	White (N = 406,227)	African American (N = 317,313)	American Indian (N = 12,836)	Any race (N = 812,717)
Diabetes prevalence, % (no. of adults)	14.6 (59,238)	17.5 ^a (55,437)	15.0 (1,921)	15.7 (127,991)
Total diabetes-related expenditures, \$	243,657,000	233,625,000	7,735,000	524,569,000
Expenditures per case, \$	4,113	4,214	4,027	4,098

a. *P* < .05, compared with the prevalence among white Medicaid enrollees.

the North Carolina Medicaid program another \$209,000 annually in diabetes-related expenditures. The total projected savings of nearly \$40 million annually is based on the assumption that racial gaps in diabetes prevalence within the Medicaid population could be eliminated.

However, we have seen that, in North Carolina, the white Medicaid population (a low-income group) has a high prevalence of diabetes (14.6%), compared with that of the overall white population (8.5%). If we assume that racial and economic disparities were eliminated and, thus, that all groups had a diabetes prevalence of 8.5%, the potential savings for the North Carolina Medicaid program are much greater (Table 2).

The disparity in diabetes prevalence between American Indians and the overall white population is large, but since American Indians are a relatively small population in North Carolina, the projected savings from eliminating this disparity are relatively small. Nevertheless, these calculations suggest that, if racial and economic disparities in diabetes prevalence were eliminated and white, African American, and American Indian recipients of Medicaid achieved the diabetes prevalence observed for all whites, the North Carolina Medicaid program could save \$225 million per year in diabetes-related expenditures.

Discussion

This study illustrates the high costs associated with diabetes in the North Carolina Medicaid population and the amount of money that could be saved by the North Carolina Medicaid program if racial and economic disparities associated with diabetes were eliminated. Our findings present a cost-savings case for eliminating or reducing these disparities that complements the moral case for their elimination.⁷ However, it is important to note that we do not underestimate the difficulties involved in achieving reduced diabetes rates. Health disparities are deep-seated in the fabric of American society and have been very resistant to change. Substantial resources would need to be invested to improve the socioeconomic status of minority and indigent groups as

a means to reducing diabetes rates. There has been insufficient investment in developing targeted, long-term interventions designed to eliminate health disparities.

Some health care programs have been effective in preventing diabetes in high-risk populations. The Diabetes Prevention Program is an intensive lifestyle intervention and preventive medication program that can delay or prevent the development of diabetes in a cost-effective manner.^{8,9} Also, a recent study concluded that the Racial and Ethnic Approaches to Community Health (REACH) project in Charlotte, North Carolina, improved several risk factors for diabetes in an African American community and, thus, has the potential to reduce health disparities.¹⁰ However, because such programs are expensive, a large amount of funding would be needed to ensure that implementation is broad enough to substantially reduce diabetes prevalence at the state level.

Although the primary purpose of this article is to estimate the costs incurred by the Medicaid program in North Carolina for diabetes cases attributable to racial and economic disparities, the net savings from eliminating health disparities should also be considered. Calculation of the net savings involves subtracting the cost of the programs and interventions required to eliminate the disparities from the savings associated with eliminating the disparities. In addition, deaths from diabetes that were averted because of these interventions would likely result in later medical care costs for diseases associated with older age; such costs would be very difficult to quantify but should also be estimated and subtracted from the overall savings to present a more accurate picture of the net savings. Together, these calculations would yield a "business case" for eliminating health disparities.¹¹

A diabetes prevalence of 15.7% for North Carolina adults enrolled in Medicaid was calculated from paid claims and enrollment data. This figure is similar to (and not statistically significantly different from) the prevalence of 14.3% reported by Medicaid enrollees who responded to the 2007 BRFSS telephone survey, but it is much higher than the prevalence of 9.1% reported by all 2007 BRFSS respondents.⁵

Table 2.
Potential Annual Savings to the North Carolina Medicaid Program in Diabetes-Related Expenditures After Elimination of Racial and Economic Disparities, by Race

Variable	White	African American	American Indian	Total
Diabetes prevalence among Medicaid enrollees, %	14.6	17.5	15.0	...
Result if target is achieved				
Proportionate reduction, %	41.8	51.4	43.3	...
Overall savings, \$	101,849,000	120,083,000	3,349,000	225,281,000

Note. Values are projected on the basis of data from state fiscal year 2007-2008. Potential savings are based on achieving the target prevalence of 8.5% estimated for all white North Carolina adults during 2007.⁵

The much higher diabetes rate in the Medicaid population is not entirely a reflection of socioeconomic disparities. Although many people qualify for Medicaid because their annual household income is very low, others become eligible for Medicaid because expenses due to treatment for and medical complications from diabetes (or another chronic condition) compel them to “spend down” their financial resources.

Our use of prescription medications to help identify people with diabetes may have yielded some false-positive findings, since medications such as metformin are increasingly used to treat conditions other than diabetes. However, few people with a drug claim did not also have a diagnosis claim. By using the prescription drug claims plus claims with an ICD-9-CM code of 250, we identified 127,991 people with diabetes. Exclusion of prescription drug claims from the analysis identified 125,473 people with diabetes.

The diabetes prevalence of 8.5% observed for all whites in the state is not a goal for the overall population; rather, it is just a relative point of comparison for this study. In fact, because the diabetes prevalence among whites in North Carolina increased from 5.9% in 2000 to 8.5% in 2007, there is certainly room for improvement in this group, as well.

A study of North Carolina children born in 1992 showed that Medicaid expenditures for African American children were significantly less than expenditures for white children, after adjustment for other variables.¹² This difference was attributed to factors such as community shortages of health care professionals who accept Medicaid patients and racial discrimination among health care professionals.¹² The present analysis did not show that the two minority groups had lower average expenditures than those for whites. Rather, our results show that, once there is a diagnosis of diabetes, annual Medicaid expenditures per person are approximately the same for each racial group.

Because we wanted to determine the total cost incurred by the North Carolina Medicaid program for diabetes-related services, all paid claims were included, regardless of an individual's length of Medicaid enrollment during SFY 2007-2008 or their dual eligibility for Medicare. Therefore, we do not have complete information about health care costs for all people in our study. Of the 39% of people (approximately 50,000) who had diabetes and were 65 years of age or older, most were dually eligible for Medicare. For this group, Medicaid pays only a small portion of medical care costs, with the exception of nursing care. As a result, the average costs presented here are lower than the actual average cost per person.

Missing data on race may have affected the results presented here. For SFY 2007-2008, a total of 8.6% of the 5.6 million paid claims used for this analysis had missing information on race. These records were used in the total Medicaid data shown in Table 1 but could not be assigned to one of the three racial groups evaluated.

Racial and economic disparities associated with diabetes clearly result in increased medical care expenditures for minority and low-income groups. Our results suggest that, if these disparities could be eliminated, the North Carolina Medicaid program could save \$225 million per year in diabetes-related expenditures (minus the cost of the programs required to eliminate the disparities). One could ask how much of a reduction in diabetes disparities is realistic. At least in the short term, it is probably more feasible to reduce rather than eliminate racial and economic disparities in diabetes. Still, closing the gap in diabetes prevalence by half between all whites in the state and the three Medicaid racial groups could result in savings to the North Carolina Medicaid program of more than \$100 million per year in diabetes-related expenditures.

For an estimated 40% of people with diabetes in the United States, the disease is undiagnosed.¹³ Therefore, the expenditures shown in this study underestimate the true cost of diabetes in the Medicaid population of North Carolina, since they are based only on diagnosed cases.¹⁴

Health disparities result in large part from entrenched social and economic inequities that will be difficult to change. In light of the rapidly rising prevalence of obesity in North Carolina and the nation, reducing the prevalence of diabetes among Medicaid enrollees and racial minority groups is a big challenge. In addition to improving the socioeconomic status for these groups, there is a need for comprehensive and targeted health care strategies, including prevention, screening, and early detection. A comprehensive approach must focus on interventions at the individual, community, and policy levels.

In addition, improvements in disease management are needed. For example, recent diabetes-management initiatives have been successful in the Community Care of North Carolina (CCNC) enhanced primary care program for Medicaid recipients. These CCNC initiatives can prevent complications and comorbidities associated with diabetes, avoid some hospitalizations, and, thus, help reduce medical care costs for all racial groups.^{15,16} **NCMJ**

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