The Contribution of Social and Environmental Factors to Race Differences in Dental Services Use

Colby H. Eisen, Janice V. Bowie, Darrell J. Gaskin,
Thomas A. LaVeist, and Roland J. Thorpe

ABSTRACT *Dental services use is a public health issue that varies by race. African Americans are less likely than whites to make use of these services. While several explanations exist, little is known about the role of segregation in understanding this race difference. Most research does not account for the confounding of race, socioeconomic status, and segregation. Using cross-sectional data from the Exploring Health Disparities in Integrated Communities Study, we examined the relationship between race and dental services use. Our primary outcome of interest was dental services use within 2 years. Our main independent variable was self-identified race. Of the 1408 study participants, 59.3 % were African American. More African Americans used dental services within 2 years than whites. After adjusting for age, gender, marital status, income, education, insurance, self-rated health, and number of comorbidities, African Americans had greater odds of having used services (odds ratio=1.48, 95 % confidence interval 1.16, 1.89) within 2 years. Within this low-income racially integrated sample, African Americans participated in dental services more than whites. Place of living is an important factor to consider when seeking to understand race differences in dental service use.*

KEYWORDS *Minority groups, Healthcare disparities, Health status disparities, Social environment, Dental care, Oral health, African Americans, Vulnerable populations*

INTRODUCTION

Improving oral health is a leading public health priority in the United States.^{1,2} Dental problems such as tooth decay, tooth loss, and oral cancer may impact an individual's quality of life in many ways including actions such as chewing, laughing, smiling, speaking and sleeping.¹⁻⁵ These conditions can lead to pain and disability that can be fatal in some cases.¹⁻⁴ Many of these health problems are preventable and treatable through regular dental care.² Dental services have been linked to other diseases such as diabetes and cardiovascular disease and decreased odds of adverse birth outcomes.^{1,2,6} However, many Americans do not utilize dental

Eisen, Bowie, Gaskin, LaVeist, and Thorpe are with the Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway Ste 441, Baltimore, MD 21205, USA; Eisen is with the Department of Environmental Health Sciences, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; Bowie and Thorpe are with the Department of Health, Behavior and Society, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA; Gaskin and LaVeist are with the Department of Health Policy and Management, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD, USA.

Correspondence: Roland J. Thorpe, Jr., Hopkins Center for Health Disparities Solutions, Johns Hopkins Bloomberg School of Public Health, 624 N. Broadway Ste 441, Baltimore, MD 21205, USA. (E-mail: rthorpe@jhsphe.edu)

services.^{1,2} Furthermore, African Americans have lower rates of dental services use than non-Hispanic whites.⁷

Individual- and population-level factors are key contributors to dental services use. Usage of these services is often associated with race, sex, age, socioeconomic status (SES), education, insurance, cost of services, and density of dentists.^{1,2,4,7-14} While understanding how these individual factors affect dental services use is informative, less is known about the impact of the social and environmental conditions in which individuals live. Population-level factors such as racial residential segregation, a key determinant of health and major problem,¹⁵⁻¹⁸ have been largely overlooked with regard to racial and SES disparities in dental services use in the United States.

Although there is little information regarding segregation and race differences in dental services use, research shows that where one lives affects health outcomes and services use.^{15-17,19} The purpose of our study was to investigate race differences in dental services use between African Americans and whites who live in similar social and environmental conditions and share the same health care resources. Few data sources exist that are available to unravel the interrelationship among race, SES, and segregation. The Exploring Health Disparities in Integrated Communities (EHDIC) study affords us the opportunity to determine if race differences are a product of the strong relationship among race, SES, and segregation rather than race itself.

METHODS

EHDIC is an ongoing multi-site study of race disparities within communities where African Americans and whites live together and where there are no race differences in SES, as measured by median income. This analysis is based on data from the first EHDIC study site in Southwest Baltimore, Maryland (EHDIC-SWB), a low-income urban area.

EHDIC-SWB was a cross-sectional face-to-face survey of the adult population (aged 18 and older) of two contiguous census tracts collected between June and September 2003. In addition to being economically homogenous, the study site was also racially balanced and well integrated, with almost equal proportions of African American and white residents. In the two census tracts, the racial distribution was 51 % African American and 44 % white, and the median income for the study area was \$24,002 and did not differ by race. We block listed the census tracts to identify every occupied dwelling in the study area. During block listing, we identified 2618 structures. Of those, we determined 1636 structures to be occupied residential housing units (excluding commercial and vacant residential structures). Up to five attempts were made to contact an eligible adult in 1244 occupied residential housing units. A total of 65.8 % of the occupied housing units enrolled in the study. This resulted in 1489 study participants (41.9 % of the 3555 adults living in these two census tracts recorded in the 2000 Census). Because our survey had similar coverage across each census block group including the study area, the bias to geographic locale and its relationship with SES should be minimal.²⁰

A trained interviewer administered the survey in person that consisted of a structured questionnaire, which included demographic and socioeconomic information, self-reported height and weight, self-reported health behaviors and chronic conditions, and three blood pressure (BP) measurements. In addition, we replicated health status and health behavior questions from the 2003 National Health Interview Survey (NHIS) questionnaire.²¹ Additional information regarding the

EHDIC study can be found elsewhere. The study was approved by the Committee on Human Research at the Johns Hopkins Bloomberg School of Public Health. All study participants gave informed consent prior to participation in research.

The primary outcome of interest for this study was dental services use. We created a binary variable to indicate if a participant had used dental services in the last 2 years. The main independent variable was race. Participants self-identified as African American or white. Demographic variables included: age (years), gender (0=female, 1=male), education level (0=less than high school graduate, 1=high school graduate/GED, 2=more than high school graduate), and income category (0=<\$10,000, 1=\$10,000–19,999, 2=\$20,000–34,999, 3=\$35,000–54,999, 4=≥\$55,000). Health-related variables were: health insurance (1=yes; 0=no), marital status (0=current, 1=former, 2=never), self-rated health (0=excellent/very good/good; 1=fair/poor), and any of the following physician-diagnosed chronic conditions: asthma, cancer, diabetes, heart disease, hypertension, or a stroke. We created a binary variable for each of the chronic conditions where 1 represents a diagnosed condition and 0 otherwise. Next, we summed the chronic conditions to create a variable that represents the number of chronic conditions that each person reported.

We used Student's *t* and chi-square tests to calculate the mean and proportional differences between African Americans and whites for demographic and health-related variables. Because the outcome variable was binary, we estimated a logistic regression model to study the association between race and dental services use.²² The referent group for race was whites, and the referent group for sex was female. The referent group for marital status is currently married. The referent group for annual income is less than \$10,000, and the referent group for education is less than high school graduate. The referent group for health insurance was no insurance coverage. For fair/poor health, the referent group was excellent/very good/good. We used Stata software, version 13.1.²³ All tests were two-sided, and we only considered *P* values <0.05 to be statistically significant.

RESULTS

The demographic and health-related variables are displayed by race in Table 1. Of the 1408 participants, 59.3 % were African American and 40.7 % were white. African Americans had a lower mean age than whites, but both groups had similar gender distribution. African Americans were less likely to be married than whites. Although both groups had similar income levels, African Americans were more likely to have earned a high school diploma than whites. African Americans were also more likely to have health insurance than whites. Whites exhibited worse health status, measured by variables such self-reported fair/poor health and number of chronic conditions than African Americans.

Table 2 shows the relationship between race and dental services used in the past 2 years. We adjusted for age, gender, marital status, income, education, insurance, self-rated health, and number of chronic conditions. African Americans had greater odds of having used dental services (odds ratio [OR]=1.48, 95 % confidence interval [CI] 1.16, 1.89) within the last 2 years than whites.

DISCUSSION

Most national data sets compare the health of different races without accounting for racial residential segregation, a prominent problem in the United States.^{7,15–20,24}

TABLE 1 Distribution of demographic and health-related variables in the exploring health disparities in integrated communities Southwest Baltimore study

Variables	Whites (n=573)	African Americans (n=835)	P value ^a
Age, mean (SD)	43.9 (16.2)	38.4 (13.3)	<0.01
Male, %	43.1	45.6	0.350
Marital status, %			
Current	25.7	15.2	<0.01
Former	37.2	22.8	<0.01
Never	37.1	62.0	<0.01
Income, %			
<\$10,000	22.2	25.3	0.180
\$10,000–19,999	40.3	41.7	0.610
\$20,000–34,999	15.5	12.7	0.130
\$35,000–54,999	11.7	11.3	0.801
>\$55,000	10.3	9.1	0.454
Education, %			
Less than high school graduate	47.5	35.4	<0.01
High school graduate/GED	34.2	45.1	<0.01
More than high school graduate	18.3	19.5	0.598
Health insurance, %	59.8	65.1	0.043
Fair/poor health, %	37.4	28.2	<0.01
Number of chronic conditions ^b	0.9 (1.09)	0.7 (0.94)	< 0.01

Mean (SD) mean (standard deviation), GED general equivalency diploma

^aP values were based on Student's *t* and chi-square tests

^bNumber of chronic conditions include physician-diagnosed: asthma, cancer, diabetes, heart disease, hypertension, and stroke

Place of living is an important health determinant that may play a larger role in explaining national race disparities in health.^{15,16,19,20,24} Our study compares whites and African Americans; all of whom live in the same social conditions and thus face comparable environmental health risk exposures and access to health and dental facilities. We found that African Americans had greater odds of having dental services use than whites. These findings emphasize the importance of where one lives in understanding race disparities in dental service use.

We studied race differences in dental services use among urban, low-income African Americans and whites living in the same environment. Therefore, the two race groups in our sample likely have similar access to health care facilities. Contrary to the findings of national data,⁷ we found that African Americans were more likely to have had a dental examination within the last 2 years than whites. One possible explanation for this finding is that there might have been greater awareness among patients and dental providers in EHDIC census tracts with regard to dental service use. However, we did not obtain this information in the survey.

The EHDIC study design minimizes the impact of two important confounders (SES and segregation) in racial disparities research. Therefore, place of living and socioeconomic status may help to explain national race differences in dental services use. The United States experiences high rates of residential racial segregation; in 2000, in order to eradicate such segregation and have a fully racially integrated

TABLE 2 Association between race and dental service use for participants in the exploring health disparities in integrated communities Southwest Baltimore study^a

Variables	OR (95 % CI)
Black ^b	1.48 (1.16–1.89)
Age	0.98 (0.97–0.99)
Male, %	0.76 (0.60–0.96)
Marital status	
Current	1.00
Former	0.78 (0.55–1.10)
Never	0.76 (0.55–1.06)
Income	
<\$10,000	1.00
\$10,000–19,999	1.04 (0.77–1.40)
\$20,000–34,999	1.14 (0.77–1.69)
\$35,000–54,999	1.26 (0.81–1.93)
>\$55,000	1.82 (1.11–2.99)
Education	
Less than high school graduate	1.00
High school graduate/GED	1.70 (1.31–2.20)
More than high school graduate	3.10 (2.18–4.40)
Health insurance, %	1.92 (1.51–2.44)
Fair/poor health, %	0.78 (0.59–1.02)
Number of chronic conditions ^c	0.99 (0.87–1.13)

OR odds ratio, 95 % CI 95 % confidence interval, GED general equivalency diploma

^aModel was adjusted for age, sex, education, income, insurance status, marital status, fair/poor health, and number of chronic conditions

^bWhite adults were the reference category

^cNumber of chronic conditions include physician-diagnosed: asthma, cancer, diabetes, heart disease, hypertension, and stroke

society, approximately two thirds of African Americans would have had to move residences.¹⁸ Current racial residential segregation likely impacts health and health behaviors.^{15–21,24,25} Socioeconomic status is also an important confounder in this body of research since poverty is associated with worse dental and overall health as well as minority race groups.^{7,8,10,11,16} Racial residential segregation often leads to social environments where either poor African Americans or poor whites lack easy access to health services.²⁶ These results suggest that we need to develop policies and interventions that can lead to the reduction of structural inequalities facilitated by racial residential segregation often found between African Americans and whites.^{17,24,26,27}

This study has three important limitations. First, our research site (a low-income urban community) may limit the external validity of our findings, which may differ in a wealthier, suburban or rural community. Second, it is important to note that we did not include all race groups. Since we only included African Americans and whites, we cannot generalize our findings to other racial or ethnic groups. Third, we used self-reported rates of dental services use and were unable to account for potential race differences in reporting.²⁸ However, previous research has found self-

report to be valid when examining preventive services use.^{28,29} This main contribution of this study is to examine the impact of two important confounders (SES and place of living) that national research on racial health disparities does not usually take into account.^{7,18–20,30} Undeniably, African Americans and whites often reside in starkly different social environments that may influence health and health services use.^{16,18,25} Therefore, we must consider place of living and socioeconomic status when examining racial health disparities in overall and dental health.

In conclusion, our study helps to answer an important question: is it race, or rather place that contributes to the nationally observed race differences in dental services use? We hope to inspire future research to consider place of living as an alternative etiology of race differences in dental services use. Examining population-level factors instead of individual-level factors in racial health disparities research should highlight the connection between residential location and health, which will improve future interventions that target communities lacking ready access to services. Dental care providers should learn about the conditions in which patients live and work. On a larger scale, dental-focused public health policies and interventions that target race and/or socioeconomic disparities should consider both individual and population-level factors.

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