

# Black/White Disparities in the Oral Health Status of American Adults.

*R.M. Adesanya\*, T.F. Drury, (National Institute of Dental and Craniofacial Research, NIH, USA)*

## □ Abstract

Although the overall oral health status of Americans has been improving, a significant gap in oral health needs persists between black and white Americans. The objective of this study was to describe racial disparities in unmet dental needs of black and white adults in the U.S. and to determine if they are accounted for by two determinants of oral health, socioeconomic status (SES) or recent dental visits. SES was measured by a summated rating scale based on individual educational attainment and the ratio of annual family income to the official poverty threshold. Data on dentate status, untreated dental caries, loss of attachment (LOA), selected restorations and tooth conditions (RTCs) that might benefit from treatment, and recent dental visits for 11,349 whites and 4,906 blacks 18 years and over who participated in NHANES III (1988-1994) were analyzed. After adjusting (in logistic analyses) for age, gender, SES and recent dental visits, blacks were found to differ from whites on all of the aforementioned indicators. Although blacks were 1.5 times more likely to have been dentate than were whites, they were 1.9 times less likely to have had a complete dentition (28 natural permanent teeth) and 1.7 times less likely to have an intact dentition (24 teeth, up to and including 1<sup>st</sup> molars). Moreover, blacks were 1.9 times more likely to have any untreated decay in the permanent dentition, 1.5 times more likely to have had LOA of 4+ mm and were 1.8 times more likely to have had advanced LOA (either 2 sites with 4+ mm or 1 site with 6+ mm). Blacks were 1.3 times less likely to have intracoronal restorations and were 2.2 times more likely to have any RTCs characterized by pulpal pathology or retained roots. For all indicators, the p-value was significant at the .01 level or less. Blacks and whites differ with respect to key aspects of oral health. These differences are only partially

explained by SES and recent use of dental services. This study was supported by NIDR, NIH.

## □ Introduction

Oral health is integral to everyone's well being and quality of life, and yet, despite the overall progress in the nation's oral health, a significant gap in oral health needs persists between black and white Americans.

A first step in eliminating oral health disparities among black and white Americans is to measure its extent. A second step would be to determine whether socioeconomic status or access to care accounts for the disparities.

## Objectives

- To assess the unmet oral health needs of black adults in the U.S.
- To determine if there were racial disparities in unmet oral health needs between black and white adults; and
- To determine if those differences, if present, could be accounted for by two determinants of oral health, socioeconomic status and recent dental visits.

## □ Methods

This study focuses on black/white differences in unmet oral health needs and access to care of adults in the civilian, non-institutionalized population of the United States during the period 1988-1994. Source of Data: 1988-1994 National Health and Nutrition Examination Survey (NHANES III).

## Study Populations:

- 16,100+ Persons 18 years and over

The percent distribution of persons 25 years and over and of dentate persons 18 years and over by selected demographic characteristics are presented in the appendix.

## Measurement

Clinical data were obtained through visual-tactile oral examinations performed in Mobile Examination Centers (MECs) by licensed dentists, who were trained and calibrated to use standardized criteria in field studies.

Information on individual educational attainment, annual family income, age, gender, race and a recent dental visit was obtained through family and personal interviews.

SES was measured by a composite index based on individual educational attainment and the ratio of annual family income to the official poverty threshold (Figure 1).

## Indicators of Unmet Need & Their Definitions

- Edentulous status: Person has no natural teeth
- Untreated coronal decay: Person has one or more coronal tooth surfaces with untreated decay.
- Untreated root decay: Person has one or more root surfaces with untreated decay
- Any untreated decay: Person has one or more tooth surfaces with untreated coronal or root decay
- Gingivitis: Person has one or more gingival bleeding sites.

- Loss of attachment (LOA) > 4+mm: Person has one or more sites with LOA > 4+mm
- Advanced LOA: Person has either two or more sites with 4+ mm of LOA or one or more sites with 6+mm of LOA
- Any restorations and tooth conditions (RTCs): Person has one or more restorations and tooth conditions that might benefit from treatment
- Any tooth condition involving pulpal pathology or a retained root: Person has one or more restorations and tooth conditions (RTCs) involving pulpal pathology or a retained root that might benefit from treatment
- Recent dental visit: Person reported visiting a dentist or dental hygienist in past 12 months

#### Data Analysis:

- Weighted data
- SUDAAN software (7.0) – Proc Descript and Proc Logistic
- Reference cells: Persons with higher SES scores, females, whites, a dental visit in the past 12 months
- .01 level of significance used in evaluation of statistical results

## Results

### Descriptive Analysis

Selected indicators of unmet oral health needs for black and white persons 18 years and over are presented in figure 2, panels A-C. Overall, blacks were found to have significantly higher levels of oral diseases and conditions than whites did on all indicators studied with the exception of edentulism (where whites had a higher relative frequency).

The relative frequency of persons 18 years and over with a dental visit within the past 12 months by race and dentate status is shown in figure 3. Among all persons and dentate persons, 18 years and older, blacks were about 1.5 times less likely to have visited

a dentist or dental hygienist within the past year. Among edentulous persons 25 years and over, blacks and whites were similar with respect to having had a recent dental visit.

The unadjusted odds ratios (Table 1) showed a three-fold difference between blacks and whites for untreated coronal tooth decay and extreme tooth conditions. A two-fold difference was found for untreated root decay and the use of dental services within the past 12 months. The black/white differences for all other indicators examined were nearly 1.5-fold.

### Indicators of Unmet Need & Their Definitions

- Edentulous status: Person has no natural teeth
- Untreated coronal decay: Person has one or more coronal tooth surfaces with untreated decay.
- Untreated root decay: Person has one or more root surfaces with untreated decay
- Any untreated decay: Person has one or more tooth surfaces with untreated coronal or root decay
- Gingivitis: Person has one or more gingival bleeding sites.
- Loss of attachment (LOA) > 4+mm: Person has one or more sites with LOA > 4+mm
- Advanced LOA: Person has either two or more sites with 4+ mm of LOA or one or more sites with 6+mm of LOA
- Any restorations and tooth conditions (RTCs): Person has one or more restorations and tooth conditions that might benefit from treatment
- Any tooth condition involving pulpal pathology or a retained root: Person has one or more restorations and tooth conditions (RTCs) involving pulpal pathology or a retained root that might benefit from treatment
- Recent dental visit: Person reported visiting a dentist or dental hygienist in past 12 months

#### Data Analysis:

- Weighted data
- SUDAAN software (7.0) – Proc Descript and Proc Logistic
- Reference cells: Persons with higher SES scores, females, whites, a dental visit in the past 12 months
- .01 level of significance used in evaluation of statistical results

## Results

### Descriptive Analysis

Selected indicators of unmet oral health needs for black and white persons 18 years and over are presented in figure 2, panels A-C. Overall, blacks were found to have significantly higher levels of oral diseases and conditions than whites did on all indicators studied with the exception of edentulism (where whites had a higher relative frequency).

The relative frequency of persons 18 years and over with a dental visit within the past 12 months by race and dentate status is shown in figure 3. Among all persons and dentate persons, 18 years and older, blacks were about 1.5 times less likely to have visited a dentist or dental hygienist within the past year. Among edentulous persons 25 years and over, blacks and whites were similar with respect to having had a recent dental visit.

The unadjusted odds ratios (Table 1) showed a three-fold difference between blacks and whites for untreated coronal tooth decay and extreme tooth conditions. A two-fold difference was found for untreated root decay and the use of dental services within the past 12 months. The black/white differences for all other indicators examined were nearly 1.5-fold.

Figures 5-8 further explore the effects of age on black/white differences in the likelihood of edentulism and the effects of gender on black/white differences in the likelihood of untreated coronal

decay. Figure 5 appears to show that the overall statistically significant black/white difference in the percent of persons who were completely edentulous masks two offsetting age trends in the data: (1) among persons 25-54 years, blacks appear to be less likely to be edentulous than whites were; (2) among persons 55 years and over, the reverse appears the case. In fact, however, there were no black/white differences in the relative frequency of edentulism in each of five specific age groups shown in figure 5.

When the interaction between race and age was tested separately among persons 25-54 years and persons 55 years and over, there was a significant interaction between race and age, in the younger but not in the older groups.

Figure 6 shows that when the interaction between race and age on the younger group is evaluated with SES taken into account, in each younger age group where there is sufficient sample size to carry out the analysis, blacks were about two times less likely than their white counterparts were to be edentulous. In effect, given the younger age composition of blacks, were it not for the fact that higher proportion of blacks were found to have lower SES, they would be even less likely to be edentulous than whites.

Figure 7 shows that the relative frequency of untreated coronal decay was higher for blacks than it was for whites among both men and women. It also was higher for men than it was for women among blacks and whites. Controlling for age, SES, and a recent dental visit showed that, compared to white females, black males were 2.5 times more likely to have any untreated coronal decay, while black females were 2.1 times more likely to have any untreated coronal decay.

**Summary**

**Among Adults 25 Years and Over:**

- 9.8% of blacks and 12% of whites were edentulous

**Among Dentate Adults:**

- 48% of blacks compared to 25% of whites had untreated coronal tooth decay
- 20% of blacks and 11% of whites had untreated root decay
- 16% of blacks relative to 6% of the whites had 1 or more restorations and tooth conditions with pulpal pathology or retained roots that might benefit from treatment
- 29.2% of blacks compared to 24.3% of whites had LOA  $\geq$  4+mm
- 20.9% of blacks had advanced LOA relative to 15.5% of whites
- 58.4% of blacks and 51.9% of whites had gingivitis

**Unmet Oral Health Needs for Black and White Americans:**

- Logistic analyses of edentulism which controlled for race, age, gender, and SES showed that racial disparities for this indicator were conditional on age. Among persons 35-44 years, compared to white females, blacks were less likely to be edentulous than whites were. Similarly, among persons 45-54 years, blacks were about 2.3 times less likely to be edentulous.
- The likelihood of untreated coronal tooth decay among blacks 18 years and over was conditional on gender. Compared to white females, the odds of showing any untreated coronal decay was greater for black males than it was for black females.
- For other indicators among dentate persons, compared to the reference population of white females of high SES, blacks were 1.5

to 2.3 times more likely to have unmet oral health needs ( $p$ 's  $<$  .01):

- Blacks were 1.7 times more likely than whites were to have untreated root decay
- Blacks were 2.3 times more likely than were whites to have 1 or more RTC's with pulpal pathology or retained roots that might benefit from treatment
- Blacks were 1.5 times more likely than whites were to have LOA  $\geq$  4+ mm
- Blacks were 1.8 more likely than were whites to have had advanced LOA

Regardless of whether we controlled for SES or a recent dental visit, blacks and whites generally continued to differ with respect to unmet oral health needs.

**Conclusions**

Black and whites differ with respect to key aspects of oral health and perhaps more importantly on unmet oral health needs.

Disparities exist between Black and White Americans both in socioeconomic status and in the likelihood of a recent dental visit.

However, these latter differences only partially explain black/white disparities in unmet oral health needs.

Further analysis of NHANES III data and new research studies are needed to specify and understand the persistent racial disparities in unmet oral health needs.

**Acknowledgements**

Richard Oldakowski – Systems Analysis  
 Jayne Lura-Brown – Graphic Layout and Design

**Figure 1. Construction and Classification of Summated SES Index Scores For Persons 18 Years and Over Based on Individual Educational Attainment and the Ratio of Annual Family Income to the Official Poverty Threshold: United States, 1988-1994**

Individual Educational Attainment	Ratio of Annual Family Income to the Poverty Threshold						
	< .5 (1) <sup>a</sup>	.5 - .9 (2)	1.0 - 1.9 (3)	2.0 - 2.9 (4)	3.0 - 3.9 (5)	4.0 - 4.9 (6)	≤ 5.0 (7)
< 8 Years (1) <sup>a</sup>	Light Blue				Light Green	Light Purple	Light Purple
8 Years (2)	Light Blue				Light Green	Light Purple	Light Purple
9-11 Years (3)	Light Blue				Light Green	Light Purple	Light Purple
12 Years (4)	Light Blue				Light Green	Light Purple	Light Purple
13-15 Years (5)	Light Blue				Light Green	Light Purple	Light Purple
16 Years (6)	Light Blue				Light Green	Light Purple	Light Purple
≥17 Years (7)	Light Blue				Light Green	Light Purple	Light Purple

Source: NHANES III  
<sup>a</sup>Item scores used in summations.

**Table 1. Unadjusted Odds Ratios (O.R.) for Indicators of Unmet Oral Health Needs for Black vs. White Americans 18 Years and Over: United States, 1988-1994**

<i>Oral Health Characteristics</i>	<i>Unadjusted Odds Ratios</i>	<i>99% Confidence Interval</i>	<i>P-Value</i>
<i>Persons 25+ Years</i>			
<b>Completely Edentulous</b>	1.3 <sup>a</sup>	1.0-1.6	.006
<i>Dentate Persons 18+ Years</i>			
<b>Untreated Coronal Decay</b>	2.7	2.2-3.2	.0001
<b>Untreated Root Decay</b>	2.0	1.6-2.5	.0000
<b>One or More RTCs Involving Pulpal Pathology or a Retained Root*</b>	3.1	2.5-3.9	.00000
<b>Any Gingivitis</b>	1.3	1.0-1.6	.0000
<b>LOA <math>\geq</math> 4+mm</b>	1.3	1.1-1.6	.001
<b>Advanced LOA</b>	1.4	1.2-1.7	.0000
<b>A Dental Visit in the past 12 Months</b>	2.1 <sup>b</sup>	1.7-2.5	.0000

\*Data shown are for dentate persons 18-74 years of age

<sup>a,b</sup>ORs and CIs shown are reflected for ease of presentations. Actual ORs (CIs) were .79(.63, 1.0) and .54 (.46, .62) respectively; that is, blacks were 1.3 times less likely to be edentulous than whites were.

Source: NHANES III.

**Table 2: P-Value for Satterthwaite-Adjusted F-Statistic Used to Evaluate Potential Two-Way Interactions Between Race and Selected Characteristics: United States, 1988-1994**

<i>Oral Health Characteristic</i>	<i>Test of Potential Interaction Between Race:</i>			
	<i>Gender</i>	<i>Age</i>	<i>SES</i>	<i>Dental Visit in Past 12 Months</i>
	<i>P-Value</i>			
<u><i>Persons 25+ Years</i></u>				
Completely Edentulous	0.67	.0000	.020	_____a
<u><i>Dentate Persons 18+ Years</i></u>				
Untreated Coronal Decay	.01	.43	.20	.34
Untreated Root Decay	.71	.27	.20	.15
Any Gingivitis	.23	.65	.17	.18
Any LOA <sup>≅</sup> 4mm	.35	.83	.32	.02
Advanced LOA	.35	.47	.17	.02
1+ RTCs Involving Pulpal Pathology or a Retained Root*	.92	.74	.09	.12
A Dental Visit in the Past 12 Months	.63	.048	.03	_____a

\* Data shown are for dentate persons 18-74 years of age

<sup>a</sup> Interaction not evaluated

Source: NHANES III

**Percent Distribution of Persons 25 Years and Over and of Dentate Persons 18 Years and Over By Selected Demographic Characteristics: United States, 1988-1994**

Demographic Characteristics	Persons 25+ Years		Dentate Persons 18+ Years		Dentate Persons 18-74 Years	
	Race		Race		Race	
	Black	White	Black	White	Black	White
	Percent Distribution					
All Persons	100.0	100.0	100.0	100.0	100.0	100.0
<u>Gender</u>						
Men	44.1	47.7	44.9	48.1	45.0	48.7
Women	55.9	52.3	55.1	51.9	55.0	51.3
<u>Age</u>						
18-24 Years	_____a	_____a	20.1	14.6	20.5	15.6
25-34 Years	31.7	25.6	28.0	24.5	28.6	25.7
35-44 Years	28.5	24.6	24.6	23.1	25.3	24.2
45-54 Years	13.8	16.2	11.2	14.1	11.5	14.8
55-64 Years	12.0	13.7	8.2	10.6	8.4	11.1
65+ Years	14.0	20.0	7.9	12.9	5.8	8.7
<u>SES</u>						
Lower	35.3	17.0	33.9	15.3	33.2	14.8
Lower Middle	28.9	24.1	30.6	24.5	30.8	24.3
Upper Middle	19.7	25.1	19.7	25.8	20.0	26.1
Higher	16.2	33.8	15.8	34.5	15.9	34.8
<u>Recent Dental Visit</u>						
Yes	36.8	53.0	38.9	57.1	39.3	56.8
No	63.2	47.0	61.1	42.9	60.7	43.2

<sup>a</sup>Does not apply

<sup>b</sup>For dentate persons 18-74 years, category is limited to persons 65-74 years.

Source: NHANES III.