

# Socioeconomic Disparities in Adult Oral Health in the United States.

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

## Introduction

Socioeconomic status (SES) inequalities in health and health care utilization are receiving increasing attention in current U.S. policy initiatives. But SES inequalities in oral health and the utilization of dental services have been integrated only partially into these ongoing initiatives. To stimulate further discussion of inequalities in oral health/care in this policy context, the present study describes and evaluates SES disparities in adult oral health using information obtained through the 1988-1994 National Health and Nutrition Examination Survey (NHANES III).

## Objectives

The purpose of this study was fourfold:

- 1) to describe SES disparities in adult oral health and in the utilization of dental services;
- 2) to evaluate whether, and to what extent, SES disparities may be independent of the effects of age, gender, and racial-ethnic background;
- 3) to evaluate the lack of a recent dental visit as a source of SES differentials in unmet oral health needs; and
- 4) to evaluate potential two-way interactions between SES and age, gender, race-ethnicity, and a recent dental visit with regard to the aspects of oral health studied.

## Methods

**Source of Data:** 1988-1994 National Health and Nutrition Examination Survey (NHANES III)

## Study Populations:

10,500+ persons 35 years and over  
14,290+ dentate persons 18 years and over  
13,370+ dentate persons 18-74 years of age

## Measurement

SES was measured by a composite index (see Figure 1) based on individual educational attainment and family economic status (as indicated by the ratio of annual family income to the official poverty threshold). This index was grouped into four approximately equal categories describing persons with lower, lower middle, upper middle, and higher SES index scores.

SES disparities in the prevalence of each oral health characteristic studied were quantified by the ratio between the odds for persons in each of three lower SES score categories and the odds for persons with higher SES scores. Particular attention was given to the ratios between the odds for the lowest and highest SES categories. In most instances, this approach captures the largest SES disparity for a given indicator (see below under *RESULTS*).

## Data Analysis

- Weighted data.
- SUDAAN software (7.0)--Proc Descript and Proc Logistic.
- Reference cells: Persons with higher SES scores, females, white non-Hispanics, and a dental visit in the past 12 months.
- T-tests used in evaluating pairwise comparisons.
- Satterthwaite adjusted F-statistic used in evaluating two-way interactions.
- .01 level of significance used in evaluating statistical results.

## Results

### Descriptive

Table 1 shows descriptive statistics for six aspects of adult oral health reflective of unmet needs and for one aspect of access to oral health care – a visit to a dentist or dental hygienist in the past 12 months.

### Analytic

Each of the oral health indicators in Table 1 were analyzed further using logistic regression to estimate (1) the unadjusted effects of SES, (2) the effects of SES adjusted for age, gender, and racial-ethnic background, and (3) the effects of SES adjusted for a recent dental visit in addition to these latter three demographic variables. Figures 2-6 show the results of the two sets of adjusted analyses, respectively, in their top and bottom panels.

Figure 7 shows the results of a logistic analysis of the effect of SES on the likelihood of a recent dental visit. This analysis is also adjusted for age, gender, and racial-ethnic background.

### Two-Way Interactions

Potential two-way interactions between SES and age, gender, racial-ethnic background, and (when appropriate) a recent dental visit were evaluated in the context of the logistic analyses. Only one of these potential two-way interactions was found to be significant at the .01 level – that between SES and race-ethnicity with respect to edentulism among persons 35 years and over.

Table 2 highlights the consequences of ignoring this interaction by juxtaposing the SES-race-ethnicity-specific adjusted odds ratios with adjusted SES odds

ratios from a model which ignores the SES-race-ethnicity interaction.

Statistical evaluation (not shown) of the race-ethnicity-specific adjusted odds ratios for the SES categories revealed a marked SES gradient in edentulism among White non-Hispanics (p-values < 0.0001), but this was not the case among Mexican-Americans nor Black non-Hispanics.

The p-values for the pairwise comparisons of racial-ethnic categories with regard to the likelihood of edentulism within specific SES categories also highlight that racial-ethnic background is an important effect modifier of the relative frequency of edentulism within lower and lower middle SES categories, and to some extent also within the upper middle SES category.

#### □ Summary & Conclusions

SES gradients in aspects of adult oral health occur across a broad spectrum of indicators reflective of unmet needs and are largest for dentate status, dental decay, and extreme tooth conditions.

Logistic analyses which controlled for age, gender, and race-ethnicity showed that, compared to the reference population of persons with higher SES

scores, those with lower SES scores were at least 1.5-2.0 times more likely to have gingivitis and LOA  $\geq$  4 mm.

For other indicators among the dentate, the disparities were 34 times greater. Lower SES scorers were 6.1 times more likely to have untreated coronal decay; were 7.2 times more likely to have untreated root decay; and were 7.5 times more likely to have a restoration or tooth condition involving pulpal pathology or a retained root that might benefit from treatment.

On only two indicators (gingivitis and LOA  $\geq$  4 mm) a lower threshold was reached among persons with upper middle SES scores. For gingivitis, persons in the lower and lower-middle SES categories also were similar.

There also is an SES gradient in the recent use of dental services, but these latter SES differentials do not account for the SES disparities in adult oral health.

In one instance (edentulism among persons 35 years and over) the effects of SES are conditional on racial-ethnic background in the sense that there is a strong SES gradient in edentulism among White non-Hispanics but there are only minimal SES effects on

edentulism among Mexican-Americans and Black non-Hispanics.

Racial-ethnic background also is an important effect modifier of the relative frequency of edentulism among lower and lower middle SES categories, and partly as well among persons in the upper middle SES category.

Future analysis of NHANES III data and new research studies need to clarify linkages between SES and adult oral health, as well as the conditional effects of SES on adult oral health. Parallel analyses should be carried out for children and adolescents on key aspects of their unmet oral health needs and access to oral health care.

#### Acknowledgements

Richard Oldakowski – Systems Analysis  
Jayne Lura-Brown – Graphic Layout and Design  
Marco Maertens – 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>	Lower SES					Higher SES	
8 Years (2)	Lower SES					Higher SES	
9-11 Years (3)	Lower SES					Higher SES	
12 Years (4)	Lower Middle SES		Upper Middle SES			Higher SES	
13-15 Years (5)	Lower Middle SES		Upper Middle SES			Higher SES	
16 Years (6)	Lower Middle SES		Upper Middle SES			Higher SES	
≥ 17 Years (7)	Lower Middle SES		Upper Middle SES			Higher SES	

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