

Black/White Disparities in Dental Sealant Use: United States, 1988-1994.

(R.H. Selwitz*, T.F. Drury, (National Institute of Dental and Craniofacial Research, NIH, USA)

Introduction

Although there have been significant improvements in the oral health of Americans over the past few decades, all groups of persons have not benefited equally.

Among other groups, minority populations still bear a disproportionate burden of oral diseases and conditions.

Analyses of data for dental caries experience from the Third National Health and Nutrition Examination Survey (NHANES III) demonstrate that black children and youth with detectable tooth decay have higher percentages of teeth with untreated caries than do their white counterparts.

In addition, differences in patterns of dental sealant use by race have been reported in the scientific literature.

Objectives

The purpose of this study was three-fold:

- 1) To describe racial patterns in dental sealant use on permanent teeth,
- 2) To evaluate the effects of socioeconomic status (SES) and reported interval since last dental visit on those patterns, and
- 3) To explore the role of race as an effect modifier of socioeconomic disparities in the use of dental sealants.

Background and Methods

Analyses were conducted for a national sample of 6,704 dentate individuals 5-17 years examined during NHANES III (1988-1994), using a stratified,

multistage probability sample of the US civilian non-institutionalized population.

Dental examiners evaluated the presence of dental sealants on erupted, permanent posterior teeth (excluding third molars) and maxillary lateral incisors using standardized criteria for visual and tactile assessment during the dental caries examination.

SUDAAN software (Rel. 7.00) was used to conduct stratified and logistic regression analyses.

Sample weights were used to produce unbiased population estimates.

Analyses also were adjusted for subpopulation differences in age and gender.

For comparisons, an α value $\leq .01$ was used to control for the overall Type I error rate.

P-Values are based on the Satterthwaite adjusted F-statistic.

Findings

Descriptive Comparisons of Dental Sealant Use by Race (Table 1)

Dental sealant use on permanent teeth in black children and youth (BCY) was less than half of that observed for white children and youth (WCY) during 1988-1994 (9.0% vs. 23.6%, respectively).

Sealant use in BCY whose head of household (HH) had more than 12 years of education (9.3%) was less than one-third of that observed for their white counterparts whose HH had a comparable number of years of education (34.2%).

A similar disparity in sealant use between BCY and WCY was observed for youngsters of families in the highest economic status category (14.9% vs. 41.7%, respectively) or in the highest SES index category (11.4% vs. 38.8%, respectively).

Sealant use in BCY who had been to the dentist or dental hygienist within the past 12 months prior to examination (15.1%) was less than half of that observed for WCY who also had been to the dentist or dental hygienist during the past 12 months before the examination (32.2%).

Analytic Comparisons of Dental Sealant Use by Race

Models for Exploring Main Effects (Figure 1)

Unadjusted and adjusted logistic regression models for main effects were constructed to ascertain the likelihood of having any dental sealants according to racial background.

Overall, as compared to WCY, BCY were 3.1 times less likely to have one or more sealants, even after adjusting for differences in gender and age ($P < .0001$).

After adjusting for the effects of gender, age, and a measure of SES—HED, INC, or SESI—and RDV, BCY still were 2.1 times less likely to have any sealants ($P < .001$).

Models for Exploring Potential Interactions (Figure 2)

Logistic regression models, adjusted for differences in gender and age, were constructed to determine if the likelihood of having any sealants according to racial background was influenced by any two-way

interactions between race and either HED, INC, SESI, or RDV.

The analyses revealed the influence of an interaction between race and INC on the likelihood of having any sealants by racial background. Black/white differences in sealant use varied by family economic status ($P < .01$).

Specification of the Interaction of Race and Economic Status--Unadjusted (Figures 3)

As depicted in the graph on the left side of Figure 3, **unadjusted** comparisons of black/white differences in sealant use within INC categories indicate that significantly lower percentages of BCY from near poor, upper middle income, and higher income families had any sealants as compared with WCY (P -Values $\leq .01$); however, for poor and lower middle income families, there were no differences in sealant use between black and white youngsters (P -Values $\geq .02$).

The right side of Figure 3 summarizes the evaluation of **unadjusted** black/white comparisons in sealant use across INC categories. As shown, black/white differences in sealant use were observed for poor vs. higher income families and near poor vs. higher income families (P -Values $< .01$); however, black/white disparities in sealant use were not evident for comparisons across other INC categories (P -Values > 0.1).

Specification of the Interaction of Race and Economic Status--Adjusted (Figures 4)

Figure 4 summarizes the evaluation of black/white comparisons in sealant use by INC **adjusted** for differences in gender, age, and RDV. As depicted on the left side of the figure, BCY of families from each INC category were less likely to have had any sealants than were WCY from higher income families (odds ratios ranged from 3.0 – 7.5; P -Values $< .01$). Also, WCY from poor and near poor families were less likely to have had any dental sealants than were

WCY from higher income families (odds ratios = 2.9 and 3.0, respectively; P -Values $< .01$).

The right side of Figure 4 summarizes the evaluation of black/white comparisons in sealant use within INC categories **adjusted** for differences in gender, age, and RDV. As shown, black/white differences in sealant use were observed for near poor, upper middle income, and higher income families (P -Values $\leq .01$); however, black/white disparities in sealant use were not evident for poor and lower middle income families (P -Values $\geq .03$).

Conditioning Effect of Race on SES Disparities in Use of Dental Sealants

Figure 5 summarizes analyses conducted to explore the possible conditioning effect of race on SES disparities in the use of sealants in American youngsters. All analytic models were adjusted for differences in gender, age, and RDV. INC, HED, and SESI served as measures of SES.

Patterns of Dental Sealant Use by Indicator Categories

As shown in the bar graphs for INC, HED, and SESI, the pattern of sealant use by indicator category is less variable for BCY than that observed for WCY.

Likelihood of Dental Sealant Use According to INC by RACE

As shown in the line graph in Figure 5, section A (bottom panel; also Figure 4), BCY of families from all INC categories were less likely to have had any sealants than were WCY from higher income families (odds ratios ranged from 3.0 – 7.5; P -Values $< .01$). WCY from poor and near poor families were less likely to have had any sealants than were WCY from higher income families (odds ratios = 2.9 and 3.0, respectively; P -Values $< .01$). There were, however, no differences in the likelihood of having any sealants among WCY from families with lower middle and upper middle incomes as compared with

their counterparts from families with higher income (P -Values $\geq .04$).

Differences in Use of Dental Sealants by INC According to RACE

As shown in the table on the right side of Figure 5-A, no differences in sealant use among BCY were observed for any pair of categories of INC (P -Values $\geq .02$). Fewer WCY from poor families, however, had any sealants as compared with their counterparts from either upper middle income or higher income families (P -Values $< .01$); fewer WCY from near poor families had any sealants as compared with their white counterparts from either upper middle income or higher income families (P -Values $< .01$). For all other contrasts of INC categories among WCY there were no differences in the use of sealants (P -Values $\geq .02$).

Likelihood of Dental Sealant Use by HED According to RACE

As shown in the line graph in Figure 5, section B (bottom panel), BCY of families whose HH reported any of three categories of educational attainment were less likely to have had any sealants than were WCY of families whose HH reported more than 12 years of educational attainment (odds ratios ranged from 3.5 – 4.8; P -Values $< .0001$). WCY of families whose HH reported either fewer than 12 years or 12 years of educational attainment were less likely to have had any sealants than were WCY of families whose HH reported more than 12 years of educational attainment (odds ratios = 2.9 and 2.1, respectively; P -Values $< .001$).

Differences in Use of Dental Sealants by HED According to RACE

As shown in the table on the right side of Figure 5-B, no differences in sealant use among BCY were observed for any pair of categories of HED (P -Values $\geq .08$). Fewer WCY of families whose HH reported

either fewer than 12 years or 12 years of educational attainment had any sealants as compared with their counterparts who reported more than 12 years of educational attainment (P-Values = .0001). There was, however, no difference in the use of sealants for WCY whose HH reported less than 12 years of educational attainment vs. those from families with a HH who reported 12 years of educational attainment (P = .30).

Likelihood of Dental Sealant Use by SESI According to RACE

As shown in the line graph in Figure 5, section C (bottom panel), BCY from families of all SES categories were less likely to have had any sealants than were WCY from families in the higher SES category (odds ratios ranged from 3.9 – 5.3; P-Values < .0001). WCY from families in the lower SES or lower middle SES category were less likely to have had any sealants than were WCY from families in the higher SES category (odds ratios = 2.0 and 1.6, respectively; P-Values ≤ .01). There was, however, no difference in the likelihood of WCY from upper middle income families having any sealants as compared with WCY from families in the higher SES category (P = .02).

Differences in Use of Dental Sealants by SESI According to RACE

As shown in the table on the right side of Figure 5-C, no differences in sealant use among BCY were observed for any pair of SES categories (P-Values ≥ .28). Fewer WCY from families in the lower SES category had any sealants as compared with their counterparts from families either in the upper middle or higher SES categories (P-Values < .01 and .0001, respectively); fewer WCY from families in the lower middle SES category had any sealants as compared with their peers from families in the higher SES category (P ≤ .01). There were, however, no differences in the use of sealants for WCY from lower SES families vs. those from lower middle SES families; lower middle SES families vs. those from upper middle SES families; and upper middle SES

families vs. those from higher SES families (P-Values ≥ .02).

Discussion and Conclusion

Black/white disparities in the use of dental sealants on permanent teeth continue to be evident in the US population during 1988-1994 even after controlling for differences in gender and age.

Among persons aged 5-17 years, these racial disparities in sealant use were explained only partially by controlling for differences in measures of educational attainment of HH, economic status, SES and reported recentness of a visit to the dentist or dental hygienist.

Racial disparities in the use of sealants differed by economic status. For the near poor, upper middle income families, and higher income families, differences in use of dental sealants between black and white youngsters were evident; however, for poor and lower middle income families there likely were no differences in sealant use between black and white children and youth. The relation between sealant use and race was influenced by an interaction of race with economic status.

Disparities in use of sealants by an index of SES were evident even after controlling for differences in gender, age, race, and RDV. Children and youth from families in the lower SES index category were 3.3 times less likely to have had any sealants as were their counterparts in the higher SES index category.

Race has a conditioning effect on SES disparities in the use of sealants on permanent teeth in persons aged 5-17 years. Whether SES is measured using INC, HED, or SESI, sealant use in BCY shows little variation across SES categories in comparison with marked variation in sealant use across SES categories in WCY.

Overall, black youngsters were 3.1 times less likely to have any dental sealants as were their white counterparts, even after adjusting for differences in

gender and age. Sociodemographic characteristics only partially accounted for racial disparities in sealant use ($2.1 \leq OR \leq 2.7$). An interaction between race and economic status provides some understanding of racial disparities in the use of dental sealants. The lack of variability in sealant use by SES for black youngsters, as compared with the SES gradient in sealant use observed for their white counterparts, clarifies further the relationship among race, SES, and sealant use.

Additional studies are needed to understand better the underlying reasons for racial disparities in oral health and in the use of disease-preventive agents or procedures such as dental sealants.

This study was supported by NIDCR, NIH.

Variables Used in Analyses and their Definitions

| <i>Variable</i> | <i>Definition</i> |
|--------------------|--|
| RACE | Racial background of the person, either black or white. Reported by the respondent of the Family Questionnaire from five categories and recoded to create a three level variable (black, white, and all other racial backgrounds). "Other" category is not addressed in this presentation. |
| DENTAL SEALANT USE | Indicates that a person has one or more dental sealants present in the permanent dentition. |
| HED | Educational attainment (in years) of the head of household; organized into three categories: < 12 years, 12 years, and > 12 years. |
| INC | Economic status of the family (and of unrelated individuals) measured by the ratio of annual income to poverty threshold; organized into five categories: poor (<1.0), near-poor (1.0-1.9), lower middle income (2.0-2.9), upper middle income (3.0-3.9), and higher income (\geq 4.0). |
| SESI | Four-category composite index of socioeconomic status (lower SES, lower middle SES, upper middle SES and higher SES) based on years of educational attainment of head of household and ratio of annual family income to poverty threshold. |
| RDV | Report of whether or not the person had been to the dentist or dental hygienist within the past 12 months prior to the NHANES oral health assessment. |

Table 1. Percentage of Children and Youth 5-17 Years Having One or More Dental Sealants in the Permanent Dentition By Race According to Selected SES Characteristics and Report of Recentness of Visit to the Dentist/Dental Hygienist: United States, 1988-1994

| Characteristic | Persons 5-17 Years of Age | | | |
|---------------------|---------------------------|------|--------------------|------|
| | <i>Black</i> | | <i>White</i> | |
| | Percent of Persons | SE | Percent of Persons | SE |
| Overall | 9.0 | 0.88 | 23.6 | 2.29 |
| <u>HED</u> | | | | |
| < 12 Years | 7.2 | 1.01 | 12.3 | 2.77 |
| 12 Years | 10.4 | 1.57 | 17.5 | 2.02 |
| > 12 years | 9.3 | 1.67 | 34.2 | 3.36 |
| <u>INC</u> | | | | |
| Poor | 7.7 | 1.12 | 13.7 | 3.24 |
| Near Poor | 6.1 | 1.23 | 14.8 | 2.90 |
| Lower Middle Income | 14.4 | 3.43 | 25.0 | 3.64 |
| Upper Middle Income | 16.5 | 3.62 | 33.0 | 2.86 |
| Higher Income | 14.9 | 4.63 | 41.7 | 5.33 |
| <u>SESI</u> | | | | |
| Lower SES | 7.6 | 0.97 | 10.1 | 2.32 |
| Lower Middle SES | 9.8 | 1.79 | 20.4 | 2.99 |
| Upper Middle SES | 10.8 | 2.05 | 26.6 | 3.16 |
| Higher SES | 11.4 | 2.52 | 38.8 | 3.94 |
| <u>RDV</u> | | | | |
| No Recent Visit | 4.1 | 0.74 | 10.4 | 1.69 |
| Recent Visit | 15.1 | 1.63 | 32.2 | 2.95 |

Source: NHANES III.