

# A STATE OF DECAY

ARE OLDER AMERICANS COMING OF AGE  
WITHOUT ORAL HEALTHCARE?

SUPPLEMENTAL APPENDIX



**WISDOM  
TOOTH  
PROJECT**

A PROGRAM OF

**oha**  
ORAL HEALTH AMERICA

## Supplemental Appendix

### State Variables

**Rationale.** To develop an Overall State Score, it was necessary to combine the specific variables. Because the data provided no basis for weighting one variable more heavily than another, we determined that the most accurate composite score would be achieved by weighting each equally.

**Methodology.** Variables were converted to a common scale. The scores were derived by converting each variable to a standard normal variable, otherwise known as a z-score, derived from the mean and standard deviation of the original variable. The z-score of each variable was calculated by subtracting the mean and dividing the result by the standard deviation of the original variable. Each z-score has a mean of zero and standard deviation of 1, with higher values denoting better performance. Note that the variable for severe tooth loss was reversed (i.e. multiplied by -1). After this conversion, higher values on each variable denote better performance, and all five variables have been adjusted to be equally important.

To combine the indicators, the six z-scores were summed together to create a variable called z-sum. Then z-sum was turned into a percentage score from 0% to 100% according to its share of the range from the lowest to the highest score. Thus, the highest ranked state on that factor was given a score of 100%, the lowest 0%, and the other states intermediate values.

### National Analysis

All variables refer to an individual respondent aged 65 years and above in the pooled national Behavioral Risk Factor Surveillance System (BRFSS) data.

**Methods in multivariate regression.** Using data from the Behavioral Risk Factor Surveillance System (BRFSS) with 153,350 observations from 2015, we conducted a multivariate logistic regression on two dependent variables: no severe tooth loss (meaning that the person had not lost 6 or more natural teeth to disease or decay) or having visited a dentist within the past 12 months. Both were favorable outcomes – i.e., indicators better oral health care. We examined the following categorical independent variables: education, sex, annual household income, race, residence in a metropolitan area, marital status, and age category. We excluded observations with missing data, which were relatively rare. We included, however, responses of “don’t know” or “refuse.” We used the BRFSS weights.

For each independent variable, we set the response category with the most responses as the reference category. This procedure gives relatively stable results. Under this analysis, a positive coefficient indicates that that category is associated with better oral health than the reference category. For example, the positive coefficient of 0.69 indicates that that variable has double the chance of a favorable outcome compared to the reference category. A positive coefficient of 1.1 indicates that the chance is tripled.

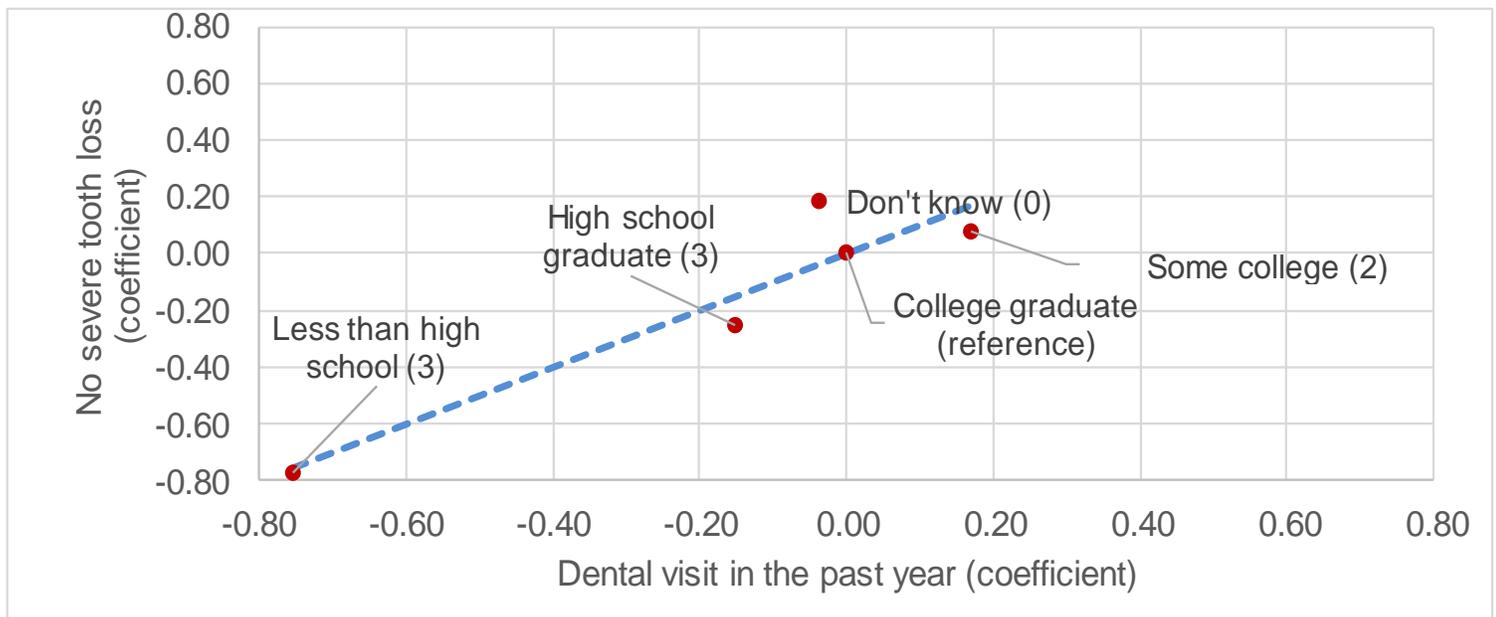
Conversely, a negative coefficient indicates that that category is associated with worse oral health than the reference category. For example, the negative coefficient of -0.69 indicates that that variable has half the chance of a favorable outcome compared to the reference category. A negative coefficient of -1.1 indicates that the chance is one third compared to the reference category.

As the two dependent variables were both measures of favorable oral health care, we examined the consistency between them. We did this by creating a scatter plot for each set of coefficients. The x-axis is the effect of a variable on the likelihood of seeing a dentist in the past year relative to the reference category and controlling for other factors. The y-axis is the effect of a category on the likelihood of seeing a dentist in the past year, again relative to the reference category and controlling for other factors. Insofar as the level of the two variables act in similar way, the logistic coefficients will be similar. The pattern of coefficients overall will approximate a 45-degree line.

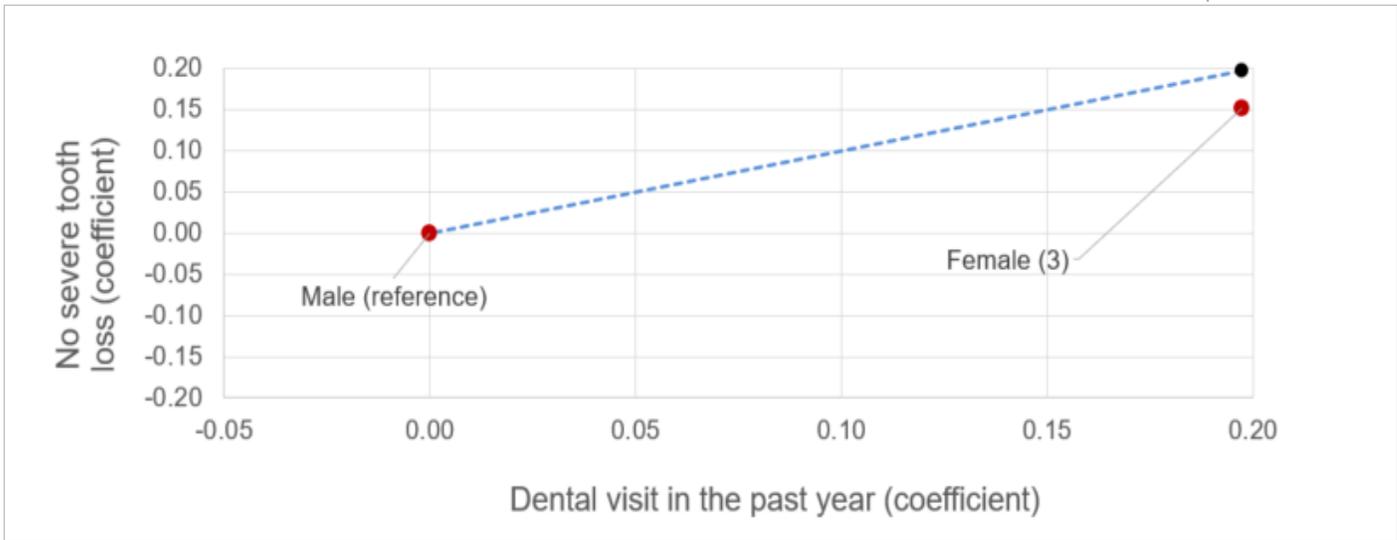
For a variable overall, a set of coefficients that are large in magnitude (whether positive or negative) such as +1.1 or -1.1 indicates that the variable has substantial explanatory power. Small coefficients (such as 0.2 or -0.2) mean that variable has relatively little explanatory power.

We assigned a numerical score to each level of an independent variable as follows:

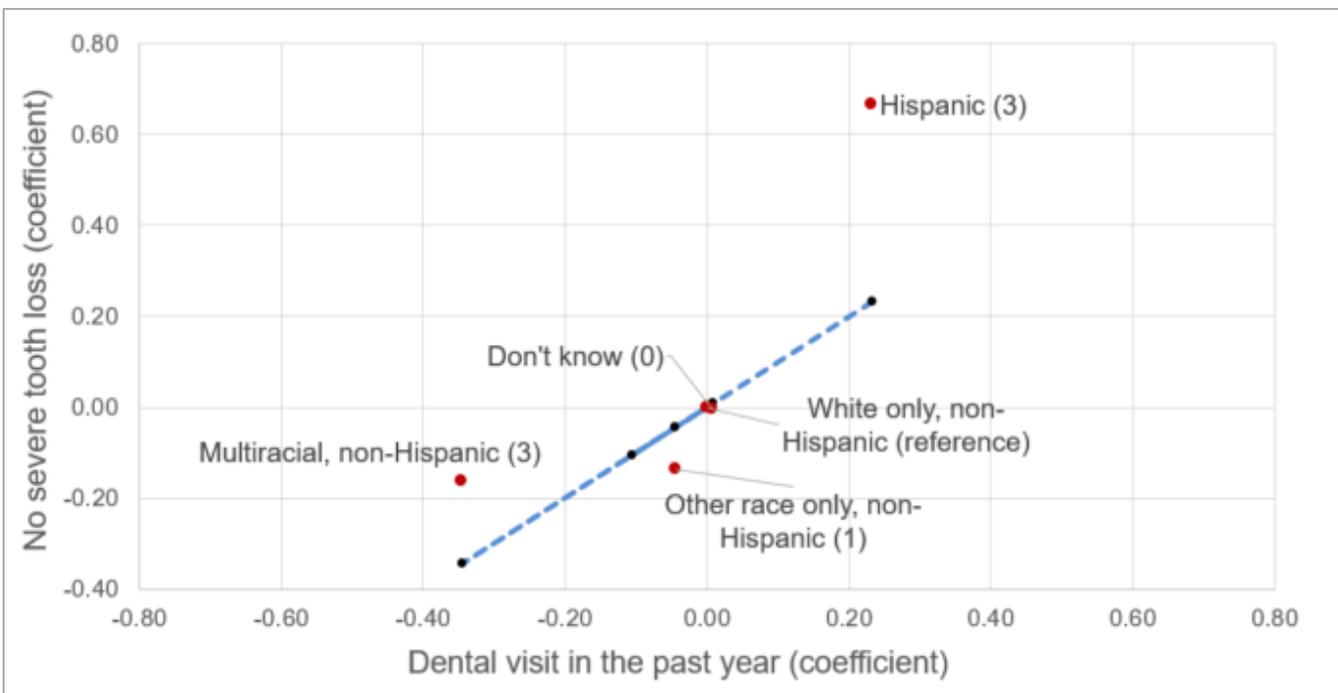
- 0 That level was not statistically significant on either variable
- 1 That variable was statistically significant on one dependent variable
- 2 That variable was statistically significant on both dependent variables.



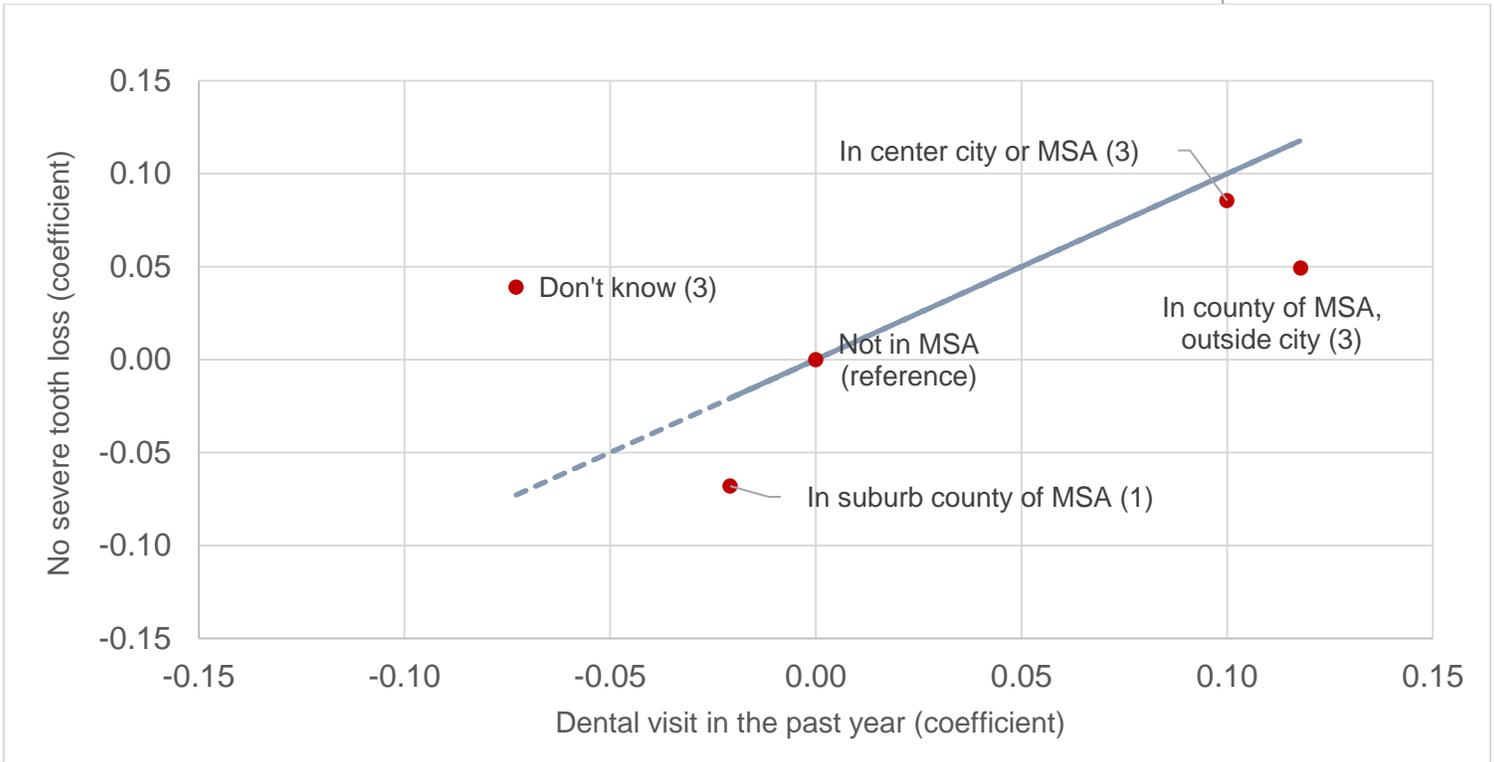
**Educational Status: Net impact on probability of visiting dentist and no severe tooth loss.**



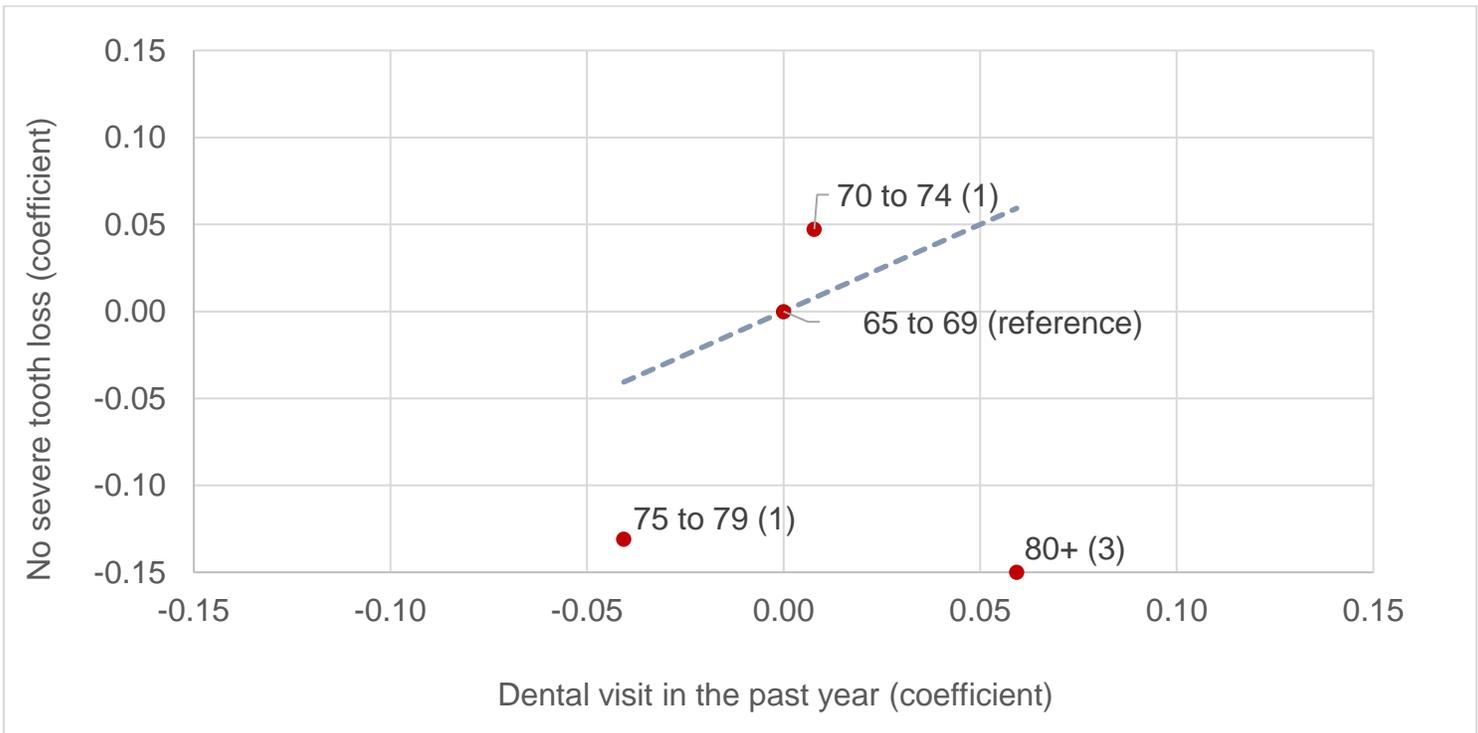
Gender: Net impact on probability of visiting a dentist and no severe tooth loss.



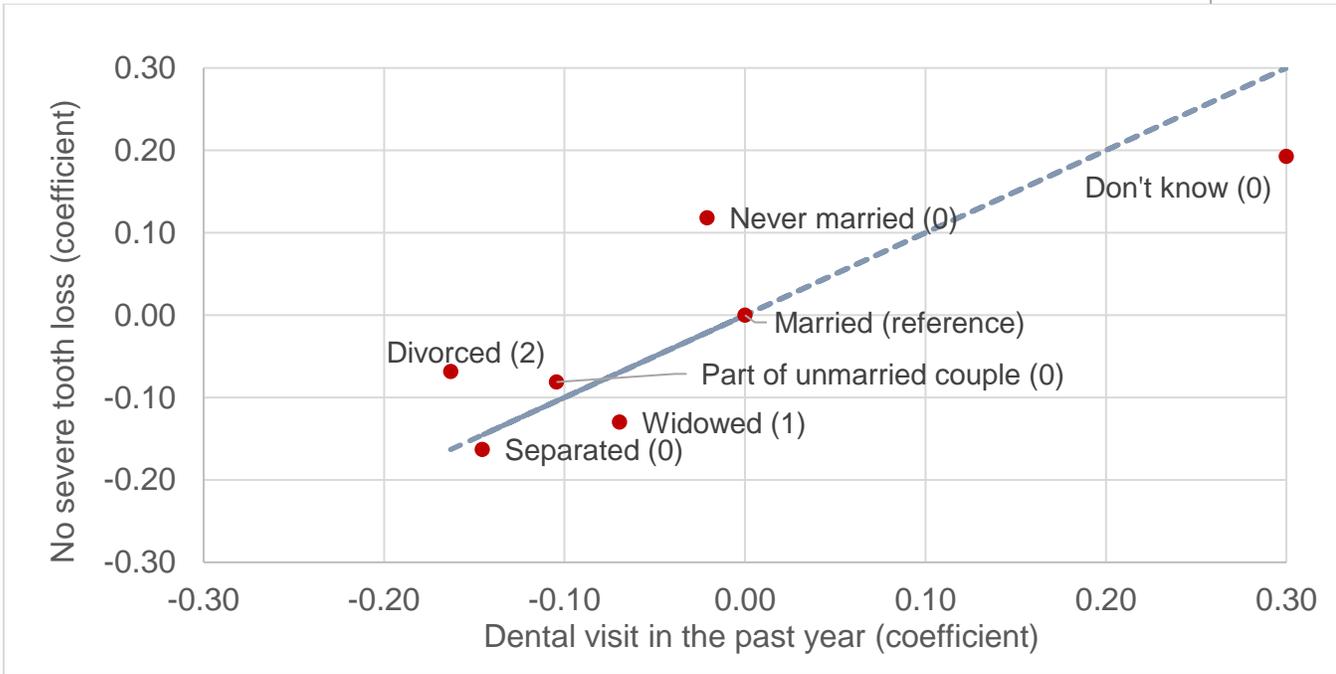
Race: Net impact on probability of visiting a dentist and no severe tooth loss.



**Metropolitan Residence (in or near metropolitan area): Net impact on probability of visiting a dentist and no severe tooth loss.**



**Age Category: Net impact on probability of visiting a dentist and no severe tooth loss.**



**Marital Status: Net impact on visiting a dentist and no severe tooth loss.**