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## 1985 NHIS Findings on Public Knowledge and Attitudes About Oral Diseases and Preventive Measures

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## Synopsis.....

*Two objectives for the nation for 1990 set goals related to the need for schoolchildren and adults to understand the causes of oral diseases and methods of prevention. Five questions related to these objectives were included in the 1985 National Health Interview Survey.*

*Survey responses of adults ages 18 years and older indicated that while the public is generally aware of the importance of a number of factors in the prevention of tooth decay, only 18 percent had both heard of, and knew the purpose of, dental sealants. At the same time, the public fails to discriminate between effective disease preventive factors related to periodontal diseases as opposed to those related to dental decay. Knowledge of oral disease prevention modalities generally varies across educational, income, age, and racial categories. However, there appears to be little variation in knowledge by gender.*

*Additional information from upcoming surveys may shed more light on the relationships between knowledge of oral diseases and their prevention and personal preventive practices.*

**T**O DATE, NATIONWIDE INFORMATION on the knowledge and attitudes about oral diseases and their prevention on the part of the general public has been extremely limited. Findings from two studies conducted by the National Opinion Research Center in 1959 and 1965 suggested that

more than half of the respondents brushed their teeth to protect them from dental decay and about one-third brushed in order to feel good or to have fresh breath (1,2). Dental decay prevention was still the predominant reason identified by respondents for brushing in a 1966 survey of family

*'Respondents were asked about their knowledge and attitudes regarding the causes and means of preventing the two major oral diseases, dental caries and periodontal disease.'*

**Dental questions and response choices from the Health Promotion and Disease Prevention Questionnaire of the 1985 National Health Interview Survey**

1. This next question is about preventing tooth decay. After I read each of the following, tell me if you think it is definitely important, probably important, probably not, or definitely not important in preventing tooth decay.

- a. Seeing a dentist regularly?
- b. Drinking water with fluoride from early childhood?
- c. Regular brushing and flossing of teeth?
- d. Using fluoride toothpaste or fluoride mouth-rinse?
- e. Avoiding in-between-meal sweets?

2. Now I'm going to ask about preventing gum disease. In your opinion, how important or not important is each of the following in preventing gum disease?

- a. Seeing a dentist regularly?
- b. Drinking water with fluoride from early childhood?
- c. Regular brushing and flossing of teeth?
- d. Using fluoride toothpaste or fluoride mouthrinse?
- e. Avoiding in-between-meal sweets?

Response choices to questions 1 (a-e) and 2 (a-e): definitely important, probably important, probably not important, definitely not important, or don't know or no opinion.

3. In your opinion, which of the following is the main cause of tooth loss in children?

- a. Tooth decay.
- b. Gum disease.
- c. Injury to the teeth.

4. In your opinion, which of the following is the main cause of tooth loss in adults?

Response choices to question 4 are the same as for question 3.

5. a. Have you ever heard of dental sealants? Yes, no.

b. (If yes), which of the following best describes the purpose of dental sealants? To prevent gum disease? To prevent decay? To hold dentures?

toothbrushing practices (3). However, one-third of the respondents also mentioned the health of their gums as a reason. In the previous two studies, less than 5 percent of respondents had mentioned the gums as a reason for brushing. More recent surveys have shown little change in these self-reported rationales for brushing (4).

In 1977, almost half of a national sample of adults correctly identified the purpose of water fluoridation (5). A 1983 study of dental researchers, dental practitioners, and the public showed that the public ranked oral hygiene measures (mechanical brushing and flossing) ahead of the specific uses of fluoride for the prevention of dental decay (6). A useful summary of the literature (including national and local studies) on public knowledge and attitudes towards oral hygiene has been supplied by Frazier: "The data point to the inescapable conclusions that the American public (a) is ill-informed about the value of fluorides for preventing caries even though the public benefits from their use, (b) is confused about the relative values of different forms of delivering fluoride, (c) firmly believes that brushing, flossing, diet, and dental visits are more important for preventing caries than fluoride in any form, and (d) is ill-informed about periodontal disease." (7).

Two of the fluoridation and dental health objectives for the nation for 1990 (8) address the need for schoolchildren and adults to be knowledgeable about risk factors for oral diseases and methods of prevention. Five questions related to these objectives were asked in a Health Promotion and Disease Prevention Questionnaire, part of the 1985 National Health Interview Survey (NHIS). The purpose of obtaining the information was to assess progress toward achieving the following 1990 objectives:

By 1990, at least 95 percent of school children and their parents should be able to identify the principal risk factors related to dental diseases and be aware of the importance of fluoridation and other measures in controlling these diseases. (Baseline data unavailable.)

By 1990, at least 75 percent of adults should be aware of the necessity for both thorough personal oral hygiene and regular professional care in the prevention and control of periodontal disease. (In 1972, only 52 percent knew of the need for personal oral hygiene and only 28 percent were aware of the need for dental checkups.)

The National Health Interview Survey is a yearly, cross-sectional study of adult respondents from randomly selected households. In 1985, one

adult (18 years or older) per family was selected to respond to a special Health Promotion and Disease Prevention Questionnaire. Approximately 33,600 questionnaires were completed. A more complete description of the survey methodology is available in a separate report (9). Respondents were asked about their knowledge and attitudes regarding the causes and means of preventing the two major oral diseases, dental caries and periodontal disease (see box). They were asked to categorize the importance of several activities, including those personally performed, professionally provided, or made available at the community level for the prevention of dental decay (caries) and gum disease (periodontal disease).

These questions were developed through a collaborative effort between the National Center for Health Statistics and other Public Health Service agencies. The questions had originally been designed to permit respondents to discriminate among alternative choices in questions 1 and 2 and to rank their responses according to their perceived priority in importance for preventing tooth decay and gum disease. However, changes made to maintain consistency of question design throughout this component of the survey did not permit such an approach. Instead, participants were asked to respond to each of the alternative choices of the first two questions as if each choice were a separate and distinct question. This affected the responses elicited and their subsequent analysis and interpretation.

There were five response choices for each of the practices listed in questions 1 and 2: "definitely important"; "probably important"; "probably not important"; "definitely not important"; and "don't know." For purposes of this article, emphasis will be placed on those respondents who reported a practice as "definitely important," the authors deeming this strength of belief to be critical in individual adoption of preventive practices. Other reports have not only listed the responses by each category, but have also combined the "definitely important" and "probably important" choices into an "important" category (10), an approach that may overestimate the strength of public belief in the importance of a measure.

For each of the dental health questions, data were analyzed according to the age, gender, race, income, and education of the respondent groups as well as for the survey population as a whole. Data were weighted so that reported response rates represent the U.S. adult population. If the effects

Table 1. Perceptions of importance of selected measures in preventing oral diseases

Response	Prevention measure (percent)		
	Fluoridated water	Fluoride toothpaste or rinse	Brushing and flossing
To prevent tooth decay <sup>1</sup> ...	100	101	100
Definitely important.....	45	61	88
Probably important.....	33	28	8
Probably not important, definitely not important, or don't know.....	22	12	4
To prevent gum disease <sup>1</sup> ..	100	99	100
Definitely important.....	34	47	83
Probably important.....	31	29	12
Probably not important, definitely not important, or don't know.....	35	23	5

<sup>1</sup>Totals may not add to 100 percent due to rounding.  
SOURCE: 1985 National Health Interview Survey.

of sociodemographic variables were minimal, only the findings for all persons are presented. Alternatively, if differences are cited between subgroups with varying characteristics, they attain both statistical ( $P < .01$ ) and social significance, in terms of critical health knowledge, unless otherwise noted. It must be emphasized that this report is preliminary and that additional analyses are needed.

## Selected Findings

Preliminary findings presented at this stage of analysis include public knowledge of, and attitudes about, the prevention of tooth decay and periodontal disease; the roles of self-care and professional care; the reasons for tooth loss in children and adults; and the existence and purpose of dental sealants.

### Prevention of tooth decay and periodontal disease.

The responses of the public with regard to the importance of key measures for the prevention of tooth decay and gum disease are presented in table 1. Dental experts regard drinking fluoridated water and using a toothpaste or mouthrinse containing fluoride as the key measures in preventing tooth decay. They regard regular brushing and flossing of teeth as the key measures in preventing gum disease. Eighty-eight percent of respondents reported brushing and flossing to be "definitely important" in preventing tooth decay—twice as many as those who cited drinking fluoridated water (45 percent) as "definitely important." In addition, 61 percent of individuals responded that

Table 2. Perceptions of importance of self-care and professional care in preventing dental diseases

Response	To prevent (percent)—	
	Tooth decay	Gum disease
<b>Self Care</b>		
Using fluoride toothpaste or mouthrinse <sup>1</sup> ..	101	99
Definitely important .....	61	47
Probably important .....	28	29
Probably not important, definitely not important, or don't know .....	12	23
Regular brushing and flossing .....	100	100
Definitely important .....	88	83
Probably important .....	8	12
Probably not important, definitely not important, or don't know .....	4	5
Avoiding between-meal sweets .....	100	100
Definitely important .....	59	50
Probably important .....	29	30
Probably not important, definitely not important, or don't know .....	12	20
<b>Professional care</b>		
Seeing dentist regularly .....	100	100
Definitely important .....	82	82
Probably important .....	13	12
Probably not important, definitely not important, or don't know .....	5	6

<sup>1</sup>Totals may not add to 100 percent due to rounding.  
SOURCE: 1985 National Health Interview Survey.

using a fluoride toothpaste or rinse was “definitely important” in preventing tooth decay. This rate is still substantially lower than the 88 percent who cited the definite importance of brushing and flossing.

Brushing and flossing were appropriately identified as “definitely important” for preventing gum disease by 83 percent of the respondents. This was significantly greater than the percent of the public who reported that drinking fluoridated water (34 percent) or using fluoride toothpaste or rinse (47 percent) was “definitely important” in preventing gum disease.

The pattern of these responses was generally similar when controlling for gender, education, and income. However, some differences were noted among older age groups, especially with regard to the role of fluorides in preventing dental decay. Positive beliefs regarding the importance of drinking fluoridated water from early childhood and using toothpaste or rinse containing fluoride were inversely related to increasing age of the respondent. For example, a total of 45 percent of all persons interviewed knew that drinking fluoridated water was definitely important in preventing decay, whereas only 32 percent of the group age 65 years and older thought so. Thirty-eight percent

of this older age group either thought that fluoridated water was not important (“definitely not” or “probably not”), responded that they did not know whether it was important, or had no opinion. Similarly, only 43 percent of those 65 years of age and older felt that using a fluoride toothpaste or rinse was “definitely important” in preventing decay, compared with 72 percent of 18–29-year-olds and an overall rate of 61 percent across all age groups.

**Self-care and professional care.** Table 2 categorizes survey responses according to whether the measures are considered self-care or professional care. The highest response rate of “definitely important” (88 percent) was for the self-care role of regular brushing and flossing for the prevention of tooth decay. Only slightly fewer persons (83 percent) knew that regular brushing and flossing were “definitely important” for the prevention of gum disease. Similarly, 82 percent of the public responded that seeing a dentist regularly was “definitely important” for both the prevention of tooth decay and for the prevention of gum disease. Avoiding between-meal sweets was seen as “definitely important” to prevent decay by 59 percent of the respondents, and 50 percent of the respondents thought that it was “definitely important” for preventing gum disease.

**Tooth loss in children and in adults.** A majority of respondents (57 percent) knew that childhood tooth loss is primarily due to tooth decay, and 29 percent said that injury to the teeth is the main cause. More than half (53 percent) cited gum disease as the main cause of adult tooth loss, while tooth decay was cited as the main cause by 40 percent. The percentage distribution follows:

Response	Main cause of tooth loss in—	
	Children	Adults
Tooth decay.....	57	40
Gum disease.....	9	53
Injury to teeth.....	29	3
Don't know.....	5	4

With regard to the main cause of tooth loss in children, there were no significant differences in opinion by age or gender of the respondents. However, differences were noted among respondents who varied both in income and education. Differences were also noted between blacks and whites, even when matched in education and income. Forty-nine percent of respondents with high income and education (\$35,000 or greater

income and college graduate or beyond) thought tooth decay was the major cause of childhood tooth loss. Another 42 percent of individuals in these same high-income, high-education categories attributed tooth loss to injury. In contrast, only 19 percent of non-high school graduates with incomes below \$10,000 attributed tooth loss in children to injury, while three times as many (59 percent) attributed it to decay.

Blacks were somewhat more likely than whites to attribute tooth loss to decay (61 percent versus 57 percent). Also, they were more likely to attribute childhood tooth loss to gum disease (13 percent versus 8 percent) and much less likely to attribute it to injury (19 percent versus 30 percent). These racial differences in injury and gum disease responses were not significant among those of lower income. For those of higher education, response differences based on race (blacks compared with whites) were significant for tooth decay and injury responses, but not for gum disease.

With regard to tooth loss in adults, there were no significant differences in responses when analyzed by age, sex, or race. However, there were substantial differences in beliefs between those respondents with differing incomes or education. Persons with household incomes greater than \$35,000 were approximately twice as likely to attribute the main cause of adult tooth loss to gum disease (63 percent) as compared with tooth decay (34 percent). Persons with household incomes less than \$10,000 were about evenly divided on this question, 44 percent attributing tooth loss to gum disease and 43 percent attributing the cause to tooth decay. These differences were similarly noted in individuals of high and low educational attainment. Fifty-nine percent of college graduates attributed adult tooth loss to gum disease as opposed to decay (36 percent), while 65 percent of those with even more education mentioned gum disease, as opposed to 31 percent for decay. Those who were not high school graduates were almost evenly divided, 43 percent attributing adult tooth loss to gum disease and 44 percent to tooth decay.

**Dental sealants.** Only 22 percent of all respondents in this survey had ever heard of dental sealants, and there was no difference in response rates between men and women. However, some differences were noted according to age, education, income, and race. Thirty percent of 30-44-year-olds had heard of sealants, but only 18 percent of 18-29-year-olds, 22 percent of 45-64-year-olds, and 13 percent of those ages 65 and older had heard of

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them. These differences generally were maintained after controlling for education or income. Blacks were less likely than whites (14 percent compared with 23 percent) to have heard of sealants. This general relation held within similar education and income groups.

Of the 22 percent of all persons who had heard of sealants, a large majority—80 percent—were aware that their purpose was “to prevent tooth decay.” Among the 18-29-year-olds, however, 18 percent thought that sealants were used “to hold dentures in place.” Of all age groups, this one had the highest proportion of persons who misunderstood the purpose of sealants. The percent distribution follows:

Purpose of dental sealants	Age		
	All persons	18-29 years	30-44 years
Prevent tooth decay .....	80	74	85
Hold dentures in place .....	12	18	9
Prevent gum disease .....	4	5	3
Don't know or refused .....	4	3	3

Persons who were not high school graduates were less likely than those with more education to know that the purpose of sealants is to prevent decay and twice as likely as college graduates to believe that the purpose is to hold dentures in place. Blacks were less likely to know the purpose of sealants (54 percent) and were more likely to believe they are used to hold dentures in place (33 percent), whereas 82 percent of whites knew the correct purpose, and 10 percent thought they were to hold dentures in place. The differences in responses between blacks and whites were maintained even within similar education and income groups.

## Discussion

These preliminary findings demonstrate clear differences between public perceptions concerning the prevention of oral diseases and the current state of scientific knowledge. They also raise questions about the way health education messages have been presented to and received by the general public. People do not appear to distinguish between preventive measures according to the dental diseases those measures were designed to prevent. For example, research evidence has clearly established the critical role of fluorides in the prevention of tooth decay. However, no substantive evidence exists concerning the role of various fluoride modalities in the prevention of gum disease. Furthermore, neither the educational messages of the dental profession nor the dental product manufacturers have specified an obvious role for fluorides in the prevention of gum disease. In spite of this, the survey findings indicate that the public underestimates the value of fluorides in the prevention of tooth decay and inappropriately values their use in the prevention of gum disease. It may well be that the reinforcement of the message to "brush with fluoride dentifrices" has muddled distinctions in the minds of the public concerning the different processes involved in tooth decay and gum disease.

Also, avoiding between-meal sweets has been consistently promoted by the dental profession as an aid in preventing tooth decay. Although 88 percent of respondents agreed that this was either "definitely" or "probably important," 80 percent also responded that avoiding sweets was important in the prevention of gum disease—again, an idea not supported by research or promoted in dental health education.

The most effective method currently available for the prevention of gum disease is regular and meticulous oral hygiene (brushing and flossing) to remove bacterial plaque that can initiate or exacerbate gum diseases. Although the proportion of persons appropriately recognizing the importance of brushing and flossing for the prevention of gum disease was very high, it was still not as high as the percent of individuals who responded that this behavior was "definitely important" for the prevention of tooth decay. Strong positive beliefs about the value of brushing and flossing may lead the public to develop good oral health habits irrespective of their understanding of the scientific rationale for their practices.

These survey results would seem to indicate a

widespread lack of appreciation of the role of fluorides for preventing tooth decay. More than 100 million people in the United States do not currently have access to fluoridated drinking water (11). For these people, the regular use of supplemental fluorides (for example, toothpaste and mouthrinse that contain fluoride and fluoride tablets or drops for children under age 16) is the most significant action that they can take to prevent decay. It is unfortunate that so many people do not perceive that drinking fluoridated water or using fluoride toothpastes or mouthrinses are "definitely important."

Drinking water has been fluoridated in this country for more than four decades, and it has contributed significantly to a reduction in dental decay. Currently, about 63 percent of those served by public water supplies receive the benefits of fluoridated drinking water (11). Given this history and the promotion of fluoride through advertisements for fluoride dentifrices, it is disappointing that only 45 percent of respondents thought that fluoridated drinking water is "definitely important" in preventing dental decay.

Indeed, fluoridation of water supplies is often hotly debated at the community level. When given the opportunity to decide whether to fluoridate, the results of public votes frequently fail to support fluoridation. The relatively scant knowledge among older adults about the importance of drinking fluoridated water seems to be consistent with their voting patterns on the fluoridation issue. This becomes significant when the elderly constitute an appreciable portion of the voting population. Thus, it remains a challenge to health professionals and designers of dental public health programs to develop meaningful and effective health education messages addressed to all people, old and young alike, about the role of fluoridated water in the prevention of dental decay.

Traditional thinking in the dental profession has viewed adult tooth loss as principally caused by gum disease. Recent analyses have questioned this dogma to a certain degree, although final consensus has not been achieved (12). It would seem that the public sees tooth decay as mainly a childhood problem and periodontal disease as mainly an adult problem. This is consistent with health education messages provided to the public over the past several decades.

Tooth loss in children due to dental decay has been so prevalent in the past that it might have been predicted that almost everyone would have reported tooth decay to be the main cause of

childhood tooth loss. However, the number of missing permanent teeth in children has declined dramatically since the mid-1960s (12). It should also be kept in mind that tooth loss is not entirely based on disease and trauma experience, but is also affected by individual access to dental care and treatment decisions. Dental decay may still be the main cause of tooth loss in children in the United States, but tooth loss can be prevented by available prevention and treatment methods. In fact, children receiving regular dental care are unlikely to lose a tooth to disease. The 29 percent of all persons who believe that injury is the main cause of tooth loss in children may, therefore, reflect a growing number of families in which tooth decay in children has been prevented or treated early enough to avoid the need for extraction. This explanation is supported by the finding that 42 percent of college-educated respondents with incomes greater than \$35,000—the group most likely to receive regular dental care—cited injury as the main cause of tooth loss in children. Because gum disease is a rare cause of tooth loss in children, it may be surprising to note that a number of people (9 percent) considered gum disease to be a major cause of tooth loss in children. This may reflect a perception of adult risk to this consequence of gum disease being inappropriately projected onto children.

Although dental sealants have been commercially available for more than a decade, they have not gained widespread use despite their safety and effectiveness in sealing pits and fissures of teeth from decay-producing bacteria. The findings of this survey indicate that the majority of the public (78 percent) has not heard of sealants. Further, only 18 percent of the public has both heard of, and knows the purpose of, dental sealants.

Although people of all ages may benefit, sealants are considered to be most cost-effective when provided to children ages 7–15 (13). Because children depend on their parents for seeking health services, the knowledge of adults under age 45 is of great interest. It is interesting that 30–44-year-olds comprise the age group with the highest recognition of sealants (30 percent), as well as an accurate understanding of their purpose (85 percent). However, about one-fourth of this age group and only 13 percent of 18–29-year-olds had both heard of sealants and understood their purpose correctly. Further discussion of the significance of these findings must await correlation of this component with data on parenthood and family structure from the core portion of NHIS.

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**Methodological problems.** Some difficulty in interpreting these findings may be due to the lack of a clear distinction among some of the behaviors studied. Clearly, some oral hygiene practices compound a number of specific actions or agents (for example, brushing with a fluoride toothpaste and flossing). Because people were not asked to report the relative importance of different behaviors, it is difficult to determine whether people knew which of two behaviors—or which aspect of a single compounded practice—was very effective, while another was only marginally so.

For example, although seeing a dentist regularly is critical in intercepting new decay and restoring teeth before much damage has been done, dental examination and cleaning alone do not prevent dental decay. However, because some persons may associate going to the dentist with certain preventive services, such as topical fluoride applications, it is not unreasonable for them to believe that going to the dentist is important for preventing decay. Similarly, brushing and flossing teeth, although critical to preventing periodontal diseases, has not been demonstrated to prevent tooth decay unless a fluoridated toothpaste is used. However, because people may be likely to associate fluoridated toothpaste with toothbrushing, it is understandable why they might rate toothbrushing as being "definitely important" for the prevention of tooth decay.

Finally, the question concerning drinking water with fluoride from early childhood may have confused some people. Although all age groups benefit from fluoridated water, fluoride is most useful in preventing decay if consumed continuously from early childhood. However, those individuals who were not personally able to benefit from fluoridated water in childhood may have accorded it a lesser endorsement.



## Future Directions

The results of the oral health questions from the 1985 National Health Interview Survey indicate a range from high to low knowledge among adult Americans about the principal factors contributing to oral diseases and their prevention. Additionally, certain groups have significantly less knowledge than others. This suboptimal and inconsistent pattern of knowledge about oral diseases and their prevention can be expected to limit effective disease prevention efforts on both an individual and a community level.

To make substantial gains in oral health that will affect all groups of Americans, a number of activities need to be undertaken.

- Further analyses of data from the 1985 National Health Interview Survey are necessary, both within the dental component of the survey and between the dental and other components. These analyses should clarify patterns of response and identify risk groups and cross-cutting issues that may be associated with limited knowledge of disease prevention.
- Research should be undertaken to determine the impact of a wide variety of factors on subjective knowledge of oral disease preventive measures; for example, do regular users of dental care services have greater or more accurate knowledge of oral diseases and the means for their prevention than nonusers?
- Narrower targeting and reinforcements of educational messages are needed for specific groups, for example, groups identified as unlikely to have adequate or appropriate knowledge of oral disease prevention. This is particularly true regarding the use of fluorides and sealants.
- Information geared to the public about preventing oral diseases and promoting oral health should clearly distinguish between the relative merits of various prevention measures in relation to specific oral diseases or conditions.
- Public knowledge and attitudes about the causes and prevention of oral diseases and conditions should be assessed periodically.

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