

# What Maryland Adults With Young Children Know and Do About Preventing Dental Caries

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Having an understanding of disease symptoms and preventive measures is essential to acting appropriately to prevent disease. Information has been available for decades on how to prevent dental caries through appropriately using fluorides and pit and fissure sealants and reducing the frequency of consumption of refined carbohydrates.<sup>1,2</sup> Yet poor oral health in US children prevails, causing children needless pain and suffering and affecting their ability to speak, eat, and learn; in some cases, untreated dental disease can even result in death.<sup>3</sup>

Between the period 1988 through 1999 and 1999 through 2004, the National Health and Nutrition Examination Survey demonstrated a rise in dental caries among 2- to 5-year-old children for the first time in 40 years.<sup>4</sup> It is estimated that 28% of children in this age group have dental caries. The survey also revealed the significant prevalence of dental decay among children enrolled in Medicaid, showing that 1 in 3 had untreated tooth decay and that 1 in 9 had untreated decay in 3 or more teeth.

Nationally, low-income populations and communities of color disproportionately experience worse health outcomes than their counterparts across a broad spectrum of diseases and conditions, including dental disease.<sup>4</sup> Furthermore, according to the US Government Accountability Office, the extent to which children in these groups experience dental disease has not decreased.<sup>5</sup> Maryland data from 2005–2006 show that 31% of children in kindergarten and 3rd grade in the state had untreated decay in their primary teeth.<sup>6</sup> In 2006, only 29% of children in Maryland's Medicaid program (7.9% of children aged 0–3 years and 37.2% of those aged 4–5 years) had at least one dental visit.<sup>7</sup> These national and state findings are extremely disturbing in light of science-based knowledge on preventing this disease. One factor that may contribute to this situation is limited health literacy.

**Objectives.** We sought to determine Maryland adults' knowledge, understanding, opinions, and practices with respect to prevention and early detection of dental caries.

**Methods.** We conducted a statewide random-digit-dialing, computer-assisted telephone survey in 2010 among 770 adults who had a child aged 6 years or younger living in their home. A traditional random-digit sample and a targeted low-income sample were included. Analyses included frequencies, percentages, the  $\chi^2$  test, and multivariate logistic regression.

**Results.** Respondents' overall level of knowledge about preventing dental caries was low. Those with higher levels of education were more likely to have correct information regarding prevention and early detection of dental caries. Nearly all respondents (97.9%) reported that they were aware of fluoride, but only 57.8% knew its purpose. More than one third (35.1%) of the respondents were not aware of dental sealants. Those with lower levels of education were significantly less likely to drink tap water, as were their children, and significantly less likely to have had a dental appointment in the preceding past 12 months.

**Conclusions.** Our results demonstrate the need to increase oral health literacy regarding caries prevention and early detection. (*Am J Public Health.* 2013;103:e69–e76. doi:10.2105/AJPH.2012.301038)

Health literacy is defined as “the degree to which individuals have the capacity to obtain, process, and understand basic health information and services needed to make appropriate health decisions.”<sup>8(p32)</sup> Numerous studies have shown that limited health literacy contributes to decreased use of preventive health practices and increased use of emergency services.<sup>8</sup> Millions of US adults have difficulty performing basic health-related tasks such as determining when and how to take their medication or determining whether they are eligible for Medicaid. Studies focusing on oral health have shown that low health literacy affects frequency of dental visits, severity of dental caries, and oral health knowledge.<sup>9–12</sup>

We are fortunate to have evidence on the pathogenesis and prevention of dental caries and knowledge regarding how to reverse the earliest symptoms of this disease. Research has clearly indicated that clinically detected noncavitated lesions (frequently referred to as “white spot lesions”) can be reversed or remineralized through appropriate use of fluorides.<sup>13</sup> This remineralization can occur only

when both caregivers and health professionals understand and value the prevention of oral disease and have the understanding and skills necessary to do so. For example, if a mother does not understand how to inspect her infant's mouth, does not know how to recognize “white spots” and reverse them, and does not have the necessary supplies (toothbrushes and fluoride toothpaste), she is not likely to engage in these activities.

A recent national study of caregivers of children aged 0 to 11 years reported that 36% of respondents admitted their children brushed their teeth less than once a day, and two thirds of the respondents indicated that their child's first visit to the dentist occurred at approximately 2.5 years of age.<sup>14</sup> With respect to the latter finding, the recommendation of the American Dental Association and the American Academy of Pediatric Dentistry is that the first dental visit occur at the age of 1 year or 6 months after the eruption of an infant's first tooth.

Individuals report that they obtain most of their dental health information from their

dentist or dental staff members, and they tend to believe the best way to prevent caries is to brush their teeth (without mentioning use of fluoride-containing dentifrice).<sup>15–17</sup> However, studies have shown that, in many cases, neither dental hygienists nor dentists have complete, current knowledge regarding caries prevention regimens.<sup>18,19</sup> Collectively, these factors may contribute to increases in dental caries, especially among lower income children.

In March and April 2010, we conducted a random-digit-dialing telephone survey to determine knowledge, opinions, and practices related to caries prevention among Maryland adults who had a child aged 6 years or younger in the home. This telephone survey was part of a needs assessment to be used in developing a state health literacy model regarding caries prevention and early detection; the ultimate goal is to decrease dental disparities among Maryland's children by increasing oral health literacy.

## METHODS

Two kinds of random samples were used in this study: a traditional random-digit-dialing sample (RS) and a targeted low-income sample (LIS). The RS ( $n = 446$ ) was based on assigned working blocks of landline telephone numbers and generated regionally in proportion to the population of Maryland. This process resulted in numbers that were both listed and unlisted as well as a high percentage of nonworking or disconnected numbers. The LIS ( $n = 324$ ) was randomly drawn from a database of households located in Maryland zip codes in the bottom 20% of median household income.

### Survey Instrument

The survey instrument included previously used questions from the National Health Interview Survey on knowledge–understanding, opinions, and practices related to prevention of dental caries.<sup>15,16</sup> The instrument was pilot tested among 12 women who were either pregnant or mothers of children aged 6 years or younger. On the basis of the pilot testing, we modified the wording of some of the questions and shortened the instrument. The survey was administered by trained interviewers from OpinionAmericaGroup, a professional telephone survey firm. The survey contained 39 items (including items focusing

on demographic characteristics) and required approximately 20 minutes to complete.

### Data Analysis

Statistical analyses included assessments of descriptive statistics, the  $\chi^2$  test, and multivariate logistic regression analyses. Logistic regression was used to model the log odds of the outcome variables: knowledge and practices. All demographic variables were included as independent variables. We calculated adjusted odds ratios (AORs) and 95% confidence intervals (CIs) for each independent variable. SAS version 9.1.3 (SAS Institute Inc, Cary, NC) was used in conducting all of the statistical analyses, and the level of significance was set at  $P < .05$ . All RS respondents whose children had Medicaid insurance were analyzed with the LIS group.

## RESULTS

A total of 10 512 random telephone numbers were generated. Almost half (4904) were unavailable as a result of disconnected phone numbers, an inability to speak English on the part of the person answering the call, or simply no answers after 10 attempted calls. Of this number, 3335 met the study eligibility criteria (i.e., English-speaking adults with a child in the home aged 6 years or younger) and were considered the study sample; 770 individuals completed the survey, resulting in a 23.1% response rate.

### Demographic Characteristics

Characteristics of the respondents are presented in Table A (available as a supplement to the online version of this article at <http://www.ajph.org>). Seventy-four percent of the RS respondents had completed 4 or more years of college compared with 38% of the LIS respondents. Eight percent of the RS sample and 33% of the LIS sample had a high school (or equivalent) education or below. Fourteen percent of the RS respondents and 30% of the LIS respondents were African American; 76% and 58%, respectively, were White.

The mean age of the RS sample was 38.14 years ( $SD = 9.06$ ), and the mean age of the LIS sample was 36.06 years ( $SD = 12.82$ ); 61% of RS participants were 36 years old or older, as opposed to only 41% of LIS respondents. All of the RS respondents had private dental insurance compared with only 34% of the

LIS respondents. The LIS was relatively evenly split between Medicaid, private insurance, and no insurance coverage.

### Understanding of Dental Caries Prevention

We used 5 questions to capture information about respondents' understanding regarding prevention of dental caries: "In your opinion, what is the single best way to prevent tooth decay?" "In your opinion, what is one early sign of tooth decay?" "Do you think that all children develop tooth decay?" "What do you think fluoride is used for?" and "What do you think dental sealants are used for?" (for more details, see Table B, available as a supplement to the online version of this article at <http://www.ajph.org>). In addition, participants responded to 2 questions asking whether they were aware of fluoride and dental sealants. Overall, respondents' level of knowledge was poor.

Figure A (available as a supplement to the online version of this article at <http://www.ajph.org>) displays the percentages of correct responses to the 5 questions just mentioned. Although relatively few of the respondents (20% in the RS and 26% in the LIS) could identify early signs of tooth decay, nearly all (97.9%) reported that they were aware of fluoride. However, when asked what fluoride is used for, only 64.6% and 49.7% of the RS and LIS respondents, respectively, indicated correctly that it is used to prevent tooth decay. Similarly, nearly two thirds (64.9%) of the RS and LIS respondents were aware of dental sealants, but only 40% and 30%, respectively, knew that they are used to seal a tooth surface to prevent tooth decay.

*Bivariate analysis.* Table B (available as a supplement to the online version of this article at <http://www.ajph.org>) shows, according to demographic characteristics, the percentages of respondents with accurate knowledge regarding the best way to prevent caries as well as knowledge related to fluoride use and the purpose of sealants. In the RS, women were significantly more likely than men to have knowledge regarding early signs of tooth decay and the purpose of dental sealant use. Those aged 36 years or older were significantly more likely than those in the younger age group to know the purpose of fluoride.

In the LIS, women and those who were single were significantly more likely than their

counterparts to know early signs of tooth decay and to correctly respond to the question regarding whether all children develop tooth decay. In addition, women were significantly more likely than men to know the purpose of sealants.

**Multivariate analyses.** Table 1 shows adjusted odds ratios for individual knowledge factors, by all demographic variables, for the RS. Women were more likely than men to be knowledgeable about early signs of tooth decay (AOR = 1.9; 95% CI = 1.1, 3.3) and use of sealants (AOR = 1.6; 95% CI = 1.0, 2.4). African Americans were less likely than members of other racial/ethnic groups to respond correctly regarding the purpose of fluoride (AOR = 0.5; 95% CI = 0.3, 1.0). Those aged 36 years or older were more likely than those in the younger age group to know the purpose of fluoride (AOR = 2.1; 95% CI = 1.4, 3.2). There were no differences according to demographic characteristics in participants' responses regarding the best way to prevent tooth decay. Also, education and marital status were not significantly associated with any of the 5 knowledge questions.

Table 2 shows adjusted odds ratios for individual knowledge factors for the LIS respondents. Women were more likely than men to know that not all children develop tooth decay (AOR = 1.8; 95% CI = 1.0, 3.2) and to know the purpose of sealants (AOR = 2.7; CI = 1.4, 5.1). African Americans were more likely than Whites to know the purpose of fluoride (AOR = 2.1; 95% CI = 1.1, 3.8).

**Dental Caries Prevention Practices**

A series of questions captured information on the preventive practices used by respondents as well as information on use of tap water.

**Bivariate analysis.** Table C (available as a supplement to the online version of this article at <http://www.ajph.org>) shows reported caries prevention practices according to sociodemographic characteristics. In the RS, women were significantly less likely than men to put their child to bed with a bottle. There were no significant differences according to demographic characteristics regarding whether or not respondents cleaned their child's mouth,

although those with a low level of education were less likely to do so.

Overall, most RS respondents reported having had a dental appointment in the preceding 12 months. Relative to their counterparts, women and older respondents were significantly more likely to have had such an appointment. Most respondents claimed to have brushed their teeth the morning of their interview. However, significantly fewer single than married adults claimed to have done so. No other demographic characteristic was significant in relation to this variable.

African American respondents in the RS and those with a high school education or below were significantly less likely than their counterparts to filter their water. Relative to their counterparts, respondents with a high school education or less, African Americans, and younger respondents were significantly less likely to drink tap water. Also, African Americans and respondents with lower levels of education were significantly less likely than their counterparts to report that their children drank tap water.

**TABLE 1—Adjusted Odds Ratios for Individual Knowledge Areas, by Demographic Characteristics, in the Random Sample: Maryland, 2010**

Characteristic	Knowledge Area				
	Best Prevention Method, AOR (95% CI)	Early Sign of Decay, AOR (95% CI)	General Prevalence of Decay Among Children, AOR (95% CI)	Purpose of Fluoride, AOR (95% CI)	Purpose of Sealants, AOR (95% CI)
<b>Education</b>					
High school or equivalent (Ref)	1.0	1.0	1.0	1.0	1.0
Some college or trade school	1.9 (0.2, 17.7)	0.5 (0.2, 1.3)	1.6 (0.7, 3.7)	1.5 (0.6, 3.5)	1.3 (0.5, 3.1)
College or more	1.7 (0.2, 13.4)	0.5 (0.2, 1.1)	1.5 (0.7, 3.2)	1.0 (0.5, 2.2)	1.6 (0.8, 3.5)
<b>Marital status</b>					
Single	1.8 (0.2, 16.1)	1.5 (0.4, 5.3)	1.5 (0.5, 4.7)	4.9 (1.0, 23.9)	2.3 (0.7, 7.6)
Married (Ref)	1.0	1.0	1.0	1.0	1.0
<b>Gender</b>					
Female	1.3 (0.5, 3.3)	1.9* (1.1, 3.3)	1.3 (0.8, 1.9)	1.1 (0.7, 1.7)	1.6* (1.0, 2.4)
Male (Ref)	1.0	1.0	1.0	1.0	1.0
<b>Race</b>					
African American	1.2 (0.4, 3.8)	0.6 (0.3, 1.4)	1.5 (0.9, 2.7)	0.5* (0.3, 1.0)	0.9 (0.5, 1.6)
White (Ref)	1.0	1.0	1.0	1.0	1.0
Other	0.5 (0.1, 3.7)	1.6 (0.8, 3.3)	0.8 (0.4, 1.7)	0.9 (0.4, 1.7)	1.3 (0.7, 2.6)
<b>Age, y</b>					
18-35 (Ref)	1.0	1.0	1.0	1.0	1.0
≥ 36	2.2 (0.8, 6.2)	0.9 (0.6, 1.5)	1.3 (0.8, 1.9)	2.1* (1.4, 3.2)	0.9 (0.6, 1.4)

Note. AOR = adjusted odds ratio; CI = confidence interval.  
\*P < .05.

**TABLE 2—Adjusted Odds Ratios for Individual Knowledge Areas, by Demographic Characteristics, in the Low-Income Sample: Maryland, 2010**

Characteristic	Knowledge Area				
	Best Prevention Method, AOR (95% CI)	Early Sign of Decay, AOR (95% CI)	General Prevalence of Decay Among Children, AOR (95% CI)	Purpose of Fluoride, AOR (95% CI)	Purpose of Sealants, AOR (95% CI)
<b>Education</b>					
High school or equivalent (Ref)	1.0	1.0	1.0	1.0	1.0
Some college or trade school	1.3 (0.2, 6.8)	1.3 (0.7, 2.7)	0.8 (0.5, 1.5)	1.1 (0.6, 2.0)	1.1 (0.6, 2.1)
College or more	1.1 (0.2, 5.8)	1.3 (0.6, 2.7)	0.9 (0.5, 1.6)	1.6 (0.9, 2.9)	1.2 (0.6, 2.2)
<b>Marital status</b>					
Single	2.1 (0.4, 12.9)	1.4 (0.7, 2.8)	1.5 (0.8, 2.9)	0.9 (0.5, 1.7)	0.7 (0.4, 1.5)
Married (Ref)	1.0	1.0	1.0	1.0	1.0
<b>Gender</b>					
Female	0.4 (0.1, 1.9)	1.7 (0.9, 3.4)	1.8* (1.0, 3.2)	1.4 (0.8, 2.3)	2.7** (1.4, 5.1)
Male (Ref)	1.0	1.0	1.0	1.0	1.0
<b>Race</b>					
African American	1.4 (0.3, 7.4)	1.6 (0.8, 3.1)	0.9 (0.5, 1.7)	2.1* (1.1, 3.8)	0.7 (0.3, 1.3)
White (Ref)	1.0	1.0	1.0	1.0	1.0
Other	1.0 (0.1, 9.3)	1.0 (0.4, 2.5)	1.2 (0.6, 2.6)	0.6 (0.3, 1.3)	0.6 (0.2, 1.4)
<b>Age, y</b>					
18-35 (Ref)	1.0	1.0	1.0	1.0	1.0
≥ 36	0.9 (0.2, 3.5)	1.4 (0.8, 2.5)	0.9 (0.6, 1.6)	1.3 (0.8, 2.7)	1.2 (0.7, 2.0)
<b>Type of dental insurance for youngest child</b>					
Medicaid (Ref)	1.0	1.0	1.0	1.0	1.0
Private	1.7 (0.3, 10.9)	0.6 (0.3, 1.1)	1.1 (0.6, 1.9)	1.1 (0.6, 1.9)	0.7 (0.4, 1.3)
Other	3.9 (0.6, 26.8)	0.6 (0.3, 1.3)	1.3 (0.7, 2.5)	1.3 (0.7, 2.5)	0.9 (0.5, 1.8)

Note. AOR = adjusted odds ratio; CI = confidence interval.  
\* $P < .05$ ; \*\* $P < .01$ .

In the LIS, respondents with a high school education or below and those who were single were significantly more likely to put their child to bed with a bottle than their counterparts. In addition, respondents with the lowest levels of education and those with Medicaid insurance were significantly less likely to have had a dental appointment in the preceding 12 months than those with higher levels of education and those with private insurance. Although most respondents claimed to have brushed their teeth the morning of their interview, those whose children had Medicaid insurance were significantly less likely to have done so than those with private insurance.

LIS respondents who were single, African American, and in the younger age group were significantly less likely than their counterparts to filter their water. Similar to the RS, those with lower levels of education, African Americans, and those who were single were significantly less likely to drink tap water. Those who

were younger and whose children were on Medicaid were less likely to drink tap water, but the differences were not significant. Respondents with lower levels of education and African American respondents were significantly less likely than their counterparts to report that their children drank tap water.

*Multivariate analyses.* Table 3 shows adjusted odds ratios and individual oral health practice factors, by demographic characteristics, among RS respondents. Female respondents were significantly less likely than male respondents to report having ever given their child a bottle to go to sleep (AOR = 0.5; 95% CI = 0.3, 0.9). There were no differences according to demographic characteristics with respect to the practice of cleaning children's mouth or gums or brushing their teeth.

RS respondents who were single and had private insurance coverage were 3 times more likely than those who were married and had Medicaid insurance to indicate they had visited

a dentist or dental hygienist in the preceding 12 months (AOR = 3.0; 95% CI = 1.7, 5.4). Furthermore, single respondents were less likely than married respondents to report that they brushed their teeth the morning of their interview.

RS respondents in the "other" racial/ethnic category were more likely than White respondents to indicate that they filtered their tap water (AOR = 2.4; 95% CI = 1.1, 5.1). Female respondents were less likely than male respondents to report that they drank tap water. Relative to their counterparts, those who had completed at least some college were more likely to report that their child drank tap water, whereas children of African Americans (AOR = 0.3; 95% CI = 0.2, 0.6) and those in the "other" racial/ethnic category (AOR = 0.5; 95% CI = 0.3, 0.9) were less likely to drink tap water.

Table 4 shows adjusted odds ratios for individual oral health practice factors, by

**TABLE 3—Adjusted Odds Ratios for Oral Health Practices, by Demographic Characteristics, in the Random Sample: Maryland, 2010**

Characteristic	Practice						
	Puts Child to Bed With Bottle, AOR (95% CI)	Cleans Child's Mouth, AOR (95% CI)	Had Dental Appointment in Past 12 Months, AOR (95% CI)	Brushed Teeth on Morning of Interview, AOR (95% CI)	Filters Tap Water, AOR (95% CI)	Drinks Tap Water, AOR (95% CI)	Child Drinks Tap Water, AOR (95% CI)
<b>Education</b>							
High school or equivalent (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Some college or trade school	0.8 (0.3, 2.2)	2.8 (1.0, 7.6)	0.7 (0.2, 2.1)	0.4 (0.1, 1.6)	2.7 (1.2, 6.3)	0.9 (0.3, 2.6)	2.5* (1.0, 5.9)
College or more	0.6 (0.2, 1.3)	1.8 (0.8, 3.9)	1.4 (0.5, 3.0)	0.6 (0.2, 2.0)	2.2* (1.7, 4.5)	0.6 (0.3, 1.6)	3.2** (1.5, 6.8)
<b>Marital status</b>							
Single	1.5 (0.4, 6.3)	0.6 (0.1, 2.3)	0.7 (0.4, 1.3)	0.2* (0.1, 0.7)	0.7 (0.2, 2.2)	1.5 (0.4, 6.3)	1.2 (0.3, 4.4)
Married (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Gender</b>							
Female	0.5* (0.3, 0.9)	1.4 (0.8, 2.4)	2.6 (1.4, 4.7)	1.4 (0.7, 2.5)	1.0 (0.7, 1.6)	0.5* (0.3, 0.9)	0.8 (0.5, 1.3)
Male (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Race</b>							
African American	1.4 (0.7, 3.0)	1.4 (0.6, 3.1)	1.6 (0.6, 4.6)	1.3 (0.5, 3.3)	0.8 (0.4, 1.4)	1.2 (0.6, 2.7)	0.3*** (0.2, 0.6)
White (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Other	1.7 (0.8, 3.9)	3.1 (0.9, 10.5)	1.9 (0.6, 6.8)	1.1 (0.4, 2.9)	2.4* (1.1, 5.1)	1.5 (0.7, 3.5)	0.5 (0.2, 1.0)
<b>Age, y</b>							
18–35 (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
≥ 36	0.7 (0.4, 1.1)	0.6 (0.3, 0.9)	1.9 (1.1, 3.6)	0.8 (0.4, 1.5)	0.8 (0.5, 1.2)	0.7 (0.4, 1.2)	1.1 (0.7, 1.8)

Note. AOR = adjusted odds ratio; CI = confidence interval.  
\* $P < .05$ ; \*\* $P < .01$ ; \*\*\* $P < .001$ .

demographic characteristics, among LIS respondents. Analyses focusing on whether respondents had ever given their child a bottle to go to sleep or whether they cleaned their children's mouth or gums or brushed their teeth did not reveal any differences according to demographic characteristics.

LIS respondents with 4 years of college or more were significantly more likely than those with less education to have had a dental appointment in the preceding 12 months (AOR = 3.2; 95% CI = 1.5, 6.9). Also, those with private insurance were significantly more likely than those in other insurance categories to have had a dental appointment in that period (AOR = 3.1; 95% CI = 1.4, 6.8). There were no differences according to demographic characteristics with respect to respondents' reports that they had brushed their teeth the morning of their interview.

LIS respondents in the "other" racial/ethnic category were more likely than White respondents to indicate that they filtered their tap water (AOR = 2.2; 95% CI = 1.0, 4.9). There were no differences according to demographic

characteristics in respondents' reports as to whether they drank tap water. Relative to their counterparts, those with at least a 4-year college education were more likely to report that their children drink tap water (AOR = 1.9; 95% CI = 1.0, 3.7), whereas children of African American respondents (AOR = 0.4; 95% CI = 0.2, 0.9) were less likely to drink tap water.

### Opinions and Experiences

In addition to questions concerning knowledge and understanding regarding prevention of dental caries, respondents were asked several questions regarding their opinions and experiences (responses are shown in Table D, available as a supplement to the online version of this article at <http://www.ajph.org>). A majority of respondents in both samples (RS, 85%; LIS, 92%) believed that it was very important to have accurate information about preventing tooth decay.

In addition, 63.2% of RS respondents and 74.1% of LIS respondents indicated that baby teeth are very important. Sixty-three percent of RS respondents and 59% of LIS respondents

reported that they obtained most of their information about oral and dental health from a dentist. Finally, when asked whether any member of the dental staff team had asked them how they would like to learn about dental health, more than 70% of the respondents in both groups responded "no."

### DISCUSSION

To our knowledge, ours is the first Maryland survey to attempt to determine adult residents' knowledge and opinions regarding prevention of dental caries. The information gained from such a survey is necessary in developing statewide health literacy models relating to caries prevention and early detection. Our findings show that, overall, Maryland adults are not well informed about tooth decay and how to prevent it, yet they believe that having accurate information about preventing tooth decay is important and that primary (baby) teeth are important.

Our respondents' level of knowledge and understanding reflects the findings of earlier



**TABLE 4—Adjusted Odds Ratios for Oral Health Practices, by Demographic Characteristics, in the Low-Income Sample: Maryland, 2010**

Characteristic	Practice						
	Puts Child to Bed With Bottle, AOR (95% CI)	Cleans Child's Mouth, AOR (95% CI)	Had Dental Appointment in Past 12 Months, AOR (95% CI)	Brushed Teeth on Morning of Interview, AOR (95% CI)	Filters Tap Water, AOR (95% CI)	Drinks Tap Water, AOR (95% CI)	Child Drinks Tap Water, AOR (95% CI)
<b>Education</b>							
High school or equivalent (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Some college or trade school	0.7 (0.3, 1.2)	0.7 (0.3, 1.6)	1.7 (0.8, 3.6)	2.5 (0.9, 7.0)	0.8 (0.4, 1.6)	0.7 (0.3, 1.3)	1.6 (0.8, 2.9)
College or more	0.5 (0.3, 1.0)	0.8 (0.4, 1.9)	3.2** (1.5, 6.9)	1.6 (0.7, 3.9)	0.8 (0.5, 1.5)	0.6 (0.3, 1.1)	1.9* (1.0, 3.7)
<b>Marital status</b>							
Single	1.5 (0.8, 2.9)	0.9 (0.4, 2.3)	1.0 (0.5, 2.2)	1.3 (0.4, 3.9)	0.7 (0.3, 1.3)	1.5 (0.8, 3.0)	1.1 (0.5, 2.1)
Married (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Gender</b>							
Female	0.7 (0.4, 1.3)	1.6 (0.8, 3.2)	1.6 (0.8, 3.1)	0.8 (0.4, 1.9)	1.0 (0.6, 1.8)	0.7 (0.3, 1.3)	1.0 (0.5, 1.8)
Male (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
<b>Race</b>							
African American	1.4 (0.8, 2.7)	0.9 (0.4, 1.9)	1.1 (0.5, 2.3)	0.9 (0.4, 2.5)	0.8 (0.4, 1.4)	1.2 (0.6, 2.4)	0.4* (0.2, 0.9)
White (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Other	0.9 (0.4, 2.2)	1.2 (0.4, 3.4)	0.8 (0.3, 2.1)	0.9 (0.3, 3.0)	2.2* (1.0, 4.9)	0.8 (0.3, 2.0)	0.7 (0.3, 1.6)
<b>Age, y</b>							
18-35 (Ref)	1.0	1.0	1.0	1.0	1.00	1.0	1.0
≥ 36	0.9 (0.5, 1.6)	0.7 (0.4, 1.4)	0.9 (0.5, 1.8)	0.7 (0.3, 1.6)	1.6 (0.9, 2.6)	0.9 (0.5, 1.9)	1.4 (0.8, 2.5)
<b>Type of dental insurance for youngest child</b>							
Medicaid (Ref)	1.0	1.0	1.0	1.0	1.0	1.0	1.0
Private	1.0 (0.5, 1.9)	0.5 (0.2, 1.2)	3.1** (1.4, 6.8)	2.6 (0.8, 8.1)	1.7 (0.9, 3.0)	1.0 (0.5, 1.9)	0.7 (0.4, 1.3)
Other	1.3 (0.7, 2.7)	0.7 (0.3, 1.8)	1.9 (0.8, 4.2)	0.6 (0.2, 1.5)	0.9 (0.5, 1.7)	1.2 (0.6, 2.5)	0.7 (0.3, 1.4)

Note. AOR = adjusted odds ratio; CI = confidence interval.  
\*P < .05; \*\*P < .01.

research, especially with respect to the purpose of fluoride and dental sealants.<sup>15-17</sup> When asked their opinion regarding the best way to prevent tooth decay, only about 5% of respondents mentioned community water fluoridation and brushing one's teeth with fluoride toothpaste or fluorides; the majority (79%) mentioned "tooth brushing." Although nearly all of the respondents (97.9%) reported that they were aware of fluoride, only slightly more than half (57.6%) knew its purpose. The link between knowledge and its application to disease prevention is not reflected in our sample's responses.

Our results raise the issue of how information about fluoride is communicated to the public. Relatively little effort has been made in recent years to educate the public, through either commercial advertisements or public campaigns, about what fluoride is and how it prevents tooth decay. In general, the only time

fluoride is brought to the public's attention is when a community is considering whether to fluoridate its water supply or eliminate use of fluoride. At that point, when those opposing fluoridation are making negative claims that are difficult to counter, it is difficult if not impossible to educate the public about fluorides and fluoridation. It is relatively easy to frighten people; it is more difficult to educate them.<sup>20</sup>

However, community water fluoridation and fluoride-containing products have been available for about three quarters of a century. Thus, all Maryland adults should know what fluoridation is and how it protects against dental caries. An accurate understanding about fluoride and water fluoridation is especially important if individuals are to appropriately participate in caring for themselves and others, participate in civic engagement, and correctly interpret the recent recommendation of the

Centers for Disease Control and Prevention and the Environmental Protection Agency to modify water fluoridation levels from a range of 0.7 to 1.2 parts per million to a single level of 0.7 parts per million.<sup>21</sup>

Similarly, although dental sealants have been available for decades, more than a third of our respondents were unaware of them. In addition, among those who claimed that they were aware of sealants, only 35% knew their purpose. Knowledge regarding dental sealants is critical because Maryland has an ongoing school-based sealant program aimed at children who are eligible for school lunches; if parents do not know what sealants are and what they are used for, they are not likely to sign and return permission slips for their child to participate in and benefit from the program<sup>22</sup> (it should be no surprise that the prevalence of sealant use is lower among Maryland children eligible for free or reduced-price

meal programs than among children who are not eligible for these programs<sup>22</sup>).

Most parents recognize that they should not put their child to bed with a bottle. Despite that recognition, many of our respondents admitted to doing so. Because data on this practice were self-reported and individuals tend to overestimate good behaviors, it is possible that the practice of putting an infant to bed with a bottle is more widespread than we found. The fact that this practice was used especially by less educated adults and Medicaid recipients is also disconcerting.

Respondents with lower levels of education and African American respondents were less likely than their counterparts to report that their child drinks tap water. Nearly 98% of Maryland's community water supplies are fluoridated. Considering that 46% of the telephone numbers used in this survey had a Baltimore area code and that the city's water supply has been fluoridated for decades, our results indicate that residents (especially children) are being denied the benefits of this preventive regimen.

However, Baltimore's water supply has been found in the past to contain higher than accepted levels of lead, which can cause serious health problems. Thus, pregnant women and young children are sometimes advised by physicians not to drink tap water. Once this kind of information is made available, it is difficult to persuade individuals that the problem has been corrected. In a recent study, several reasons were cited as to why Maryland mothers do not drink tap water, including the content of lead and bacteria and its perceived bad taste and smell.<sup>23</sup> Although our study reflects Maryland data, community water use and concerns with water quality are national issues as well.

Our findings regarding knowledge about prevention of dental caries differed according to respondent gender. Traditionally, women have been assigned the role of caregiver. Studies focusing on general health issues (e.g., cancer prevention) have shown that women generally are more knowledgeable than men about health matters.<sup>24,25</sup> Thus, it is not surprising that women in our study were more knowledgeable about tooth decay and how to prevent it.

Our findings also showed that Maryland adults value accurate information and look to

their dentist to obtain it. Respondents noted the importance of having accurate information about preventing tooth decay and about baby teeth. A majority of respondents reported that they obtain their oral health information from their dentist. However, more than 75% indicated that members of their dental staff team had not asked them how they would like to learn about dental health. Knowledge of such preferences for learning provides the basis for good communication. Also, previously published findings regarding the perceived communication practices of Maryland dentists and their team members revealed a need for enhanced communication skills.<sup>26</sup>

### Study Limitations

Similar to other telephone surveys, this study involved limitations. For example, nonresponse bias could have influenced our findings. There is always the possibility of nonresponse bias in survey studies because those who are willing to participate usually have an interest in the topic, which may indicate that they are more knowledgeable about the issue than those who opt not to participate.

Furthermore, all respondents were contacted through landlines rather than cell phones; landlines are more likely to be used by middle- and upper-income individuals than by those with lower incomes. Lower income individuals are more likely to use only cell phones, and they may not want to use minutes on answering a survey.<sup>27</sup> Another limitation of our survey is that it was conducted only in English, and thus non-English-speaking groups were not included.

Finally, the majority of respondents had a relatively high level of education; as a result, the levels of knowledge we found are probably higher than in the general population. Despite these limitations, our findings provide clear guidelines on needed educational interventions.

### Conclusions

It has long been known that simply having information or knowledge about a given health issue does not necessarily mean that appropriate preventive action will follow. Concomitantly, one cannot engage in appropriate health actions without correct information and understanding. These concepts hold for self-care as well as for caregiving. Overall, our results showed that

Maryland adults who had a child aged 6 years or younger in their home were not well informed about how to prevent dental caries and that their related disease prevention practices were limited. Respondents with higher levels of education and female respondents were more likely to have correct information and to practice appropriate caries prevention activities. The majority of respondents believed that having accurate information about preventing tooth decay is very important, and they reported that their primary source of oral health information is their dentist.

We will use the findings of this study to guide our efforts to increase oral health literacy, especially regarding the appropriate use of fluorides and dental sealants among women, African Americans, those with lower levels of education, pregnant women, and those who have children aged 6 years or younger. The science-based information about how to prevent dental caries is available. To decrease dental disparities, we must ensure that our most vulnerable user groups understand and use these preventive regimens. ■

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### Contributors

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### Human Participant Protection

This study was approved by the institutional review board of the University of Maryland, College Park. Individuals who participated were advised that the interview was entirely voluntary and that they could stop the interview at any time.

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