



## Consumer Survey of Barriers to and Facilitators of Access to Oral Health Services

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Center for Health Workforce Studies  
School of Public Health  
University at Albany, State University of New York



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**March 2019**



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## PREFACE

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The Oral Health Workforce Research Center (OHWRC) at the Center for Health Workforce Studies (CHWS) at the University at Albany's School of Public Health completed a study to evaluate factors identified by consumers as impacting their access to oral health services and to explore differences in utilization of oral health services by demographically distinct population groups.

This report was prepared for OHWRC by Simona Surdu, Margaret Langelier, Sohini Dhar, and Mia Stufflebeam, with layout design by Leanne Keough. Qiushuang Li completed the data analyses. OHWRC is supported by the US Health Resources and Services Administration (HRSA) of the US Department of Health and Human Services (HHS) under grant number U81HP27843, a Cooperative Agreement for a Regional Center for Health Workforce Studies, in the amount of \$2,249,288. The content and conclusions of this report are those of OHWRC and should not be construed as the official position or policy of, nor should any endorsements be inferred by, HRSA, HHS, or the US government.

The mission of OHWRC is to provide accurate and policy-relevant research on the impact of the oral health workforce on oral health outcomes. The research conducted by OHWRC informs strategies designed to increase access to oral health services for vulnerable populations. OHWRC is based at CHWS at the School of Public Health, University at Albany, State University of New York (SUNY), and is the only HRSA-sponsored research center with a unique focus on the oral health workforce.

The views expressed in this report are those of OHWRC and do not necessarily represent positions or policies of the School of Public Health, University at Albany, SUNY.

*March 2019*

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This material is based upon data provided by the AAMC. The views expressed herein are those of the authors and do not necessarily reflect the position or policy of the AAMC.

### **Institutional Review Board**

The plan for this study was reviewed and designated exempt from further review by the Institutional Review Board of the New York State Department of Health (Study No. 1197810-1).

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## BACKGROUND

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Gaps in access to and utilization of oral health services are recognized public health problems that result in persistent deficiencies in oral health status for many high-needs populations. One of the major oral health goals of Healthy People 2020 is to increase the proportion of people who use the oral health care system by 10%, from a baseline of 44.5% in 2007 to 49% by 2020.<sup>1</sup>

The National Health Interview Survey (NHIS) data showed that, in 2015, 64% of adults aged 18 to 64 years had had a dental visit in the past year; among those aged 65 years and older, 62.7% had had a dental visit in the past year.<sup>2</sup> The Behavioral Risk Factor Surveillance System (BRFSS) reported that in 2016, 65.7% of adults had visited the dentist or dental clinic within the past year.<sup>3</sup>

Analysis of recent trends shows a steady decrease in utilization of oral health services among US adults across all socioeconomic strata, with cost being the most reported reason for the decline.<sup>4</sup> The Health Policy Institute (HPI) of the American Dental Association reported that financial obstacles to oral health care are increasing among adults because of a trend toward decreasing dental benefits coverage.<sup>5,6</sup> Other factors may also influence access to oral health services, including demographics, socioeconomic characteristics, geographic location, health status, availability of dental providers, oral health literacy, and level of understanding of appropriate care-seeking behaviors.<sup>7,8</sup>

Prior research has examined patient/consumer perspectives on difficulty accessing oral health services. These studies identified several barriers to access to services, including cost, limited health literacy, insurance status, and reported oral health status.<sup>9-19</sup> In one study completed by the HPI comparing the National Health and Nutrition Examination Survey (NHANES) data over 2 periods of time,<sup>20</sup> the most frequently reported reason in both periods for not receiving needed dental care was affordability or cost. The financial burdens related to cost of services were highest for low-income, non-elderly adults. Only a small proportion of the population indicated that lack of availability of a dentist was a barrier to dental care. The study also found that a decrease in private dental insurance coverage and an increase in public health insurance and lack of dental coverage over the period from 2003 to 2014 had resulted in decreased utilization of dental services among non-elderly adults and increased emergency room visits for dental-related conditions.<sup>20</sup>

Incorporating the consumer perspective on access to oral health services is important in the design of public policy and programming to improve the oral health status of the population. The present study sought to obtain information from US consumers about their oral health status and perceived barriers to care. The Oral Health Workforce Research Center (OHWRC) collaborated with the Workforce Studies

team at the Association of American Medical Colleges (AAMC) to conduct a survey of a representative sample of the US adult population in order to obtain information on factors contributing to oral health disparities and to describe barriers to utilization of services.

## METHODS

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The analytic data set was created by merging data from the January 2018 and June 2018 waves of the Consumer Survey of Health Care Access fielded by AAMC. The survey is a cross-sectional online survey conducted biannually using a national panel of approximately 1.2 million adults aged 18 years and older. The June 2018 sample excluded respondents who had completed the previous survey in January 2018 to eliminate the possibility of duplication. In addition, the June survey oversampled for additional respondents from underserved population groups including racial/ethnic minorities, low-income people, those who were uninsured, Medicaid beneficiaries, and rural individuals.

The oral health module, which was part of the larger survey about need for medical services, consisted of 25 skip-logic questions asking about respondents' ability to obtain needed oral health care, self-reported oral health status, oral health literacy, attitudes toward oral health, oral health behaviors, perceived barriers to and facilitators of oral health care services, and other topics. In addition to the data on oral health, the medical module of the survey collected extensive information on respondents' demographic characteristics, socioeconomic factors, and urban/rural location of their primary home.

The characteristics of study respondents who needed dental care and their access to and utilization of oral health care were evaluated using descriptive statistical analyses, including frequency distribution, cross tabulation, and chi-square test. To better represent the characteristics of the US adult population as measured by the US Census Bureau, survey data were weighted by age, gender, race/ethnicity, employment status, household income, educational attainment, and geographic region.

# KEY FINDINGS

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## Perceived Need for Dental Care

- Among the 6,951 survey respondents, three-quarters (75.3%) reported a need for dental care in the past year.
- Proportionally more male respondents, younger adults, Asians, Hispanics/Latinos, adults with a college or postgraduate degree, those with a higher income, and respondents residing in urban or suburban areas reported a need for dental care than other groups.

## Utilization and Self-Reported Barriers and Facilitators to Receiving Needed Dental Care

- The majority of survey respondents (70.9%) reported receiving needed dental care from a dentist or other dental provider, most of them (75.1%) indicating 2 or more dental visits during the past year.
- The most commonly identified barrier to seeing a dental provider as often as needed was being unable to afford needed dental care (22.2%), followed by difficulty finding a dentist who accepted their dental plan (7.0%), anxiety about going to the dentist (6.7%), and an inability to find time to see a dentist (6.3%).
- The most commonly identified facilitator of dental care was dental insurance (22.0%), followed by the availability of more dentists who accept the respondent's insurance (16.1%), more reminders to visit the dentist (14.7%), and more convenient hours (11.5%).

## Factors Influencing Utilization of Needed Dental Care

### Demographic, socioeconomic, and geographic characteristics

- Adults who were male, non-elderly, Hispanic/Latino, black/African American, had not graduated from college, had a lower income, and lived in urban or rural areas were more likely to report not getting needed dental care in the past year than the other survey respondents.

## **Oral health literacy, attitudes toward oral health, and oral health behaviors**

- Respondents with lower oral health literacy, negative or neutral attitudes toward oral health, and those who brushed their teeth less than once a day were more likely to report not receiving needed dental care than other groups.

## **Perceived need for dental care**

- Adults who reported multiple oral health symptoms (eg, dry mouth, bad breath, difficulty eating) or dental problems (eg, toothache, broken or missing teeth, bleeding gums) were more likely to indicate not getting needed dental care than other survey respondents.
- Respondents with self-reported poor or fair oral health were more likely to indicate a failure to obtain needed dental care in the past year compared with those reporting good, very good, or excellent oral health.

## **Access factors**

- Survey respondents without any dental insurance coverage, those who reported travel time >60 minutes to a dental provider, or resided in the South Region were more likely to report not getting needed dental care than other respondents.
- Proportionally more adults who indicated that they had difficulty finding a dentist who accepted their insurance plan, those who could not afford dental care, or could not easily travel to a dentist were more likely to report not receiving needed dental care than those who did not experience these difficulties.
- Proportionally more adults who indicated that they would benefit from more dentists who accepted their insurance, from help with transportation to the dental visit, or from having dental insurance coverage were more likely to report not receiving needed dental services compared with respondents who did not identify these as facilitating factors to access.

## DISCUSSION

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The data confirmed findings from several previous studies investigating the utilization of dental services by different demographic groups. Among the respondents to the present survey who indicated a need for dental care, adults aged 18-34 years (30.2%) and those aged 35-64 years (32.7%) were proportionally more likely to report an inability to obtain dental services than were adults aged 65 years and older (16.6%), a finding that is supported by several previously published studies.<sup>6,20,21</sup>

The study data revealed disparities by race/ethnicity and income in the ability of consumers to obtain dental services when needed. Hispanic/Latino (36.8%) and black/African American (35.3%) survey respondents were more likely to report being unable to obtain dental services when needed than were white (25.7%) or Asian (24.9%) survey respondents. Also, travel time was found to be a significant factor in whether needed dental services were obtained suggesting that reasonable proximity to a dentist is a facilitator of access to services.

Our survey found that people who were uninsured (39.6%), insured by a government plan other than Medicare or Medicaid (38.7%), or insured by Medicaid (32.7%) were significantly more likely to be unable to obtain dental care when needed than were survey respondents who had insurance from their employers (22.6%). The cost and unaffordability of dental services is identified in the literature as an important—and likely primary—barrier to obtaining dental services when needed.<sup>10,13,20</sup>

The survey data also revealed that level of education and income impact access to dental services. Those with a high school education or less (33.0%) were significantly more likely to be unable to obtain dental care when needed than were college graduates (24.7%). Similarly, those with annual incomes less than \$50,000 (36.7%) were significantly more likely to be unable to access needed dental services than were those with annual incomes of \$100,000 or more (19.7%). Associations of poor oral health with demographic and socioeconomic characteristics have been previously reported in the literature discussing oral health status and need for services.<sup>11,22</sup>

Among respondents who indicated a need for dental services, more than one-third (34.6%) of those with low oral health literacy were unable to access the needed services. These findings suggest a need for improved oral health literacy in the population of patients who have difficulty obtaining needed oral health services. Prior research has highlighted the importance of interventions that target issues of health and oral health literacy, especially for the underserved.<sup>17</sup>

Half of survey respondents who both needed dental services and brushed less than once a day were unable to obtain needed dental services during the year. These findings suggest that certain groups of

patients would likely benefit from oral health education and routine oral hygiene behaviors that meet suggested standards.

Between one-fifth and one-quarter of survey respondents (22.2%) indicated that they could not afford to go to the dentist. This finding is consistent with other published studies describing financial constraints and their relationship to utilization of services.<sup>10,20</sup> More than half (56.5%) of those respondents who indicated that they could not afford to go to the dentist did not access needed dental services in the prior year. The next most common barriers to accessing dental services were difficulty finding a dentist who accepted the person's dental benefit plan (7.0%), fear of going to the dentist (6.7%), and the inability to find time to see a dentist (6.3%). Each of these barriers has been identified by other research as impacting utilization of dental services.<sup>13,20</sup> Transportation and distance were an issue for some patients; more than half (57.9%) of respondents who reported difficulty traveling to a dentist were unable to access dental services when needed.

Survey respondents were also asked to identify factors that would facilitate their access to dental services. About 22.0% indicated that dental insurance would facilitate access and 16.1% indicated that having more dentists who accepted their insurance plan would improve access. As with the barriers to dental services identified by respondents, the most prominent facilitators to access to dental services were also financial. Some of the other facilitators selected by consumers were service related, including reminders to visit the dentist (14.7%) and more convenient office hours (11.5%).

## LIMITATIONS

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One of the limitations of the current study is that it only included people with access to computers. The use of computers by elders is likely limited,<sup>23</sup> which would engender some response bias by age cohorts. Those who responded to this survey may differ from the general population in that they may have chosen to respond to the survey because they have a greater awareness of health or oral health topics.

A potential limitation of the self-reported data is related to recall bias. However, it is unlikely that there were systematic differences in completeness or accuracy of information reported by the survey respondents by need or utilization of dental care services because of the relatively short recall periods (up to 6 and 12 months), and, therefore, the study findings are not expected to be affected by this bias.

## CONCLUSIONS

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Many of the survey findings supported results from prior research including that the most prominent structural barriers to access to oral health services are financial in nature. The cost of dental services or a lack of dental insurance to pay for services was cited by many survey respondents as the primary barrier to care. Other contributing factors to access include distance to a qualified provider, provider participation in and portability of dental insurance, convenience of services, and dental anxiety. This study also found a likelihood that oral hygiene behaviors and level of oral health literacy are associated with the ability to access services when needed.

The study examined and found differences by patient characteristics in the ability to obtain services. The linkages between socioeconomic characteristics and access, while not surprising, suggest that present efforts to link underserved populations with oral health services remain important policy and program initiatives at the local, state, and national level for the near future. Efforts to educate the public about the importance of maintaining oral health should also continue to be a priority among stakeholders.

# Technical Report

## BACKGROUND

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In 2011, the Institute of Medicine published a report on advancing the oral health of the American public that described the importance of improving access to oral health services and reducing disparities in outcomes for vulnerable and underserved populations.<sup>24</sup> Gaps in access to and utilization of oral health services are recognized public health problems that result in persistent deficiencies in oral health status for many high-needs populations. One of the major oral health goals of Healthy People 2020 is to increase the proportion of children, adolescents, and adults who use the oral health care system by 10%, from a baseline of 44.5% in 2007 to 49% by 2020.<sup>1</sup>

The proportion of individuals who visit a dentist each year is a common measure of utilization of oral health care services.<sup>25,26</sup> Analysis of recent trends shows a steady decrease in utilization of oral health services among US adults across all socioeconomic strata, with cost being the most reported reason for the decline.<sup>4</sup> Research and policy briefs from the Health Policy Institute (HPI) of the American Dental Association find that financial obstacles to oral health care are increasing among adults because of a trend toward decreasing dental benefits coverage.<sup>5,6</sup> Other factors may also influence access to oral health services, including demographics, socioeconomic characteristics, geographic location, health status, availability of dental providers, oral health literacy, and level of understanding of appropriate care-seeking behaviors.<sup>7,8</sup>

Several national surveys collect data on dental services utilization, among them the Medical Expenditure Panel Survey (MEPS),<sup>27</sup> the National Health and Nutrition Examination Survey (NHANES),<sup>28</sup> the National Health Interview Survey (NHIS),<sup>29</sup> and the Behavioral Risk Factor Surveillance System (BRFSS).<sup>30</sup> Each of these surveys varies in methodology and design; as a result, the data on access to dental services and dental care utilization vary considerably by source.<sup>31</sup>

MEPS, which is the most complete source of data on the cost and use of health care and health insurance coverage in the US, is a set of large-scale surveys of families and individuals, their medical providers, and employers.<sup>27</sup> NHANES gathers data from the non-institutionalized population of adults and children aged 2 years and older through personal interviews in the home followed by a standardized physical examination, including laboratory tests, in a medical setting.<sup>28</sup> NHANES collects information on health and nutritional status and includes questions related to oral health.<sup>28</sup> NHIS, which is sponsored by the Centers for Disease Control and Prevention (CDC), collects data on several health indicators (including oral health), on access to and utilization of health services, and on health behaviors from a sample of adults and children in the non-institutionalized US population.<sup>29</sup> NHIS has 4 component surveys—one each for the household, the family, a sample adult within the household, and a sample child within the household. The surveys are completed in personal interviews/visits supplemented by a telephone interview when

necessary to ensure completion of the instruments.<sup>29</sup> BRFSS is a cross-sectional telephone survey conducted at the state level and compiled nationally to track preventive health practices (including oral health-related measures) and risk behaviors of the non-institutionalized US population aged 18 years and older.<sup>30</sup>

The most recent data from each of these surveys provide an overview of access to and utilization of oral health services among US adults. The NHIS data showed that, in 2015, 64% of adults aged 18 to 64 years had had a dental visit in the past year; among those aged 65 years and older, 62.7% had had a dental visit in the past year.<sup>2</sup> BRFSS reported that in 2016, 65.7% of adults had visited the dentist or dental clinic within the past year.<sup>3</sup> MEPS data indicated that in 2014, 5.6% of adults 18 years of age or older had been unable to find or were delayed in receiving dental care.<sup>32</sup> MEPS reported that the most common reason for difficulty in receiving dental care was affordability (65.2%), followed by lack of dental insurance coverage (10.7%).<sup>32</sup>

Macek and colleagues compared rates of dental visits among adults as reported by the various national surveys and found a statistically significant difference in the data for overall reported dental visits; however, these researchers also found consistent stratum-specific trend estimates.<sup>31</sup> Dolan and colleagues conducted a literature review to assess trends in dental care utilization among older adults in the US based on these national surveys and found inconsistent results attributed to differences between surveys, but also trends in health disparities that were consistent across surveys.<sup>33</sup> Possible reasons for the inconsistencies in estimates from national data sources include differences in study design, variation in collection methods, and discrepancies in reference periods.<sup>33</sup>

Survey research has also examined patient/consumer perspectives on difficulty accessing oral health services. These studies identified several barriers to access to services, including cost, limited health literacy, insurance status, and reported oral health status.<sup>9-19</sup> In one study,<sup>10</sup> the HPI analyzed the reasons reported by adult survey respondents for not intending to visit the dentist in the coming year. Nearly 1 in 4 adults were unsure about seeing or did not plan to see a dentist within the next 12 months; the most frequently reported reasons were cost (40.2%), perceptions of having a healthy mouth (32.7%), and not having time to go to a dentist (14.1%). Among respondents who were privately insured, high-income adults, the top reason for not seeing a dentist in the coming year was a perception that they did not need dental care. Medicaid-insured and low-income adults were more likely than others to report cost as a reason for not intending to visit a dentist within the next 12 months.<sup>10</sup>

In another study completed by the HPI comparing NHANES data over 2 periods of time,<sup>20</sup> the most reported reason in both periods for not receiving needed dental care was affordability or cost. The financial burdens related to cost of services were highest for low-income, non-elderly adults. Only a small proportion of the population indicated that lack of availability of a dentist was a barrier to dental care.

The study also found that a decrease in private dental insurance coverage and an increase in public health insurance and lack of dental coverage over the period from 2003 to 2014 had resulted in decreased utilization of dental services among non-elderly adults and increased emergency room visits for dental-related conditions.<sup>20</sup>

Incorporating the consumer perspective on oral health is important in the design of public policy and programming to improve the oral health status of the population. The present study sought to obtain information from US consumers about their oral health status and perceived barriers to care. The Oral Health Workforce Research Center (OHWRC) collaborated with the Workforce Studies team at the Association of American Medical Colleges (AAMC) to conduct a survey of a representative sample of the US adult population in order to obtain information on factors contributing to oral health disparities and to describe barriers to utilization of services.

The objectives of the study were to describe:

- The extent to which adults in the US were unable to obtain necessary oral health care in the past year
- The demographic and socioeconomic characteristics of population groups that experienced a lack of access to oral health care services
- The most critical access barriers to oral health services
- Unique access barriers for different underserved population groups

# METHODS

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## Data Sources

The analytic data set was created by merging data from the January 2018 and June 2018 waves of the Consumer Survey of Health Care Access fielded by AAMC. The survey is a cross-sectional online survey conducted biannually using a national panel of approximately 1.2 million adults aged 18 years and older. The June 2018 sample excluded respondents who had completed the previous survey in January 2018 to eliminate the possibility of duplication. In addition, the June survey oversampled for additional respondents from underserved population groups including racial/ethnic minorities, low-income people, those who were uninsured, Medicaid beneficiaries, and rural individuals. Data accrued in the 2 sampling periods were combined. The total number of individuals who responded to the survey was 6,951, including 5,206 people who indicated a need for oral health services in the past year.

## Survey Instrument

The oral health module, which was part of the larger survey about need for medical services, consisted of 25 skip-logic questions asking about respondents' ability to obtain needed oral health care, self-reported oral health status, oral health literacy, attitudes toward oral health, oral health behaviors, perceived barriers to and facilitators of oral health care services, and other topics. In addition to the data on oral health, the medical module of the survey collected extensive information on respondents' demographic characteristics, socioeconomic factors, and urban/rural location of their primary home.

Many of the survey questions about oral health were constructed based on questions from established surveys such as the Consumer Survey of Health Care Access, NHIS, NHANES, the World Health Organization's Oral Health Survey, and the American Dental Association's *Oral Health and Well-Being in the United States*. A copy of the oral health survey module is included in the Appendix of this report.

## Data Analysis

Researchers from OHWRC analyzed survey data using SAS v.9.4. To better represent the characteristics of the US adult population as measured by the US Census Bureau, survey data were weighted by age, gender, race/ethnicity, employment status, household income, educational attainment, and geographic region.

The characteristics of study respondents who needed dental care and their access to and utilization of oral health care were evaluated using descriptive statistical analyses, including frequency distribution, cross tabulation, and chi-square test as follows:

- Description of demographics (gender, age, race/ethnicity), socioeconomic characteristics (ie, education, employment status, household income, dental insurance coverage), and geographic distribution (ie, rural/urban area of residence, census region/division of residence) of survey respondents
- Evaluation of self-reported oral health knowledge, attitudes, and behaviors among all survey respondents
- Evaluation of perceived need for oral health care among all survey respondents as measured by self-reported oral health problems, oral health–related well-being, overall oral health status, and self-reported need for dental care in the last 12 months
- Investigation of utilization of oral health care among those indicating a need for oral health care as measured by having dental visit(s) in the last 12 months, number of visits in the last 12 months, settings in which dental care was last received, types of providers seen, and dental care services at most recent visit
- Identification and evaluation of factors determining access to oral health care services among those indicating a need for oral health care including dental insurance coverage, travel time to a dental provider, and major barriers to and facilitators of access to a dental provider as often as needed
- Assessment of associations between utilization of oral health care (having dental visit[s] in the last 12 months) and factors that may influence the utilization of oral health services among those indicating a need for dental care

## FINDINGS FROM THE LITERATURE REVIEW

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The objective of this literature review was to examine current research and reports exploring dental access-to-care issues from a patient perspective. In addition, the literature review was used as a tool to support the development of survey methods and questions for current research activities. The relevant literature was useful to validate findings from the subsequent study of consumers' attitudes and behaviors related to oral health.

This review was comprehensive and focused on literature related to consumer surveys about health, and more specifically dental health. Search engines comprised Google Scholar, Medline via PubMed, and Medline with Full Text via EBSCO. Search terms included: survey AND dental health, survey and questionnaires AND dental health, self-reported data AND dental health, oral health survey, oral health questionnaire, dental health survey, dental health AND population surveillance, national health survey AND access to care, dental survey AND access barriers, and oral health survey AND access barriers.

In total, 30 documents published between 2007 and 2017 were identified as potential contributors to the literature review. Of the 30 documents, 4 were eliminated; 1 was a non-evidence-based opinion piece<sup>34</sup>; another had a questionable sample design that collected data at 3 different time points, which may have affected outcomes<sup>35</sup>; another used outdated national data<sup>36</sup>; and the last used 6 data sources, posing a threat to consistency.<sup>37</sup> The remaining 26 documents—comprising 3 data reports and 23 peer-reviewed journal articles—are discussed in the following summary.

### Methods

The reviewed studies used many different approaches and methods for data acquisition. The most popular approach, used in 12 studies, was to analyze secondary data, especially from national surveillance surveys. This is a cost-effective approach to gathering data, although it is limited because it may not answer all relevant questions. The most-used secondary data sets were BRFSS, NHANES and NHANES III, and NHIS. As noted above, BRFSS is a nationwide telephone survey that tracks preventive health practices and risk behaviors (including oral health) of the non-institutionalized US population aged 18 years and older. NHANES is an in-home, in-person administered questionnaire that is followed by a physical examination at a mobile examination center. Participants include the US non-institutionalized population aged 2 years and older. NHANES gathers data on health and nutritional status and also includes questions related to dental issues. NHIS is an annual home interview conducted for the CDC, which sometimes includes follow-up by telephone. NHIS gathers data for adults and children and collects a wide array of health and oral health data on the non-institutionalized population in the US.

Some of the studies uncovered in the literature review had fielded their own surveys and/or questionnaires; some reused questions from national surveys or previously tested and validated surveys/questionnaires.

The survey methods varied and included:

- 2 Internet surveys<sup>9,10</sup>
- 2 telephone surveys (1 exclusively used landlines; the other used mobile phones in addition to landlines)<sup>11,12</sup>
- 4 surveys administered onsite (senior centers, multiple clinical sites, supermarket)<sup>13-16</sup>
- 1 mixed-methods study collecting demographic information orally from respondents, followed by a written survey with no interpretation aid<sup>17</sup>
- 1 personal computer–assisted interview culminating with a clinical examination<sup>18</sup>
- 2 surveys completed independently by patients at home, which were subsequently submitted to a clinical exam site<sup>38,39</sup>
- 1 mailed survey<sup>19</sup>

These studies commonly collected demographic information such as age, sex, race/ethnicity, income, and education level, which allowed analysis of participant responses by their various demographic characteristics.

## Response Rates/Sampling

Surveys that were administered onsite achieved response rates between 76.7% and 88%.<sup>14,16</sup> Surveys administered by telephone had lower response rates, ranging from 21% to 27.2%.<sup>11,12</sup> Surveys that used combined methods such as personal interviews or a telephone call documented response rates between 72.3% and 80.6%.<sup>40</sup> The response rate for the mailed survey was 22.3%.<sup>19</sup> The survey that collected participant demographic characteristics orally followed by a written questionnaire booklet completed independently by the participant had a response rate of 72.3%.<sup>17</sup> Lastly, the study that involved participants completing a survey prior to a clinical examination had a 68.3% response rate.<sup>38</sup>

No response rates were described for several of the studies due to the sampling designs, which included quota sampling<sup>41</sup> and convenience sampling.<sup>15</sup> Several studies/reports described data from a nationally

or statewide representative sample of respondents.<sup>10,20,22,42-45</sup> The remaining studies did not provide a reason for not reporting response rates.<sup>9,13,17,18,39,46</sup>

As mentioned, many of the reviewed studies used secondary data from nationally representative sample surveys, including NHANES,<sup>20,22</sup> NHIS,<sup>42,47</sup> and BRFSS.<sup>48-50</sup> Others used secondary data from the National Survey of American Life, the 2009 Health Center Patient Survey,<sup>40</sup> the Community Health Resources and Needs Assessment at New York University School of Medicine, the Center for the Study of Asian Health,<sup>46</sup> the Canadian Community Health Survey,<sup>51</sup> the 2010 Survey of the Health of Wisconsin,<sup>44</sup> and the 2012 Oral Health Consumer Survey of West Virginia.<sup>45</sup> The national surveys have rigorous weighting and sampling designs that are described in extensive detail on their websites.

Several of the studies noted limitations that might have created sampling bias. One study conducted by telephone contacted only landlines, which excluded anyone who exclusively used a mobile phone.<sup>11</sup> Sampling bias may have occurred in one study conducted in South London that investigated dental attendance patterns. The survey sampled only those who had already visited the dentist; researchers selected this method as optimal to validate actual dental attendance needs.<sup>14</sup> One reviewed study provided an oral exam to patients who were already present at a facility for a voluntary medical examination. This sampling design may have inherent bias because agreeing to a voluntary medical exam suggests a more health-conscious population than the general population.<sup>39</sup> Last, a study that collected survey information at a grocery store central to a target population may have been biased due to the convenience sample.<sup>15</sup>

## Results

### **Self-reported data vs clinical data**

One study evaluated the validity and diagnostic accuracy of self-reported data compared with clinically acquired data.<sup>18</sup> In this study, self-reported need for care was found to be highly specific, but not highly sensitive. Self-reported data were most accurate in affirming that dental treatment needs were not present, as opposed to affirming that there were treatment needs. Another study measured the validity of self-reported number of teeth relative to the clinically determined number of teeth.<sup>39</sup> This study found that most participants self-reported their number of teeth accurately, but there was a slight tendency to underreport, possibly due to the wording of the survey question and the phrase “natural teeth.”

### **Health literacy and self-rated oral health**

Two studies examined the role of health literacy in relation to oral health status.<sup>11,17</sup> Specifically, one of the studies examined health literacy in relation to race/ethnicity and educational characteristics of older

adults.<sup>17</sup> This study showed that older white adults had a higher average health literacy score than older black/African American or Hispanic/Latino adults. The study also revealed a variation in average health literacy scores by education level.

The second study, which examined the association of health literacy with self-rated oral health status, revealed that higher levels of oral health literacy were statistically associated with better self-rated oral health.<sup>11</sup> In addition, the individuals who reported fair or poor oral health were proportionally more likely to be black/African American (34%), to have a high school diploma or less (53%), to not have a regular dentist (71.2%), and to be problem-oriented care seekers (65.5%). Both studies found that level of health literacy contributes to oral health disparities, especially among underrepresented minority patients and those with lower educational attainment.

Another study analyzed the oral health data collected in NHANES from 1999 to 2014.<sup>22</sup> The authors found that the proportion of survey respondents reporting excellent or very good oral health increased over this period. The regression analyses found that females, whites, those with higher educational attainment, and those with higher incomes were more likely to self-report excellent or very good oral health than other groups.

Some of the reviewed literature discussed state-specific populations and geographical issues linked to poor self-reported oral health. West Virginia, which has the highest reported rate of tooth loss in the nation in those aged 65 years and older, conducted a survey of a representative sample of adults in the state in 2012.<sup>45</sup> At that time, 26% of the sample population reported fair or poor oral health in contrast to 24.4% of adults in the US. Women (52%) and young people (64%) more often indicated excellent or very good oral health compared with men (38%) and older people (38%). Survey respondents cited lack of dental insurance as an impediment to receiving dental services; one-quarter of respondents had not seen a dentist in at least 2 years.

A 2008 study in Florida used a survey of adult residents of Union County to assess county residents' perceived needs for oral health services.<sup>15</sup> The study was conducted because Union County was unique in the state in its complete lack of water fluoridation and the absence of public oral health services or full-time dentists in the county. Almost half of county residents (48.5%) reported the condition of their teeth as fair or poor; 41% reported having a dental problem in the past 12 months for which they did not consult a dentist.

Data from another Florida study used a baseline survey in 2009 and a follow-up survey in 2011.<sup>11</sup> The study revealed that among those who reported fair to poor oral health, 34% were black/African American, 53% had a high school diploma or less, 71.2% did not have a regular dentist, and 65.5% were problem-oriented dental care seekers. Although the results are not generalizable, the study provides insight into

variables that may impact self-rated oral health status such as race/ethnicity, education level, and pattern of care-seeking behaviors.

In a Canadian study, income variations were found to predict self-rated oral health after controlling for age, gender, denture wearing, and having a tooth extracted in the previous year.<sup>51</sup> A study by Finlayson et al (2010) found that those reporting fair to poor oral health had a greater number of psychosocial stressors and access to fewer psychosocial resources than those with higher self-rated oral health.<sup>40</sup> Another study using NHANES data found that better health literacy was linked to better self-rated oral health.<sup>22</sup>

Some studies examined the oral health of the subpopulation of Asians. In these groups, poor self-rated oral health was associated with low English fluency, low income, poor general health, and lack of dental insurance.<sup>46</sup> In addition, among the Asian population in New York City, Chinese immigrants were the most likely subgroup to report poor oral health; predictors included education, dental insurance, and dental care utilization.<sup>16</sup>

### **Medicaid-related findings**

Four of the studies in the literature review assessed the oral health of Medicaid-enrolled populations. Multiple studies indicate that dental care utilization in this population may be lagging behind utilization of primary care medical services. In a study using data from the 2008 NHIS, adult Medicaid beneficiaries were twice as likely as others to not have a dental visit in more than 5 years.<sup>42</sup>

In 2007, IPRO published a study of Medicaid managed care enrollees that found that a third of respondents reported fair or poor oral health and had had a major oral health problem in the last year.<sup>19</sup> Bloom and co-authors found that self-reported poor oral health was 5 times more common in adults with Medicaid coverage than in their privately insured counterparts.<sup>42</sup>

Another study evaluated dental care received by Medicaid managed care enrollees.<sup>19</sup> Survey respondents reported barriers to care that included dentists not accepting their insurance (14%), difficulty scheduling an appointment (12%), and trouble obtaining transportation (9%). Only 45% of the enrolled population was satisfied with the explanation of their plan benefits.

### **Cost-related barriers**

The CDC examined 2008 NHIS data and found that the primary reason reported by adults aged 18 to 64 years for forgoing a dental visit for an oral health problem in the most recent 6 months was the cost; 42% reported that they could not afford treatment or did not have insurance.<sup>42</sup> Respondents to the 2009

Health Center Patient Survey also reported that the most common barriers were affordability (cost) and lack of insurance coverage, with more than half reporting that they could not afford care.<sup>43</sup>

The Health Policy Institute of the American Dental Association used NHANES data from 2003 through 2004 and 2011 through 2012 to describe trends in the percentage of the population that needed dental care but could not get it.<sup>20</sup> The most reported reason for not receiving needed dental care was cost, with non-elderly, low-income adults being the most likely to report financial barriers. In a 2014 American Dental Association study, low-income people and/or those with no health insurance were the most likely to report no intention to visit the dentist in the next 12 months; the main reason was cost (42%).<sup>10</sup>

In a 2010 survey in Wisconsin, 58% of respondents reported they could not afford the cost of dental care, and cost was the primary reason for unmet needs across all sociodemographic groups.<sup>44</sup> A 2012 study in West Virginia revealed that the primary reasons survey respondents did not receive dental care were cost (54%) and inadequate insurance coverage (16%).<sup>45</sup> In a 2016 study that assessed barriers to oral health services for underserved and vulnerable populations in California's San Joaquin Valley, 44.6% of survey respondents identified the cost of dental care as a barrier to care.<sup>13</sup> Respondents also identified an inability to get timely appointments as a common barrier. Latino respondents were found to be the most worried about the cost associated with oral health care. People who were insured or who spoke English as a primary language were more concerned about barriers to timely appointments. The Medicaid insured more often identified transportation as a major barrier to care than did the privately insured or those with no dental insurance.<sup>13</sup>

## Limitations

The literature review also permitted an exploration of the limitations of consumer surveys and the inherent biases of self-reported data.

### Bias of self-reported data

Nine studies specifically noted limitations related to the potential biases of self-reported data.<sup>11,16,18,22,40,42,43,46,50</sup>

A CDC report commented that self-reported data might have contributed to the underreporting of oral health issues, as self-reported measurements differ from clinical oral health measurements.<sup>42</sup> Luo and colleagues noted inherent limitations of the data used in their study due to the potential for recall bias.<sup>50</sup> The authors also discussed the limitations in the BRFSS data, including that the data set does not include the various reasons for respondents' dental visits. Some patients may visit a dentist only when necessary to address a serious dental problem and not in the context of routine evaluation. Jones et al<sup>43</sup> and Jung

et al<sup>46</sup> noted that self-reported data may cause recall and social desirability bias. Farmer and co-authors conclude that self-reports were more accurate for describing lack of need than for estimating actual treatment need.<sup>18</sup>

Li et al discussed the limitations of cross-sectional studies using self-reported data, which could be influenced by individual and population factors.<sup>22</sup> These authors suggested that a longitudinal study might better track self-reported data over a life course. Shelley et al emphasized the utility of comparing clinical data with self-reported data,<sup>16</sup> while Guo et al noted that choosing validated self-report measures for a research study is helpful in eliminating bias.<sup>11</sup>

One of the limitations of cross-sectional data is that they do not allow the identification of a causal relationship.<sup>22,38</sup> Longitudinal studies offer better opportunities to establish causal relationships, though these studies are far more costly than cross-sectional research, especially when surveying large nationally representative samples.<sup>22</sup>

## **Survey design**

The design of survey questions and response options also affects outcomes. For example, some of the surveys used in these studies did not offer options for a response of “unknown.” In one study, if a participant did not know an answer, he or she was forced to guess or leave the question blank.<sup>13</sup> Including an “other” response and asking for an elaborating description makes it possible to identify other common responses to the survey question. In one study that asked participants to identify reasons why they did not plan to visit a dentist in the coming months, several respondents marked “other” and identified either anxiety or edentulism as the reason. There were enough of these responses to include these answers in the findings of the survey.<sup>10</sup>

The limitations inherent in using secondary survey data were discussed by Wall and colleagues in the context of the HPI study comparing trends in NHANES data between 2003–2004 and 2011–2012.<sup>20</sup> The authors commented on the lack of “precision” related to response options in terms of supply or financial barriers to dental care. For instance, the authors commented that survey takers responding to a question about barriers to obtaining care were not provided with a response option specifying an inability to find a dentist that would accept their dental insurance. The same authors also commented on possible shortcomings of surveys that use a skip-logic design. In the NHANES instrument, for example, respondents who indicated that they had never visited a dentist were excluded from answering subsequent questions about reasons for not getting dental care; these questions were shown to other survey respondents who reported seeing a dentist sometime in the past.<sup>20</sup>

Another limitation related to the use of secondary data is that much of the national surveillance data is collected with an emphasis on general health with an added oral health component. These surveys commonly ask about health insurance status but not dental insurance. This is an important disadvantage when analyzing the oral health data collected by these instruments, as not having dental insurance is recognized as a barrier to care. Four studies that used secondary data acknowledged this limitation.<sup>10,44,47,50</sup> Certain studies that collected primary data also noted possible low reliability<sup>13</sup> and questionable validity because the survey was not tested prior to administration.<sup>16</sup>

## Policy Implications

### Medicaid and the Affordable Care Act (ACA)

A study of the impact of ACA implementation and Medicaid expansion in states with an adult dental benefit showed an increased probability of Medicaid-eligible adults having a dental visit after Medicaid expansion compared with residents of states with no Medicaid dental benefit for adults.<sup>49</sup> The study found that low-income, non-elderly, childless adults experienced an increase in the probability of seeing a dentist in the year prior to 2014; at the same time, the probability of low-income adults with children visiting a dentist in that year declined. Although the reason for the decline was unknown, it might be attributed to limited capacity in the oral health care system. Newly insured, childless adults used dental capacity, reducing the availability of dental services for adults with children who had used it in the past.

Investigators also commented on the utility of using findings from research on access to oral health services for vulnerable populations when designing Medicaid policy to create maximum impact.<sup>47</sup> Yarbrough et al suggest that offering an adult dental benefit in Medicaid would improve affordability and increase dental care utilization.<sup>10</sup> In addition, authors noted the importance of consistent monitoring of the effects of Medicaid expansion on dental care services and the impact on capacity to provide care to the newly insured.<sup>20</sup>

### Dental safety net

While improving access to dental insurance is important, supply-side issues also must be considered in efforts to expand access. Researchers discuss the importance of supporting existing capacity and expanding capacity in the dental care safety net, including community health center infrastructure and training funds for dentists in the National Health Service Corps.<sup>49</sup> Federally qualified health centers contribute to a reduction in racial and ethnic health disparities and to addressing unmet needs through culturally competent care.<sup>43</sup>

## Health Literacy

Health literacy plays an important role in a person's understanding of health information and in obtaining services. The literature suggests the importance of public health education materials that are designed for a general audience of varying levels of health literacy.<sup>11</sup> Although more research is needed on the effects of health literacy on utilization of services, creating interventions that target issues related to health literacy should be considered in dental program development.<sup>17</sup> To improve utilization, Medicaid plans should create interventions that educate their members on their benefits, covered services, and how to access providers.<sup>19</sup>

## Specific populations

Many of the reviewed studies focused on findings from specific populations and the implications for oral health policy. Shelley and co-authors discuss the need to pay attention to older adults with health disparities and the importance of establishing community partnerships to address disparities.<sup>16</sup> Luo et al state that it is vital for all health care providers (primary care physicians and dental care and public health professionals) to promote the inclusion of oral health evaluation in diabetes management programs and to improve access to dental services.<sup>50</sup> Other investigators have remarked that community leaders and policymakers should review the current research describing the needs of a particular population and use it to formulate programs to target those needs.<sup>15</sup>

## Overall

In general, more research is required on the access of the US population to oral health care.<sup>42</sup> The findings from research activities should then be used not only to assess oral health needs but also to plan for future interventions.<sup>38</sup> NHANES has considerable potential as a resource to predict the effectiveness of oral health programs; this information should be used in program planning and development.<sup>22</sup> In addition, because the self-reported data from many national surveys are not a substitute for clinical data, more research is required to compare self-reports with clinical examinations and identify individual factors that affect perceived treatment need.<sup>18</sup> Although reducing barriers and increasing access to care is part of the solution, policy change to address persistent socioeconomic inequities that affect access to care and risk factors is also vital.<sup>40</sup>

# RESULTS FROM THE STUDY

The tables and figures that follow provide new data from the series of questions on oral health care access in AAMC’s annual Consumer Survey of Health Care Access. All survey results were weighted to be representative of the US population.

## Characteristics of Survey Respondents

### Demographic characteristics

Among the 6,951 survey respondents, 52.6% were female and 47.4% were male (Table 1). The survey respondents were evenly distributed by age, except in the youngest cohort, with the highest proportion of respondents being 65 years of age or older. The survey respondents were predominantly white (65.5%), followed by Hispanic/Latino (12.4%) and black/African American (11.4%).

**Table 1. Demographic Characteristics of Survey Respondents**

Demographics	n	%
<b>Gender</b>		
Female	3,656	52.6%
Male	3,295	47.4%
<b>All</b>	<b>6,951</b>	<b>100.0%</b>
<b>Age (years)</b>		
18-24	809	11.6%
25-34	1,215	17.5%
35-44	1,210	17.4%
45-54	1,268	18.2%
55-64	1,129	16.3%
65+	1,320	19.0%
<b>All</b>	<b>6,951</b>	<b>100.0%</b>
<b>Race/ethnicity</b>		
Asian	325	4.7%
Black or African American	790	11.4%
Hispanic, Latino/Spanish	863	12.4%
White	4,552	65.5%
Other	122	1.7%
Multiracial	299	4.3%
<b>All</b>	<b>6,951</b>	<b>100.0%</b>

## Social characteristics

The majority of survey respondents were married or living together (51.7%), lived in households of 1 or 2 people (54.0%), had no children under the age of 18 living in the household (63.5%), and had either completed some college or had graduated (64.6%) (Table 2).

**Table 2. Social Characteristics of Survey Respondents**

Social Characteristics	n	%
<b>Marital status</b>		
Married, living together	3,595	51.7%
Single, never married	2,031	29.2%
Divorced, separated	999	14.4%
Widowed	326	4.7%
All	6,951	100.0%
<b>Number of people living in the household</b>		
1	1,422	20.5%
2	2,331	33.5%
3	1,249	18.0%
4	1,129	16.2%
5+	820	11.8%
All	6,951	100.0%
<b>Number of children under the age of 18 living</b>		
0	4,415	63.5%
1	1,187	17.1%
2	892	12.8%
3	301	4.3%
4+	156	2.3%
All	6,951	100.0%
<b>Education</b>		
Less than or some high school	371	5.4%
High school graduate	2,075	30.0%
Some college	2,264	32.8%
College graduate	1,406	20.4%
Postgraduate	791	11.4%
All	6,907	100.0%

Note: Total numbers may vary due to missing data.

## Economic characteristics

More than half of survey respondents were employed (59.0%); 20.1% were either homemakers, unemployed, or students; and 20.9% were retired (Table 3). Some 42.3% of respondents reported an annual household income below \$50,000, one-third (33.8%) reported an annual income between \$50,000 and \$100,000, and nearly one-quarter (23.9%) indicated a household income of more than \$100,000 a year. More than 2 in 3 survey respondents (68.4%) were covered by a dental insurance plan at the time of the survey.

**Table 3. Economic Characteristics of Survey Respondents**

Economic Characteristics	n	%
<b>Employment status</b>		
Full-time	3,002	43.2%
Part-time	1,097	15.8%
Homemaker	444	6.4%
Unemployed	643	9.2%
Student	315	4.5%
Retired	1,450	20.9%
<b>All</b>	<b>6,951</b>	<b>100.0%</b>
<b>Annual household income</b>		
<\$25,000	1,367	19.9%
\$25,000–49,999	1,539	22.4%
\$50,000–74,999	1,380	20.1%
\$75,000–99,999	944	13.7%
\$100,000–124,999	570	8.3%
\$125,000–149,999	416	6.0%
>\$150,000	660	9.6%
<b>All</b>	<b>6,876</b>	<b>100.0%</b>
<b>Current dental insurance</b>		
No	2,131	31.6%
Yes	4,616	68.4%
<b>All</b>	<b>6,747</b>	<b>100.0%</b>

Note: Total numbers may vary due to missing data.

## Geographic distribution

Nearly half of the survey respondents (46.3%) characterized the area in which they lived as suburban; the remainder described the area of their residence as either urban (31.2%) or rural (22.5%) (Table 4). A larger proportion of respondents lived in the South Atlantic Division (20.7%; South Region), the East North Central Division (16.3%; Midwest Region), the Pacific Division (15.5%; West Region), and the Mid-Atlantic Division (14.4%; Northeast Region) than in other subregions of the US.

**Table 4. Geographic Distribution of Survey Respondents**

Residence	n	%
<b>Self-reported area of residence</b>		
Rural	1,563	22.5%
Suburban	3,215	46.3%
Urban	2,170	31.2%
All	6,951	100.0%
<b>Census region/division of residence</b>		
<b>Northeast</b>	<b>1,281</b>	<b>18.4%</b>
New England	282	4.1%
Mid-Atlantic	999	14.4%
<b>Midwest</b>	<b>1,534</b>	<b>22.1%</b>
East North Central	1,133	16.3%
West North Central	401	5.8%
<b>South</b>	<b>2,555</b>	<b>36.8%</b>
South Atlantic	1,440	20.7%
East South Central	376	5.4%
West South Central	739	10.6%
<b>West</b>	<b>1,581</b>	<b>22.7%</b>
Mountain	507	7.3%
Pacific	1,074	15.5%
All	6,951	100.0%

Note: Total numbers may vary due to missing data.

## Oral health literacy, attitudes toward oral health, and oral health behaviors

Respondents were asked about personal knowledge of oral health as a measure of oral health literacy (Table 5). More than three-quarters of survey participants responded correctly when asked to identify the truth or falsity of specific statements about oral health. Correct response rates to each of the 5 statements ranged between 75.8% and 89.8%. The statement with the lowest correct response rate was “Baby teeth are not that important because they do not stay in your child’s mouth very long” (the correct answer is that the statement is false).

Almost half of the respondents (46.1%) answered all 5 questions correctly. However, 9.2% of respondents answered fewer than 3 questions correctly.

**Table 5. Oral Health Literacy**

Oral Health Knowledge	Correct Answer		Incorrect Answer	
	n	%	n	%
<b>Statements</b>				
Some medical conditions, like diabetes, affect the health of your mouth <i>[true]</i>	5,650	81.9%	1,246	18.1%
Baby teeth are not that important because they do not stay in your child’s mouth very long <i>[false]</i>	5,218	75.8%	1,666	24.2%
Some medicines can affect the health of your mouth <i>[true]</i>	6,186	89.8%	702	10.2%
Blood on your toothbrush is a sign of gum disease <i>[true]</i>	5,289	76.8%	1,598	23.2%
If you are not having any pain in your mouth, then your mouth is disease free <i>[false]</i>	5,878	85.3%	1,012	14.7%
<b>Total number of correct answers</b>	<b>n</b>		<b>%</b>	
<3	638		9.2%	
3	1,189		17.2%	
4	1,896		27.5%	
5	3,182		46.1%	
<b>All</b>	<b>6,905</b>		<b>100.0%</b>	

Note: Total numbers may vary due to missing data.

Certain questions in the survey assessed respondents' attitudes toward oral health (Table 6). Survey participants were asked to express their level of agreement with 5 statements describing personal opinions about oral health. Survey respondents indicated the most agreement with the statements "I value keeping my mouth healthy" (agree, 89.3%) and "Regular visits to the dentist will help keep me healthy" (agree, 86.6%).

The highest level of disagreement (29.4%) was to the statement "I accept that I will lose some of my teeth as I grow older." Disagreement with this statement would indicate a positive attitude toward personal oral health.

Survey respondents generally exhibited overall positive attitudes toward oral health (84.9%); however, 1 in 10 exhibited an overall negative attitude toward oral health.

**Table 6. Attitudes Toward Oral Health**

Oral Health Attitudes	Disagree		Neutral		Agree	
	n	%	n	%	n	%
<b>Statements</b>						
I value keeping my mouth healthy	620	9.0%	120	1.7%	6,158	89.3%
Regular visits to the dentist will help keep me healthy	750	10.9%	171	2.5%	5,964	86.6%
I accept that I will lose some of my teeth as I grow older <sup>a</sup>	2,023	29.4%	271	3.9%	4,594	66.7%
It is easier to get ahead in life with straight, white teeth	1,128	16.4%	477	6.9%	5,281	76.7%
<b>Overall attitude toward oral health</b>	<b>n</b>		<b>%</b>			
Negative	693		10.0%			
Neutral	351		5.1%			
Positive	5,861		84.9%			
<b>All</b>	<b>6,905</b>		<b>100.0%</b>			

<sup>a</sup>Reversed rating (ie, "disagree" indicates a positive attitude toward oral health).

Note: Total numbers may vary due to missing data.

Respondents were also asked about oral health behaviors (Table 7). The findings revealed that:

- More than half of respondents (55.3%) brushed their teeth at least 2 times a day, 29.0% brushed once a day, and 12.7% brushed less than once a day or, at most, once a week
- Nearly half of respondents (45.4%) used dental floss at least once a day, 28.1% flossed between 1 and 6 times a week, and 22.3% used dental floss less than once a week or never

**Table 7. Oral Health Behaviors**

Oral Health Behaviors	n	%
<b>Tooth-brushing frequency</b>		
At most, once a week	433	6.3%
2 to 6 times a week	440	6.4%
Once a day	2,000	29.0%
Twice or more times a day	3,820	55.3%
Not applicable	209	3.0%
<b>All</b>	<b>6,902</b>	<b>100.0%</b>
<b>Dental floss use</b>		
Never	606	8.8%
Less than once a week	931	13.5%
Once a week	703	10.2%
2 to 6 times a week	1,234	17.9%
Once a day	1,836	26.7%
Twice or more times a day	1,290	18.7%
Not applicable	290	4.2%
<b>All</b>	<b>6,890</b>	<b>100.0%</b>

Note: Total numbers may vary due to missing data.

## Perceived need for dental care

Survey respondents were asked to describe symptoms of oral health-related well-being during the last 6 months (Table 8). More than half (57.8%) reported no symptoms that lasted more than a day during that time period. The most-reported symptoms were dry mouth (18.7%) and bad breath (16.5%). The least-reported symptom was sores in the mouth (8.4%).

While more than half of survey respondents reported no symptoms in the last 6 months, one-quarter (24.5%) reported a single symptom during that period, 11.1% reported 2 symptoms, and 6.6% indicated that they had experienced 3 or more symptoms during that time.

**Table 8. Self-Reported Oral Health-Related Well-Being in the Last 6 Months That Lasted More Than a Day**

Self-Reported Oral Health Status	n	%
<b>Oral health-related well-being<sup>a</sup></b>		
Bad breath	1,139	16.5%
Dry mouth	1,289	18.7%
Difficulty eating or chewing	989	14.3%
Jaw pain	801	11.6%
Sores in mouth	582	8.4%
None	3,972	57.8%
<b>Total number of oral health symptoms</b>		
3+	456	6.6%
2	764	11.1%
1	1,693	24.5%
None	3,997	57.8%
<b>All</b>	<b>6,910</b>	<b>100.0%</b>

<sup>a</sup> Respondents were permitted to select more than one response option. Therefore, total response percentages exceed 100%.

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Survey respondents also reported specific oral health problems experienced in the past 6 months (Table 9). The most-reported problems were toothache or sensitive teeth (35.4%) and broken or missing teeth (21.0%). Four in 10 respondents (41.0%) indicated that they had experienced no oral health problems in the past 6 months.

More than one-quarter of survey respondents (28.9%) reported only a single oral health problem, 22.1% reported 2 or 3 problems, and 8% reported 4 or more of the listed oral health problems in the last 6 months.

**Table 9. Self-Reported Oral Health Problems in the Last 6 Months**

Self-Reported Oral Health Status	n	%
<b>Oral health problems<sup>a</sup></b>		
Toothache or sensitive teeth	2,443	35.4%
Stained or disordered teeth	1,334	19.3%
Broken or missing teeth	1,450	21.0%
Crooked teeth	577	8.4%
Bleeding gums	1,188	17.2%
Broken or missing filling	783	11.3%
Loose teeth	326	4.7%
None	2,835	41.0%
<b>Total number of oral health problems</b>		
4+	553	8.0%
3	514	7.4%
2	1,013	14.7%
1	1,995	28.9%
None	2,835	41.0%
<b>All</b>	<b>6,910</b>	<b>100.0%</b>
<sup>a</sup> Respondents were permitted to select more than one response option. Therefore, total response percentages exceed 100%.		

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Nearly 7 in 10 survey respondents (69.0%) evaluated their oral health as good, very good, or excellent; the remainder (31.0%) reported fair or poor oral health (Table 10).

**Table 10. Self-Reported Overall Oral Health Status**

Self-Reported Overall Oral Health Status	n	%
Poor	807	11.7%
Fair	1,327	19.3%
Good	2,126	30.9%
Very good	1,743	25.3%
Excellent	883	12.8%
<b>All</b>	<b>6,886</b>	<b>100.0%</b>

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Three-quarters of survey respondents (75.3%) reported a need for dental care in the last 12 months (Table 11).

**Table 11. Self-Reported Need for Dental Care in the Last 12 Months**

Self-Reported Need for Dental Care	n	%
No	1,704	24.7%
Yes	5,206	75.3%
All	6,910	100.0%

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

### Perceived Need for Dental Care Services by Characteristics of Survey Respondents

Self-reported need for dental care services varied significantly ( $P<.0005$ ) by respondents' demographics, socioeconomic characteristics, and geography (Table 12):

- Proportionally more male respondents, younger adults aged 18 to 34 years, Asians, and Hispanics/Latinos reported a need for dental care in the past year relative to other demographic groups
- Proportionally more respondents with a college or postgraduate degree and those with an annual household income of \$50,000 or more indicated a need for dental care services in the past year compared with other respondents
- Similarly, proportionally more respondents residing in urban and suburban areas reported a need for dental care in the past year relative to those residing in rural areas

**Table 12. Distribution of Self-Reported Need for Dental Care in the Last 12 Months by Demographic Characteristics of Survey Respondents**

Characteristics of Survey Respondents	Self-Reported Need for Dental Care in the Last 12 Months			
	Yes		No	
	n	%	n	%
<b>Gender</b>				
Female	2,646	50.8%	985	57.8%
Male	2,561	49.2%	720	42.2%
<b>All</b>	<b>5,206</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Age (years)</b>				
18–34	1,611	30.9%	396	23.3%
35–64	2,683	51.5%	913	53.6%
65+	912	17.5%	395	23.2%
<b>All</b>	<b>5,206</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Race/ethnicity</b>				
Asian	266	5.1%	58	3.4%
Black or African American	595	11.4%	190	11.1%
Hispanic, Latino/Spanish	680	13.1%	176	10.4%
White	3,340	64.2%	1,187	69.6%
Other	95	1.8%	26	1.5%
Multiracial	230	4.4%	68	4.0%
<b>All</b>	<b>5,206</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Education</b>				
Less than or high school graduate	1,703	32.9%	727	43.0%
Some college	1,678	32.4%	573	33.9%
College graduate	1,118	21.6%	283	16.8%
Postgraduate	678	13.1%	107	6.3%
<b>All</b>	<b>5,178</b>	<b>100.0%</b>	<b>1,690</b>	<b>100.0%</b>
<b>Annual household income</b>				
<\$50,000	1,971	38.3%	916	54.3%
\$50,000–99,999	1,780	34.6%	534	31.6%
\$100,000+	1,399	27.2%	237	14.1%
<b>All</b>	<b>5,150</b>	<b>100.0%</b>	<b>1,687</b>	<b>100.0%</b>
<b>Self-reported area of residence</b>				
Rural	1,054	20.3%	501	29.4%
Suburban	2,461	47.3%	741	43.5%
Urban	1,688	32.4%	462	27.1%
<b>All</b>	<b>5,203</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>

Note: There were statistically significant differences, estimated using Pearson chi-square tests, in respondents' perceived need for dental care by demographics, socioeconomic characteristics, and geography ( $P < .0005$ ). Total numbers may vary due to missing data.

Self-reported need for dental care services varied significantly ( $P<.0001$ ) by attitudes toward oral health and oral health behaviors (ie, frequency of tooth brushing) but was similar across levels of oral health literacy (Table 13):

- Proportionally more respondents with a positive attitude toward oral health indicated a need for dental care services in the past year compared with other respondents
- Similarly, proportionally more respondents who brushed their teeth 2 or more times a day reported a need for dental care in the past year relative to other respondents

**Table 13. Distribution of Self-Reported Need for Dental Care in the Last 12 Months by Oral Health Knowledge, Attitudes, and Practices of Survey Respondents**

Oral Health Knowledge, Attitudes, and Practices	Self-Reported Need for Dental Care in the Last 12 Months			
	Yes		No	
	n	%	n	%
<b>Oral health knowledge (number of correct answers)</b>				
<3	471	9.1%	168	9.8%
3	886	17.0%	303	17.8%
4	1,460	28.1%	435	25.5%
5	2,384	45.8%	799	46.9%
<b>All</b>	<b>5,201</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Overall attitude toward oral health</b>				
Negative	480	9.2%	213	12.5%
Neutral	224	4.3%	110	7.4%
Positive	4,497	86.5%	1,365	80.1%
<b>All</b>	<b>5,201</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Tooth-brushing frequency</b>				
Less than once a day	664	12.9%	209	13.6%
Once a day	1,476	28.6%	524	34.1%
Twice or more times a day	3,017	58.5%	804	52.3%
<b>All</b>	<b>5,157</b>	<b>100.0%</b>	<b>1,536</b>	<b>100.0%</b>

Note: There were statistically significant differences, estimated using Pearson chi-square tests, in respondents' perceived need for dental care by oral health knowledge ( $P=.2065$ ), attitudes ( $P<.0001$ ), and behaviors ( $P<.0001$ ). Total numbers may vary due to missing data.

Self-reported need for dental care services varied significantly ( $P<.0001$ ) by self-reported oral health-related well-being, oral health problems, and overall oral health status, as presented in Table 14:

- Proportionally more respondents with 1 or more oral health-related symptoms or problems indicated that they needed dental care services in the past year relative to those without oral health problems
- Respondents with very good or excellent oral health had a higher perceived need for dental care services in the past year than did other respondents

**Table 14. Distribution of Self-Reported Need for Dental Care in the Last 12 Months by Self-Reported Oral Health Status**

Self-Reported Oral Health Status	Self-Reported Need for Dental Care in the Last 12 Months			
	Yes		No	
	n	%	n	%
<b>Oral health-related well-being (number of oral health symptoms)</b>				
3+	378	7.3%	78	4.6%
2	615	11.8%	148	8.7%
1	1,316	25.3%	377	22.1%
None	2,897	55.6%	1,100	64.6%
<b>All</b>	<b>5,206</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Oral health problems (number of oral health problems)</b>				
4+	463	8.9%	90	5.3%
3	445	8.5%	70	4.1%
2	829	15.9%	184	10.8%
1	1,596	30.7%	399	23.4%
None	1,873	36.0%	962	56.4%
<b>All</b>	<b>5,206</b>	<b>100.0%</b>	<b>1,704</b>	<b>100.0%</b>
<b>Self-reported overall oral health status</b>				
Poor	610	11.8%	198	11.6%
Fair	971	18.7%	356	20.9%
Good	1,525	29.4%	601	35.3%
Very good	1,366	26.3%	378	22.2%
Excellent	713	13.8%	170	10.0%
<b>All</b>	<b>5,185</b>	<b>100.0%</b>	<b>1,702</b>	<b>100.0%</b>

Note: There were statistically significant differences, estimated using Pearson chi-square tests, in respondents' perceived need for dental care by self-reported oral health-related well-being ( $P<.0001$ ), oral health problems ( $P<.0001$ ), and overall oral health status ( $P<.0001$ ). Total numbers may vary due to missing data.

## Utilization of Dental Care Services Among Those Indicating a Need for Dental Care

Survey respondents who indicated a need for dental care in the past year were asked questions about their utilization of dental services in the last 12 months (Table 15). The majority of respondents (70.9%) reported receiving oral health services from a dentist or other dental professional. However, nearly 3 in 10 respondents (29.1%) did not receive needed dental care in the past year.

**Table 15. Utilization of Dental Care Services in the Last 12 Months Among Survey Respondents Indicating a Need for Dental Care**

Received Dental Care From a Dentist or Other Dental Professional	n	%
Yes	3,674	70.9%
No	1,510	29.1%
All	5,184	100.0%

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Furthermore, survey respondents who had received oral health services in the last 12 months were asked to indicate the number of visits they made to a dentist or other dental provider (Table 16). About 1 in 4 (24.9%) reported a single dental visit during the year. Nearly half (49.7%) indicated that they had visited a dentist or other dental provider twice, and 25.4% reported 3 or more dental visits during the past year.

**Table 16. Number of Dental Visits Among Survey Respondents Who Needed and Received Dental Care in the Last 12 Months**

Number of Dental Visits	n	%
1	905	24.9%
2	1,803	49.7%
3	567	15.6%
4+	355	9.8%
All	3,630	100.0%

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Respondents who had needed and received dental care over the past year were asked where they had received services (Table 17). The majority (87.5%) received their needed dental care in the office of a dental practice. The next most common location was a community health center clinic (6.7%).

**Table 17. Settings in Which Dental Care Was Last Received Among Survey Respondents Indicating a Need for Dental Care**

Settings of Dental Care	n	%
Office of a dental practice	4,541	87.5%
Community health center clinic	346	6.7%
Mobile clinic	82	1.6%
Urgent care center	80	1.5%
Hospital emergency room	47	0.9%
Hospital outpatient room	41	0.8%
Other (eg, dental school, VA clinic, military clinic)	55	1.0%
All	5,192	100.0%

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Most respondents (83.1%) received their needed dental services from a general dentist (Table 18). Nearly 2 in 10 (19.4%) received services from a dental hygienist, while 13.0% visited a specialty dentist.

Survey participants were asked about the type(s) of dental services they had received at their last dental visit (Table 18). More than half (57.1%) of those who responded to the question reported having their teeth cleaned, 27.5% reported having teeth filled or replaced, and 19.6% reported having teeth pulled/extracted.

**Table 18. Types of Providers Last Seen and Dental Care Services Last Received Among Survey Respondents Indicating a Need for Dental Care**

Providers and Dental Services	n	%
<b>Providers<sup>a</sup></b>		
A general dentist	4,323	83.1%
A dental hygienist	1,008	19.4%
A specialty dentist	679	13.0%
Other (eg, a dental student)	43	0.8%
<b>Dental services<sup>a</sup></b>		
Cleaning	2,974	57.1%
Teeth filled or replaced	1,430	27.5%
Teeth pulled/extracted	1,018	19.6%
Relief of pain	395	7.6%
Gum treatment	390	7.5%
Denture work	371	7.1%
Work to improve appearance	175	3.3%
Other	245	4.7%

<sup>a</sup> Respondents were permitted to select more than one response option. Therefore, total response percentages exceed 100%.

## Access to Dental Care Services Among Those Indicating a Need for Dental Care

The respondents who indicated a need for dental care in the past year were asked questions about factors that might have affected their access to dental care services (Table 19). Dental insurance is one facilitator of access. Nearly half of the respondents (48.5%) had employer-sponsored dental insurance at the time of their dental service; 32.2% of respondents reported having dental benefits through a Medicaid program (11.4%) or through various other sources. Nearly 2 in 10 respondents (19.3%) reported not having any type of dental insurance coverage.

**Table 19. Dental Insurance Coverage When Dental Care Was Last Received Among Survey Respondents Indicating a Need for Dental Care**

Dental Insurance	n	%
Employer (mine, my spouse/partner's, or my parent/guardian's)	2,520	48.5%
Medicaid	591	11.4%
Directly from an insurance company, not through the marketplace	342	6.6%
Medicare Advantage Plan	250	4.8%
Through a government program other than Medicaid/Medicare (eg, TRICARE or VA)	215	4.1%
Through a health insurance marketplace or exchange	190	3.7%
Other	83	1.6%
Did not have dental insurance	1,006	19.3%
<b>All</b>	<b>5,197</b>	<b>100.0%</b>

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Respondents indicated the waiting time between scheduling an appointment and the date of dental services (Table 20). More than one-quarter (28.3%) reported that they received needed dental care services on the same day as the request for the appointment, suggesting urgent or emergent care services. A similar percentage (27.4%) reported receiving needed services within a week of requesting them. Some respondents reported much longer periods between scheduling and services; 4.0% indicated a wait of between 3 weeks and 3 months, while 3.0% reported a waiting time of more than 3 months.

**Table 20. Waiting Time Between Appointment Scheduling and Date of Dental Care Among Survey Respondents Indicating a Need for Dental Care**

Waiting Time	n	%
The same day	1,364	28.3%
1 day to 1 week	1,322	27.4%
More than 1 week to 3 weeks	686	14.2%
More than 3 weeks to 3 months	192	4.0%
More than 3 months to 1 year	142	3.0%
Approximately 6 months—it was a standard scheduled check-up	1,115	23.1%
<b>All</b>	<b>4,820</b>	<b>100.0%</b>

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Nearly three-quarters of respondents (73.5%) reported a travel time to a dentist of less than 30 minutes, while 21.8% reported a travel time of 30 to 60 minutes (Table 21). The remaining respondents (4.5%) reported a travel time of more than an hour.

**Table 21. Travel Time to a Dental Provider Among Survey Respondents Indicating a Need for Dental Care**

Travel Time	n	%
Less than 30 minutes	3,775	73.5%
30 to 60 minutes	1,118	21.8%
More than an hour	230	4.5%
Not applicable (transported in ambulance, etc)	11	0.2%
All	5,134	100.0%

Note: The total number in this table may vary from total numbers presented in other tables in this report due to missing data.

Survey respondents who indicated a need for dental care in the past year were asked to identify any difficulties they encountered in seeing a dental provider as often as they needed (Table 22). The majority (62.3%) indicated no difficulties in obtaining services. However, more than 1 in 4 reported either not being able to afford to go to the dentist (22.2%) or having difficulty finding a dentist who accepted their dental plan (7.0%).

**Table 22. Major Barriers to Seeing a Dental Provider as Often as Needed Among Survey Respondents Indicating a Need for Dental Care**

Barriers to Dental Care <sup>a</sup>	n	%
No difficulties	3,241	62.3%
I cannot afford to go to the dentist	1,154	22.2%
It is too hard to find a dentist who accepts my dental plan (eg, Medicaid)	365	7.0%
I am afraid of going to the dentist	348	6.7%
I cannot find the time to get to a dentist (eg, cannot get the time off from work or dentist does not have convenient office hours)	327	6.3%
I cannot find a dentist who provides the services I need	248	4.8%
I cannot travel to a dentist easily (eg, do not have transportation or located too far away)	164	3.2%
Other (eg, no dental insurance, limited coverage)	104	2.0%

<sup>a</sup> Respondents were permitted to select more than one response option. Therefore, total response percentages exceed 100%.

Respondents who indicated a need for dental care in the past year were also asked to identify factors that would help them to see a dental provider as often as they needed (Table 23). About 4 in 10 respondents (39.6%) reported seeing a dentist as often as they needed and thus did not identify any of the listed facilitators. Among the rest, the most commonly identified facilitator of dental care was dental insurance (22.0%), followed by the availability of more dentists who accept the respondent’s insurance (16.1%).

**Table 23. Major Facilitators in Seeing a Dental Provider as Often as Needed Among Survey Respondents Indicating a Need for Dental Care**

Facilitators of Dental Care <sup>a</sup>	n	%
I see the dentist as often as I need	2,061	39.6%
Dental insurance	1,146	22.0%
More dentists who accept my insurance	836	16.1%
Reminders to visit the dentist	763	14.7%
More convenient office hours	597	11.5%
More dentists in my area	529	10.2%
Help with transportation to the dental visit	520	10.0%
Other (eg, better dental coverage, lower costs)	265	5.1%
<sup>a</sup> Respondents were permitted to select more than one response option. Therefore, total response percentages exceed 100%.		

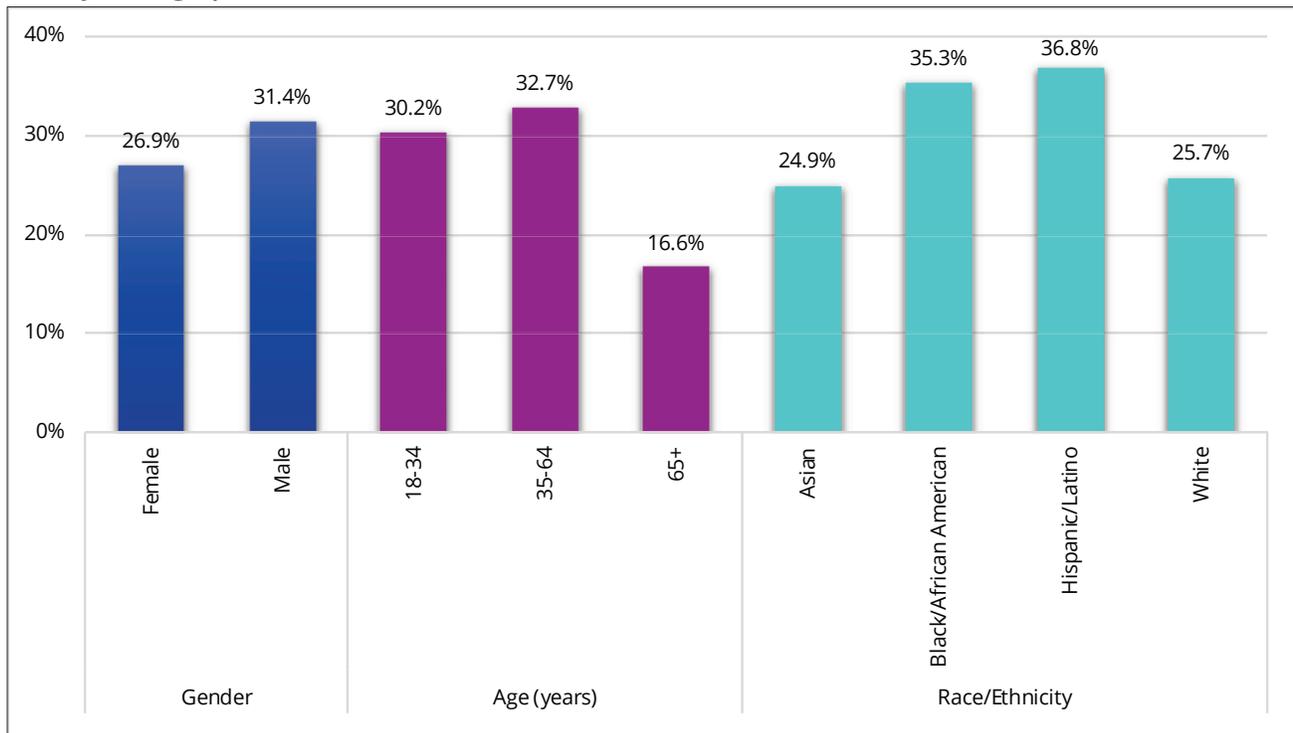
# Factors Influencing Utilization of Oral Health Services Among Those Indicating a Need for Dental Care

## Demographic characteristics

Among survey respondents who indicated a need for dental care in the past year (n=5,206), there were statistically significant differences between respondents who did not receive the needed dental care and those who did by gender ( $P=.0004$ ), age ( $P<.0001$ ), and race/ethnicity ( $P<.0001$ ) (Figure 1):

- Male respondents (31.4%) were more likely than female respondents (26.9%) to report not getting needed dental care in the past year
- Proportionally more respondents between the ages of 35 and 64 years (32.7%) and between the ages of 18 and 34 years (30.2%) did not get the needed dental care compared with respondents over 65 years of age (16.6%)
- Hispanic/Latino respondents (36.8%) and African American respondents (35.3%) were also proportionally more likely to report not getting needed dental care services in the past year than Asians (24.9%) and whites (25.7%)

**Figure 1. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Demographic Characteristics**



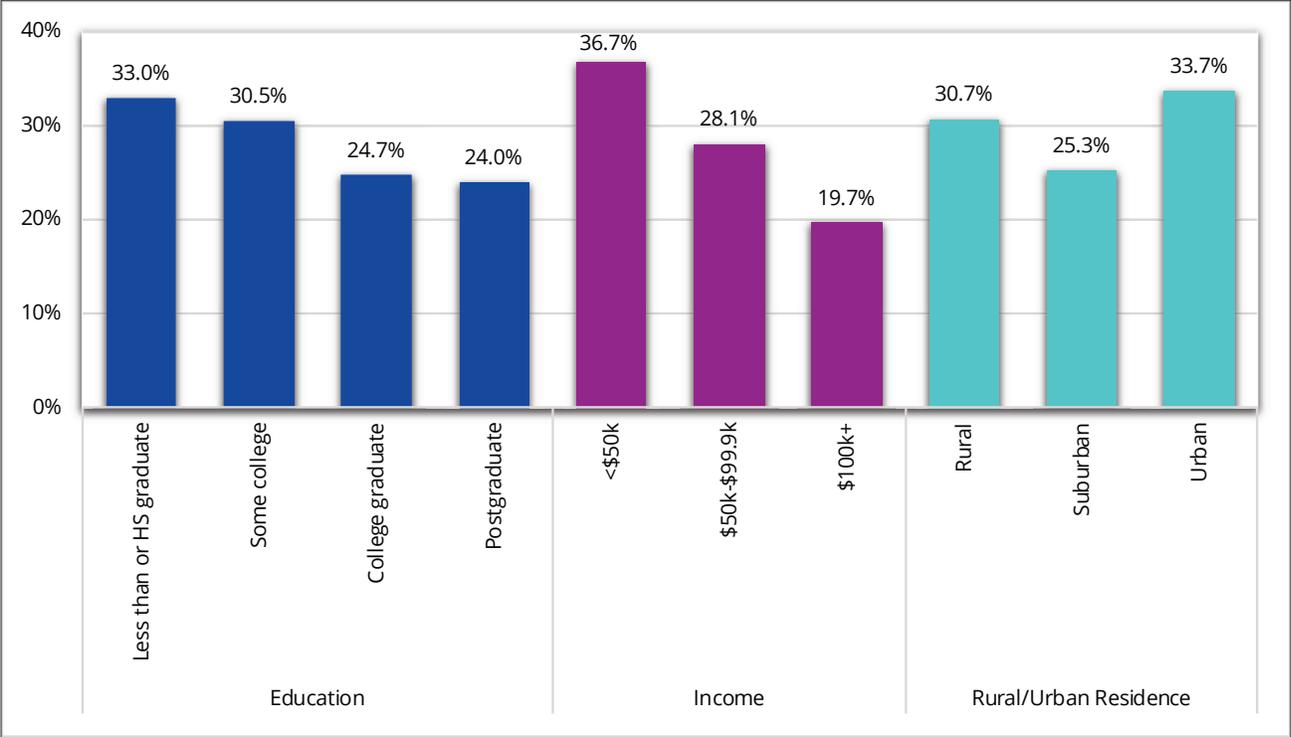
Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by gender ( $P=.0004$ ), age ( $P<.0001$ ), and race/ethnicity ( $P<.0001$ ).

### Socioeconomic and geographic characteristics

Utilization of dental care services among survey respondents who indicated a need for dental care in the past year was significantly associated ( $P<.0001$ ) with respondents' education, income, and area of residence (Figure 2):

- Respondents who had less than a college education (33.0%) or had some college (30.5%) were more likely to report not receiving needed dental care in the past year than those with a college degree (24.7%) or with a postgraduate degree (24.0%)
- Proportionally more respondents with an annual income of less than \$50,000 (36.7%) did not receive the needed dental care compared with those with an annual income of \$50,000 to \$99,999 (28.1%) or more than \$100,000 (19.7%)
- Respondents who lived in urban areas (33.7%) or in rural areas (30.7%) were more likely to report not getting needed dental services than those who lived in suburban areas (25.3%)

**Figure 2. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Socioeconomic and Geographic Characteristics**



Abbreviation: HS, high school.

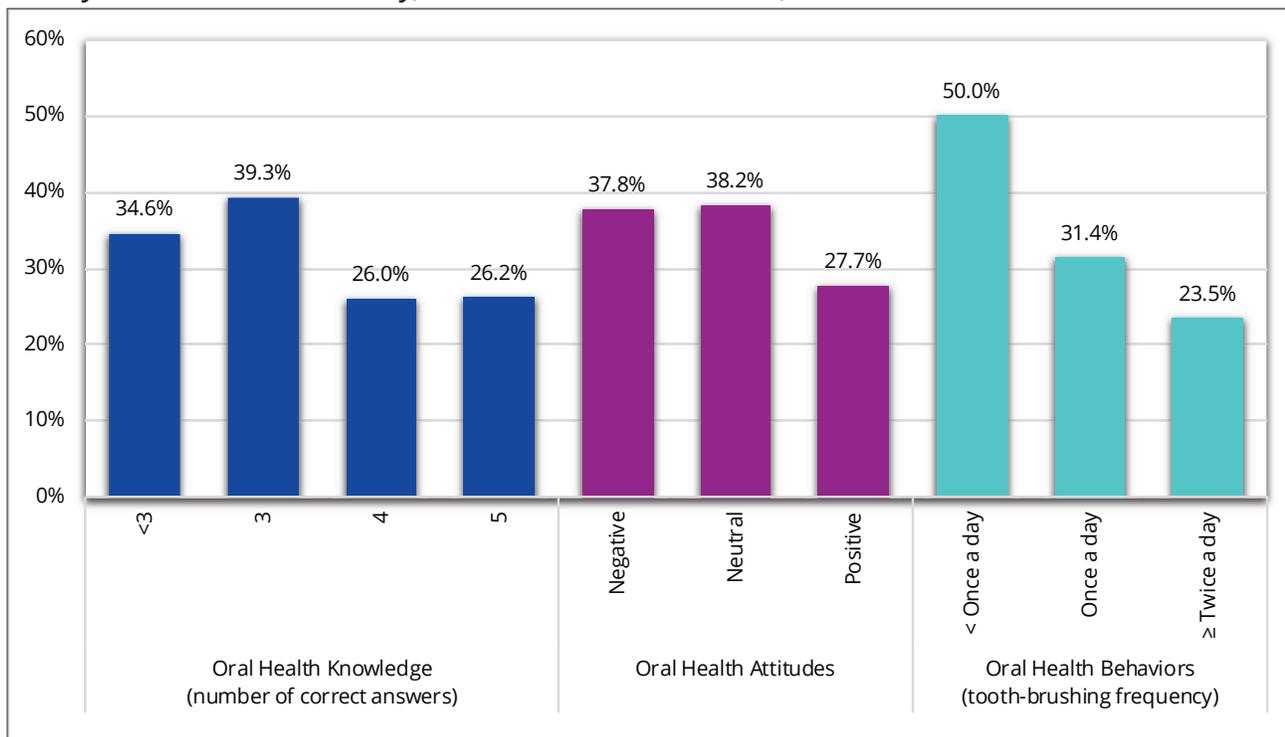
Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by education ( $P<.0001$ ), household income ( $P<.0001$ ), and area of residence ( $P<.0001$ ).

## Oral health literacy, attitudes toward oral health, and oral health behaviors

In the subgroup of individuals who needed dental care in the past 12 months, there were statistically significant differences ( $P < .0001$ ) between respondents who did not receive the needed dental care and those who did by oral health knowledge, attitudes, and behaviors (Figure 3):

- Respondents with lower oral health literacy (34.6% of those who correctly answered fewer than 3 oral health knowledge questions and 39.3% of those who correctly answered 3 questions) were more likely to report that they did not receive needed dental services compared with those with higher oral health literacy (26.0% and 26.2% of those who correctly answered 4 and 5 questions, respectively)
- Proportionally more respondents with negative (37.8%) and neutral (38.2%) attitudes toward oral health did not receive needed dental services in the past year relative to those with positive attitudes toward oral health (27.7%)
- Respondents who brushed their teeth less than once a day (50.0%) were more likely to report not receiving needed dental care compared with those who brushed their teeth once a day (31.4%) or twice or more times a day (23.5%)

**Figure 3. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Their Oral Health Literacy, Attitudes Toward Oral Health, and Oral Health Behaviors**



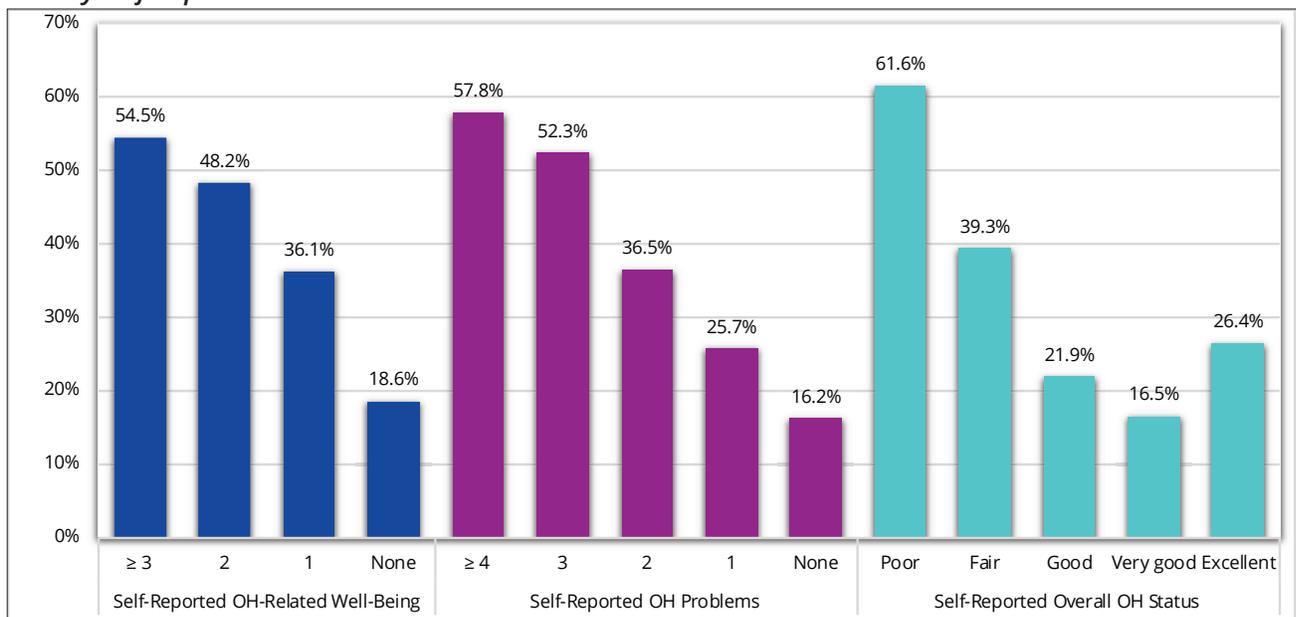
Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by oral health knowledge ( $P < .0001$ ), attitudes ( $P < .0001$ ), and behaviors ( $P < .0001$ ).

## Perceived need for dental care

In the subgroup of individuals who needed dental care in the past 12 months, utilization of dental care services varied significantly ( $P<.0001$ ) by self-reported oral health–related well-being, oral health problems, and overall oral health status, as presented in Figure 4:

- The proportion of respondents who did not get needed dental care increased with the number of self-reported oral health symptoms that they experienced in the past 6 months (ie, dry mouth, bad breath, difficulty eating/chewing, jaw pain, sore in mouth)—from 18.6% of respondents without any dental symptoms to 36.1% of those with 1 symptom, 48.2% of those with 2 symptoms, and 54.5% of those with 3 or more symptoms
- The proportion of respondents who did not get needed dental care also increased with the number of self-reported dental problems in the past 6 months (ie, toothache, broken/missing teeth, stained/disordered teeth, bleeding gums, loose teeth)—from 16.2% of respondents without any dental problems to 25.7% of those with 1 dental problem, 36.5% of those with 2 problems, 52.3% of those with 3 problems, and 57.8% of those with 4 or more problems
- Respondents with self-reported poor (61.6%) or fair (39.3%) oral health were more likely to indicate a failure to obtain needed dental care in the past year compared with those reporting good, very good, or excellent oral health (21.9%, 16.5%, and 26.4%, respectively)

**Figure 4. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Self-Reported Oral Health Status**



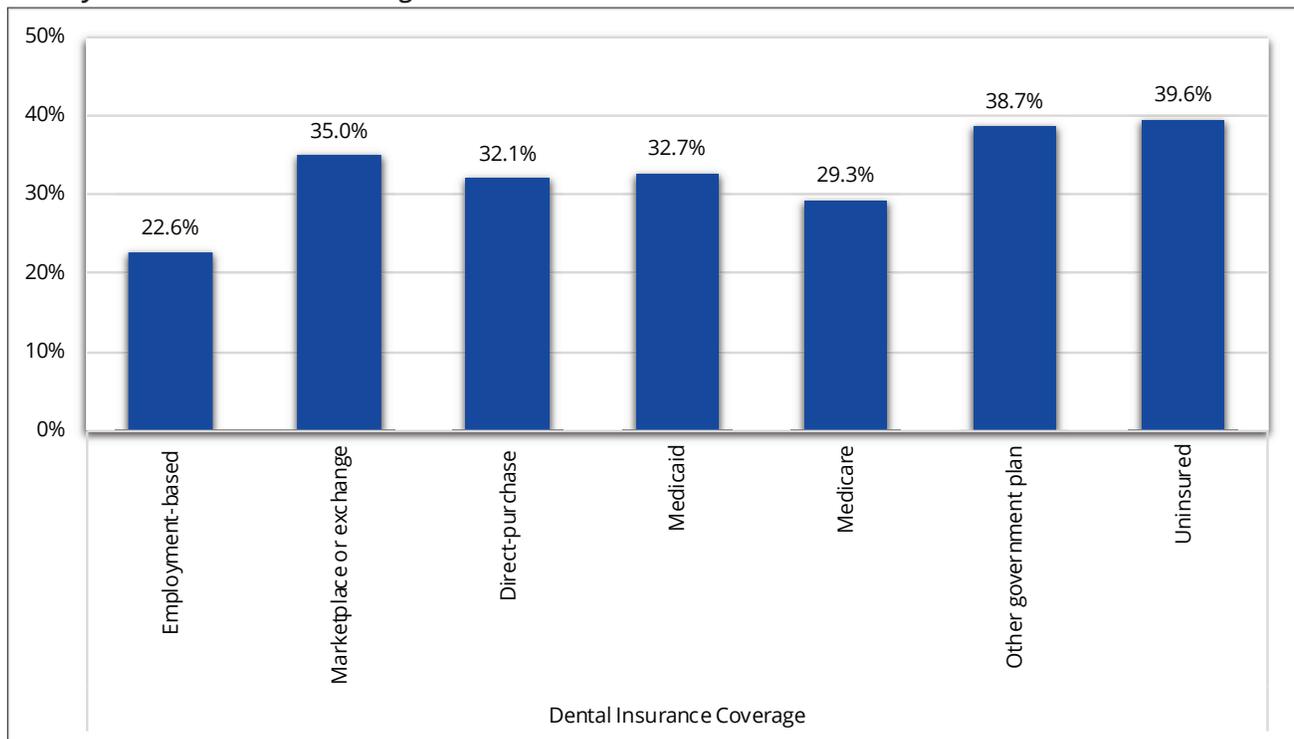
Abbreviation: OH, oral health.

Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by self-reported oral health–related well-being ( $P<.0001$ ), oral health problems ( $P<.0001$ ), and overall oral health status ( $P<.0001$ ).

## Access factors

There were statistically significant differences by dental insurance coverage ( $P < .0001$ ) between respondents who did not receive needed dental care in the past year and those who did (Figure 5). Survey respondents with employment-based dental insurance (22.6%) or Medicare (likely Medicare Advantage plans; 29.3%) were less likely to report not getting needed dental care in the past year than other respondents (32.1% to 39.6%).

**Figure 5. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Dental Insurance Coverage**

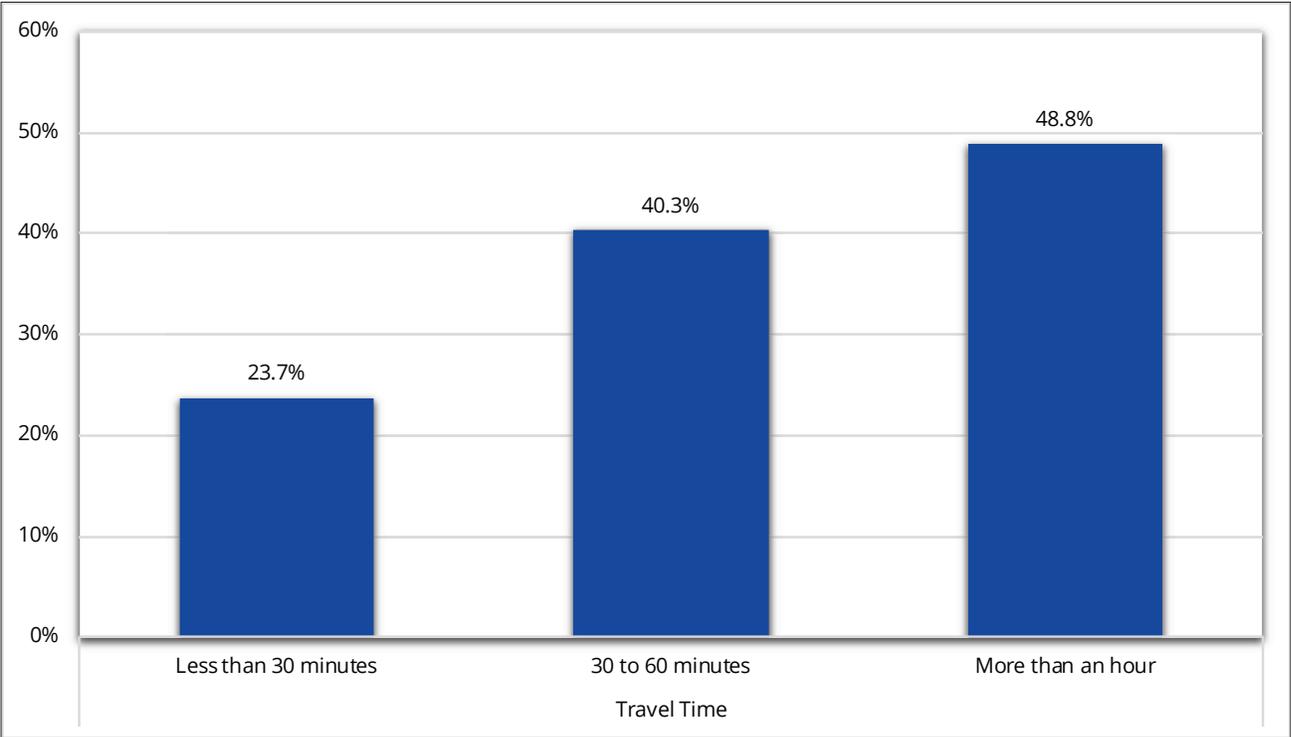


Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by dental insurance coverage ( $P < .0001$ ).

In the subgroup of individuals who needed dental care in the past 12 months, utilization of dental care services varied significantly ( $P<.0001$ ) by travel time to a dental provider (Figure 6):

- The proportion of respondents who did not get needed dental care increased with increasing travel time to a dental provider—from 23.7% of respondents who needed to travel less than 30 minutes, to 40.3% of those requiring 30 to 60 minutes of travel time, to 48.8% of those who needed to travel more than an hour to a dental provider

**Figure 6. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Travel Time to a Dental Provider**

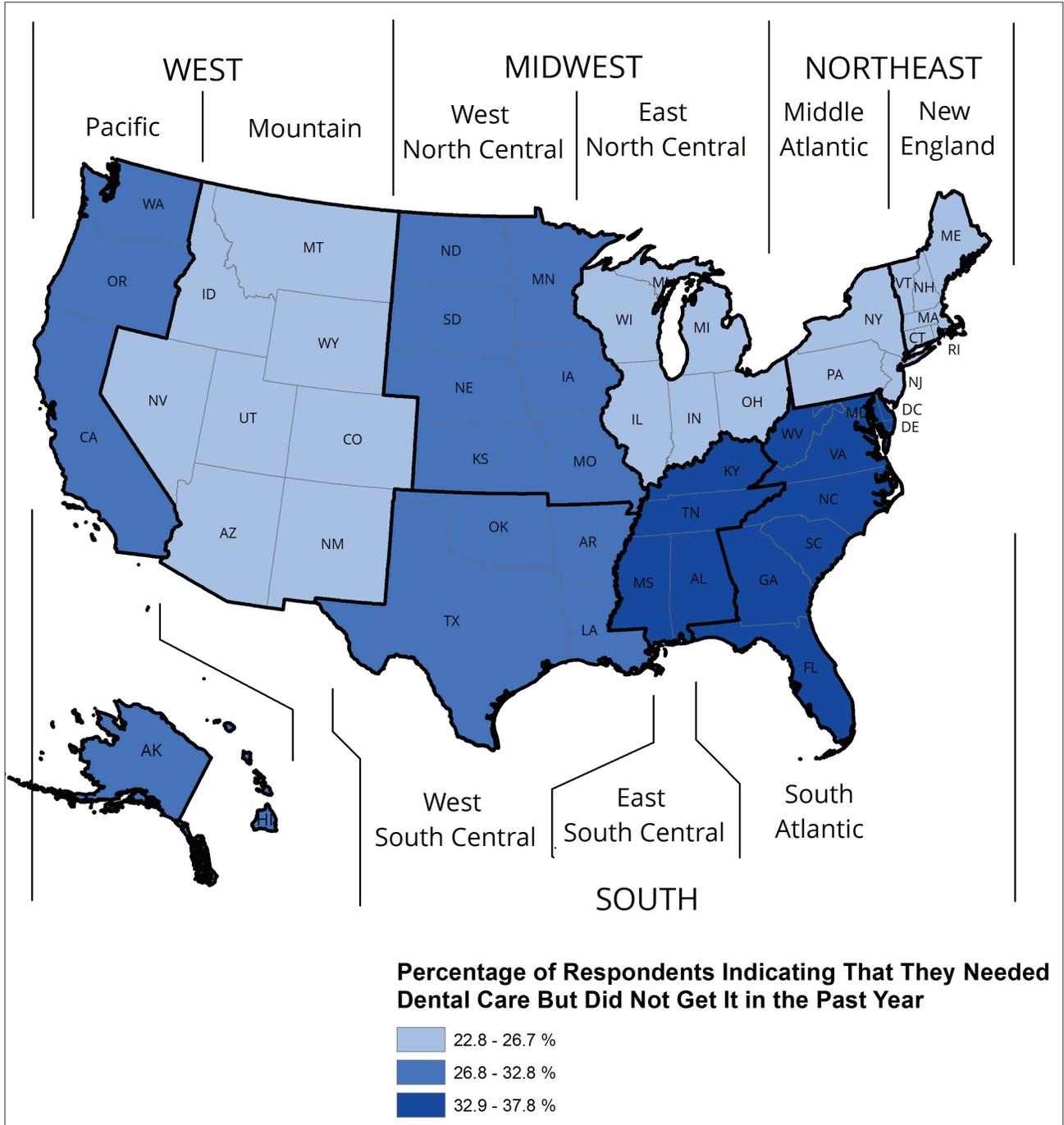


Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by travel time to a dental provider ( $P<.0001$ ).

In the subgroup of individuals who needed dental care in the past 12 months, utilization of dental care services varied significantly ( $P<.0001$ ) by the census division in which the respondent resided, as illustrated in Figure 7:

- Respondents residing in the East South Central Division (37.8%) and South Atlantic Division (33.0%) in the South Region were more likely to report not getting needed dental care in the past year than respondents residing in the other census divisions (22.8% to 32.8%), including:
  - The West North Central Division (27.8%; Midwest Region), West South Central Division (32.7%; South Region), and Pacific Division (32.8%; West Region)
  - The East North Central Division (22.8%; Midwest Region), New England Division (24.0%; Northeast Region), Mid-Atlantic Division (24.4%; Northeast Region), and Mountain Division (26.7%; West Region)

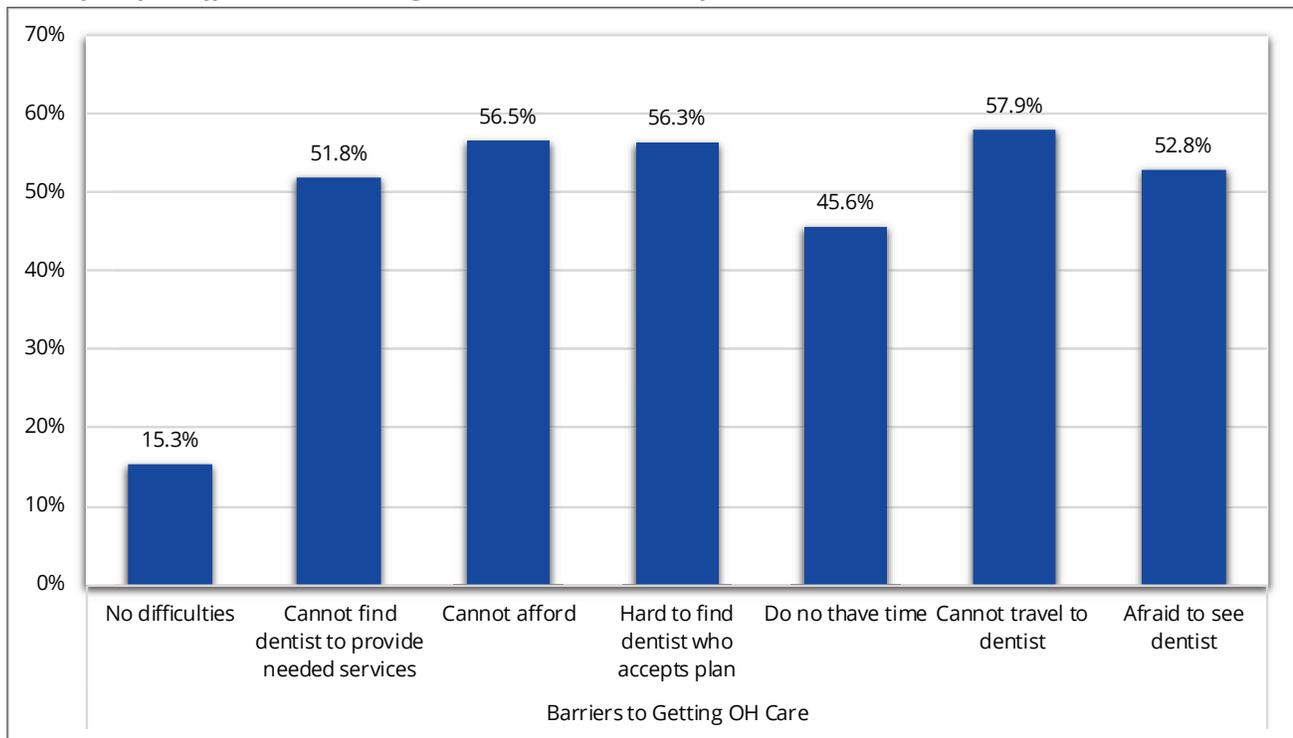
**Figure 7. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Region of Residence**



There were statistically significant differences ( $P<.0001$ ) between respondents who did not receive needed dental care and those who did by the major difficulties involved in seeing a dental provider as often as needed (Yes vs No), as presented in Figure 8:

- Among the survey respondents who indicated that they had no difficulties in obtaining oral health care, 15.3% were unable to get the dental care that they needed in the past year
- Roughly half of the respondents who indicated that they could not find the time to visit a dentist (45.6%), could not find a dentist who provided the needed services (51.8%), or were afraid of going to the dentist (52.8%) reported not getting needed dental services in the past year
- Proportionally more respondents who indicated that they could not afford dental care (56.5%), had difficulty finding a dentist who accepted their insurance plan (56.3%), or could not easily travel to a dentist (57.9%) did not receive needed dental care in the past year compared with other survey respondents

**Figure 8. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Major Difficulties in Seeing a Dental Provider as Often as Needed**



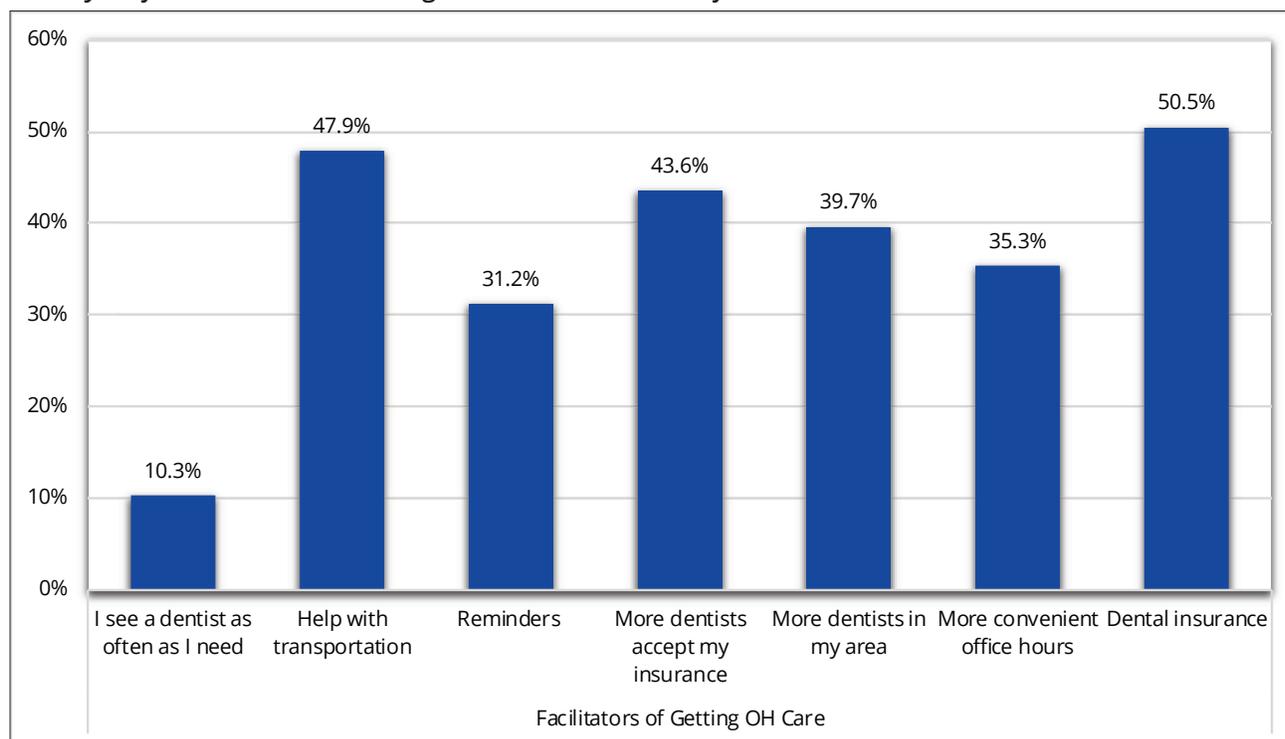
Abbreviation: OH, oral health.

Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by major difficulties in seeing a dental provider (Yes/No) ( $P<.0001$ ).

There were statistically significant differences ( $P<.0005$ ) between respondents who did not receive needed dental care and those who did by identified facilitators to seeing a dentist or other dental provider as often as needed (Yes vs No), as presented in Figure 9:

- Among the survey respondents who reported seeing a dentist as often as needed, only 10.3% were not able to get the dental care that they required over the past year
- Between 30% and 40% of respondents who indicated that care could be facilitated by reminders to visit the dentist (31.2%), more convenient office hours (35.3%), or having more dentists in the local area (39.7%) reported not getting needed dental services in the past year
- Proportionally more respondents who indicated that they would benefit from more dentists who accepted their insurance (43.6%), from help with transportation to the dental visit (47.9%), or from dental insurance coverage (50.5%) did not receive needed dental care in the past year compared with other survey respondents

**Figure 9. Percentage of Respondents Indicating That They Did Not Receive Needed Dental Care in the Past Year by Major Facilitators to Seeing a Dental Provider as Often as Needed**



Abbreviation: OH, oral health.

Note: There were statistically significant differences, estimated using Pearson chi-square tests, between respondents who did not receive the needed dental care versus those who did by major facilitators in seeing a dental provider (Yes/No) ( $P<.0005$ ), except for "Reminders to visit the dentist."

## DISCUSSION

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The objectives of this study were to obtain consumers' perspectives on the importance of oral health, to ascertain the level of oral health literacy within different population groups, and to understand barriers and facilitators to receiving oral health services. It is important to understand the consumer experience obtaining oral health services in order to effectively design interventions and service delivery programs that meet the needs of those who are underserved for dental services.

The survey for this study was administered in 2 waves to a large panel of consumers who were demographically representative of the US population. In addition, one of the 2 waves of the survey solicited responses from an oversample of underrepresented groups, including those who were racially/ethnically diverse or low income. All responses were weighted to be representative of the US population.

The data confirmed findings from several previous studies investigating the utilization of dental services by different demographic groups. Among the respondents to the present survey who indicated a need for dental care, males (31.4%) were proportionally more likely than females (26.9%) to report an inability to obtain needed dental care during the past year. A review of BRFSS data between 1995 and 2008 by Akinkugbe and colleagues<sup>21</sup> found that females were more likely to seek health care services than males. Our study also demonstrated that adults aged 18 to 34 years (30.2%) and those aged 35 to 64 years (32.7%) were proportionally more likely to report an inability to obtain needed dental services than were adults aged 65 years and older (16.6%), a finding that is supported by several previously published studies.<sup>6,20,21</sup> However, homebound or non-community-dwelling elders may have special difficulties accessing oral health services due to their dependent status and their physical and cognitive health.<sup>52</sup>

Recent declines in utilization of oral health services among working-age adults have been attributed to a decrease in the percentage of the population with private dental insurance coverage, increases in eligibility for public insurance programs that may not have an adult dental benefit, and increases in the percentage of the population without dental insurance.<sup>6,20</sup> Our survey found that people who were uninsured (39.6%), insured by a government plan other than Medicare or Medicaid (38.7%), or insured by Medicaid (32.7%) were significantly more likely to be unable to obtain dental care when needed than were survey respondents who had insurance from their employers (22.6%). The cost and unaffordability of dental services is identified in the literature as an important—and likely primary—barrier to obtaining dental services when needed.<sup>10,13,20</sup>

Respondents to the AAMC's consumer survey on access to medical services were asked a question about whether they had been told by a medical or dental professional of a need for dental services or self-identified a need for dental services within the past year. Those who responded that they had not needed

dental services in the previous year (24.7%) were asked a limited number of questions about their oral health status, oral hygiene behaviors, and oral health knowledge and attitudes. Those who had needed dental care (75.3%) were asked a more extensive panel of questions that covered the aforementioned topics as well as their experience with receiving or not receiving needed dental services. The discussion that follows variously describes all survey respondents and/or the subgroups of those who needed and received dental care versus those who needed but did not receive dental services.

Among respondents who indicated a need for dental services in the past year, 70.9% indicated that they received the needed services. Nearly half (49.7%) reported having 2 dental visits in the prior year. One-quarter (24.9%) reported 1 dental visit during that period, and the remainder (25.4%) had 3 or more dental visits. Among those who received dental services, most obtained those services in the office of a dental practice (87.5%) or in a community health center clinic (6.7%). Eighty-three percent of patients received a service from a general dentist, while 19.4% received a service from a dental hygienist. More than half (57.1%) had their teeth cleaned, 27.5% had teeth filled or replaced, and 19.6% had one or more teeth extracted.

The following paragraphs compare those who needed and received dental services within the past year (70.9%) with those who needed but did not receive services (29.1%). There were many significant differences between the 2 groups of consumers related to geographic, demographic, and socioeconomic characteristics; level of education; and oral health attitudes, behaviors, and knowledge.

The study data revealed disparities by race/ethnicity and income in the ability of consumers to obtain dental services when needed. Hispanic/Latino (36.8%) and black/African American (35.3%) survey respondents were significantly more likely to report being unable to obtain dental services when needed than were white (25.7%) or Asian (24.9%) survey respondents.

Survey respondents who reported that their residence was in an urban or rural area were significantly more likely to report being unable to obtain dental services than those living in areas described as suburban; just 25.3% of suburban residents who needed dental care did not receive that care versus 33.7% of urban residents and 30.7% of rural residents.

More than three-quarters of survey respondents who needed a dental service (73.5%) reported that their travel time to a dental provider was less than 30 minutes; just 4.5% of respondents indicated a travel time of more than an hour. Among respondents in the latter group, nearly half (48.8%) were unable to obtain needed dental services. Additionally, 40.3% of respondents with a travel time to a dentist of 30 to 60 minutes were unable to get services. That travel time was found to be a significant factor in whether needed dental services were obtained suggests that reasonable proximity to a dentist is a facilitator of access to services.

The survey data also revealed that level of education and income impact access to dental services. Those with a high school education or less (33.0%) were significantly more likely to be unable to obtain dental care when needed than were college graduates (24.7%). Similarly, those with annual incomes less than \$50,000 (36.7%) were significantly more likely to be unable to access needed dental services than were those with annual incomes of \$100,000 or more (19.7%). Associations of poor oral health with demographic and socioeconomic characteristics have been previously reported in the literature discussing oral health status and need for services.<sup>11,22</sup>

The self-reported overall oral health status of those who responded to the survey varied by group. Among all survey respondents, 38.1% reported that their oral health status was very good or excellent; only 11.7% reported poor oral health status. Furthermore, among those respondents who reported a need for dental services in the previous year, 11.8% reported poor oral health status. Six in 10 people (61.6%) who reported both poor oral health status and a need for dental services were unable to obtain those services during the year.

This study also revealed that more than one-quarter (26.4%) of those who self-reported excellent oral health status were unable to obtain dental care when needed. This finding requires further investigation. One possible reason is that individuals who hold the view that their oral health status is excellent might not actively seek dental benefits or insurance coverage, so that when an oral health problem arises, they may have difficulty affording the cost of dental services.

Overall, 57.8% of survey respondents reported having no oral health symptoms that lasted more than a day over the past 6 months and 24.5% reported a single such symptom (variously described as bad breath, dry mouth, difficulty eating or chewing, jaw pain, or sores in the mouth). Similarly, 41.0% of survey respondents indicated no oral health problems (eg, toothache, broken or loose teeth, bleeding gums, etc) within the 6 months prior to the survey. However, 8.0% of all survey respondents reported 4 or more oral health problems in the prior 6 months.

Among those respondents who indicated a need for dental care in the past year, 8.9% reported 4 or more oral health problems in the prior 6 months; 57.8% of these consumers were unable to obtain dental care. Differences between the subgroup of respondents who needed and received dental services for 1 or more oral health problems and those who needed services but did not successfully obtain care for an oral health problem were statistically significant.

Oral health literacy also varied by the demographic characteristics of respondents. All survey participants were asked about their oral health knowledge, which was assessed by asking respondents whether each of 5 statements about oral health was true or false. Nearly half of all respondents (46.1%) correctly

identified all 5 statements as true or false; 17.2% marked only 3 statements correctly, while 9.2% marked fewer than 3 statements correctly.

Among respondents who indicated a need for dental services, more than one-third (34.6%) of those who answered fewer than 3 of the oral health knowledge questions correctly were unable to access the needed services. Differences in oral health knowledge between those who needed and were able to obtain oral health services and those who needed but were not able to access those services were statistically significant. These findings suggest a need for improved oral health literacy in the population of patients who have difficulty obtaining needed oral health services. Prior research has highlighted the importance of interventions that target issues of health and oral health literacy, especially for the underserved.<sup>17</sup>

Oral hygiene behaviors also varied among respondents to the present survey. More than half of respondents (55.3%) reported brushing their teeth 2 or more times per day, which accords with suggested standards. Among respondents who reported needing dental care within the last year, 58.5% reported brushing at least twice a day. On the other hand, 12.9% of respondents who needed dental services in the last year brushed less than once a day, and exactly half of those who both needed dental services and brushed less than once a day were unable to obtain needed dental services during the year. Again, statistical testing revealed that the differences in oral hygiene behaviors between those who were able and those who were unable to obtain dental services were statistically significant. These findings suggest that certain groups of patients would likely benefit from oral health education and routine oral hygiene behaviors that meet suggested standards.

Survey respondents were asked to identify barriers to obtaining dental services. Nearly two-thirds of respondents (62.3%) who indicated needing dental services in the past year indicated that they had no difficulty in accessing services. Of the more than 3,200 survey respondents who needed dental services and indicated no barriers to obtaining care, nearly 500 did not actually utilize oral health services during the year despite indicating a need and experiencing no barriers. The reasons for this anomaly require further detailed analysis of this subgroup of patients.

Survey respondents were provided with several response options describing possible barriers to obtaining needed services. These options included unaffordability of services, inability to find a dentist who accepted their dental benefit plan, inability to secure transportation, inconvenience, and other conditions. Between one-fifth and one-quarter of survey respondents (22.2%) indicated that they could not afford to go to the dentist. This finding is consistent with other published studies describing financial constraints and their relationship to utilization of services.<sup>20,30</sup> More than half (56.5%) of those respondents who indicated that they could not afford to go to the dentist did not access needed dental services in the prior year.

The next most common barriers to accessing dental services were difficulty finding a dentist who accepted the person's dental benefit plan (7.0%), fear of going to the dentist (6.7%), and inability to find time to see a dentist (6.3%). Each of these barriers has been identified by other research as impacting utilization of dental services.<sup>13,20</sup> Transportation and distance were an issue for some patients; more than half (57.9%) of respondents who reported difficulty traveling to a dentist were unable to access dental services when needed.

Survey respondents were also asked to identify factors that would facilitate their access to dental services. Four in 10 (39.6%) indicated that they see a dentist as often as they need; 22.0% indicated that dental insurance would facilitate access, and 16.1% indicated that having more dentists who accepted their insurance plan would improve access. As with the barriers to dental services identified by respondents, the most prominent facilitators to access to dental services were financial in nature. Some of the facilitators selected by consumers were service related. Reminders to visit the dentist (14.7%), more convenient office hours (11.5%), availability of more dentists in the area (10.2%), and help with transportation to dental visits (10.0%) were also selected by respondents as possible facilitators to receiving services.

The findings from this survey validate many of the findings from previous surveys and also suggest areas for further exploration, including a need for more in-depth analyses of the impacts of various sociodemographic factors, oral health literacy and hygiene, and insurance status on the utilization of dental services.

## STUDY LIMITATIONS

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One of the limitations of the current study is that it only included people with access to computers. The use of computers by elders is likely limited,<sup>23</sup> which would engender some response bias by age cohorts. Those who responded to this survey may differ from the general population in that they may have chosen to respond to the survey because they have a greater awareness of health or oral health topics.

A potential limitation of the self-reported data is related to recall bias. However, it is unlikely that there were systematic differences in completeness or accuracy of information reported by the survey respondents by need or utilization of dental care services because of the relatively short recall periods (up to 6 and 12 months), and, therefore, the study findings are not expected to be affected by this bias.

## CONCLUSIONS

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Many of the survey findings supported results from prior research including that the most prominent structural barriers to access to oral health services are financial in nature. The cost of dental services or a lack of dental insurance to pay for services was cited by many survey respondents as the primary barrier to care. Other contributing factors to access include distance to a qualified provider, provider participation in and portability of dental insurance, convenience of services, and dental anxiety. This study also found a likelihood that oral hygiene behaviors and level of oral health literacy are predictive of the ability to access services when needed.

The study examined and found differences by patient characteristics in the ability to obtain services. The linkages between socioeconomic characteristics and access, while not surprising, suggest that present efforts to link underserved populations with oral health services remain important policy and program initiatives at the local, state, and national level for the near future. Efforts to educate the public about the importance of maintaining oral health should also continue to be a priority among stakeholders.

# Appendix

# SURVEY INSTRUMENT

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Q1. Are you currently covered by any type of dental insurance plan (through an employer, another family member, direct purchase, Medicare, Medicaid or other government assistance plan, TRICARE, VA, etc.)?

1. Yes
2. No
3. Don't know

**[ASK Q2 ONLY IF Q1=2]**

Q2. You indicated that you are not currently covered by a dental insurance plan. Is there any time in the last 12 months when you were covered by a dental insurance plan?

1. Yes
2. No
3. Don't know/Don't recall

Now, we are going to ask you some questions about dental care.

Q3. **In the last 12 months**, did you or a health care professional believe you needed any dental care (including check-ups)?

1. Yes
2. No [SKIP TO STATEMENT JUST BEFORE QUESTION Q15]

*Dental care: Includes general work such as check-ups, cleanings, fillings, extractions, and also specialized work such as root canals, fittings for braces, etc.*

**[ASK Q4 ONLY IF Q3 =1]**

Q4. **In the last 12 months**, was there a time when you needed dental care but could not get it?

1. Yes
2. No
3. Don't know

**[ASK Q5 ONLY IF Q4 =1]**

Q5. You indicated that at least once in the last 12 months, you needed dental care but you were unable to get it. What type of dental care did you think you needed? *Please mark all that apply.*

1. Teeth filled or replaced (for example, fillings, crowns and/or bridges)
2. Teeth pulled/extracted
3. Gum treatment
4. Denture work
5. Relief of pain
6. Work to improve appearance (for example, braces or bonding)
7. Cleaning
8. Other [PLEASE SPECIFY: \_\_\_\_\_]

Q6. What type of dental insurance did you have the **last time** you needed dental care?

1. Employer (mine, my spouse/partner's or parent/guardian's)
2. Through a health insurance marketplace or exchange
3. Directly from an insurance company, not through the marketplace
4. Medicaid
5. Medicare Advantage Plan
6. Through a government program other than Medicaid/Medicare (e.g., VA, TRICARE)
7. Did not have dental insurance
8. Other [PLEASE SPECIFY:\_\_\_\_\_]

Now we are going to ask you some questions about the **last time** you received dental care.

Q7. Where did you **last** receive dental care?

1. Office of a dental practice
2. Community health center clinic
3. Mobile clinic
4. Urgent care center
5. Hospital emergency room
6. Hospital outpatient clinic
7. Other [PLEASE SPECIFY:\_\_\_\_\_]

Q8. Thinking about your **last** dental care visit, which provider(s) did you see? *Please mark all that apply.*

1. A general dentist
2. A specialty dentist (such as an orthodontist, oral surgeon, endodontist, etc.)
3. A dental hygienist
4. Other [PLEASE SPECIFY:\_\_\_\_\_]

**[ASK Q9 ONLY IF Q8 = 2]**

Q9. What type of specialist did you see? \_\_\_\_\_

Q10. What did you have done when you **last** received dental care? *Please mark all that apply.*

1. Teeth filled or replaced (for example, fillings, crowns and/or bridges)
2. Teeth pulled/extracted
3. Gum treatment
4. Denture work
5. Relief of pain
6. Work to improve appearance (for example, braces or bonding)
7. Cleaning
8. Other [PLEASE SPECIFY:\_\_\_\_\_]

Q11. Thinking about your **last** dental care visit, how long did you have to wait between the time you made the appointment and the day you actually saw the provider?

1. Same day
2. \_\_\_ days [Range=1-31]
3. \_\_\_ weeks [Range=1-8]
4. \_\_\_ months [Range=1-12]
5. Approximately six months—it was a standard scheduled check up
6. Other (no appointment, emergency room visit only, etc.) [PLEASE SPECIFY:\_\_\_\_\_]
7. Don't know

Q12. Thinking about your **last** dental care visit, how long did it take you to travel to see the provider?

1. Less than 30 minutes
2. 30 to 60 minutes
3. More than an hour
4. Not applicable (transported in ambulance, etc.)
5. Don't know

Q13. What are the major difficulties you have in seeing a dentist or other dental professional as often as you need? *Please mark all that apply.*

1. No difficulties
2. I cannot find a dentist who provides the services I need
3. I cannot afford to go to the dentist
4. It is too hard to find a dentist that accepts my dental plan (e.g., Medicaid)
5. I cannot find the time to get to a dentist (e.g., cannot get the time off from work, dentist does not have convenient office hours)
6. I cannot travel to a dentist easily (e.g., do not have transportation, located too far away)
7. I am afraid of going to the dentist
8. Other [PLEASE SPECIFY:\_\_\_\_\_]

*Dentist or other dental professional: Include all types of dentists, such as, orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists. Dental hygienists clean teeth, examine patients for signs of oral diseases and provide other preventive dental care.*

Q14. Which of the following would help you see a dentist or other dental professional as often as you need? Please mark all that apply.

1. Help with transportation to the dental visit
2. Reminders to visit the dentist
3. More dentists who accept my insurance
4. More dentists in my area
5. More convenient office hours
6. Dental insurance
7. None of the above. I see the dentists as often as I need.
8. Other [PLEASE SPECIFY:\_\_\_\_\_]

Now we are going to ask you questions about where you usually get your dental care and when you last saw a dentist.

Q15. Is there a particular dentist or other dental professional who you usually see if you need dental care or dental advice?

1. Yes
2. No

*Dentist or other dental professional: Include all types of dentists, such as, orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists. Dental hygienists clean teeth, examine patients for signs of oral diseases and provide other preventive dental care.*

Q16. About how long has it been since you last saw a dentist or other dental professional?

1. Less than 12 months
2. 1 to 2 years
3. 3 to 5 years
4. More than 5 years
5. I have never been to a dentist

**[ASK Q17 ONLY IF Q16 =1]**

Q17. During the past 12 months, how many times did you go to the dentist or other dental professional?

1. Once
2. Twice
3. Three times
4. Four or more times
5. Don't know

The next questions will ask about the condition of your mouth and teeth and some factors related to dental/oral health.

Q18. **During the past 6 months**, have you had any of the following problems that lasted more than a day? Please mark all that apply.

1. Bad breath
2. Dry mouth
3. Difficulty eating or chewing
4. Jaw pain
5. Sores in your mouth
6. None of these

Q19. **During the past 6 months**, have you had any of the following problems? *Please mark all that apply.*

1. Toothache or sensitive teeth
2. Stained or discolored teeth
3. Broken or missing teeth
4. Crooked teeth
5. Bleeding gums
6. Broken or missing fillings
7. Loose teeth not due to injury
8. None of these

Q20. How would you describe the condition of your mouth and teeth?

1. Excellent
2. Very Good
3. Good
4. Fair
5. Poor

Q21. How many natural teeth do you have? (Most adults have 32 teeth, including 4 wisdom teeth)

1. No natural teeth
2. A few (1–9 teeth)
3. Some (10–19 teeth)
4. Most (20 teeth or more)

Q22. Are the following statements true or false? If you are not sure, please make your best guess.

*[True, False]*

1. Some medical conditions like diabetes affect the health of your mouth
2. Baby teeth are not that important because they do not stay in your child's mouth very long
3. Some medicines can affect the health of your mouth
4. Blood on your toothbrush is a sign of gum disease
5. If you are not having any pain in your mouth, then your mouth is disease free

Q23. How strongly do you agree or disagree with the following statements about how you perceive the health of your mouth?

*[Strongly Disagree, Some-what Disagree, Some-what Agree, Strongly Agree, Don't know]*

1. I value keeping my mouth healthy
2. Regular visits to the dentist will help keep me healthy
3. I accept that I will lose some of my teeth as I grow older
4. It is easier to get ahead in life with straight white teeth

Q24. How often do you brush your teeth?

1. Never
2. Less than once a week
3. Once a week
4. 2-6 times a week
5. Once a day
6. Twice or more a day
7. Not applicable (no natural teeth)

Q25. How often do you clean between your teeth (using dental floss, dental tape, an interdental brush or a toothpick)?

1. Never
2. Less than once a week
3. Once a week
4. 2-6 times a week
5. Once a day
6. Twice or more a day
7. Not applicable (no natural teeth)



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