Addressing the Oral Health Needs of Hispanics in the U.S.

AN EXPLORATION OF ORAL HEALTH STATUS, DENTAL NEEDS, UTILIZATION OF DENTAL SERVICES, AND WORKFORCE

White Paper and Gallery Report | Part 2

INTRODUCTION

Hispanics have reached a demographic inflexion point in our social landscape, increasing their impact in the U.S. economy and politics. The 2020 U.S. Census confirmed that Hispanics or Latinos now represent approximately 18.7% of the total population. The Hispanic Dental Association (HDA), representing over 35,000 members of dental teams across the country, reflects the diversity of the Hispanic population.

Our diversity includes racial and geographic heterogeneity with African American and Native American members, as well as colleagues from Central and South America, the Caribbean, Asia, Europe, Oceania, the Middle East, the Indian subcontinent, and other world regions.

In a previous HDA evaluation of the impact of oral health among Hispanics, we identified a lack of relevant data to develop policies supporting the oral health of our community. HDA, in partnership with CareQuest Institute for Oral Health®, is assuming a vital role identifying policies that can be improved for the benefit of our communities, through reliable and updated information.

Disparities in oral health affecting the most vulnerable populations in the U.S. are especially impacting Latino communities. Factors such as culture, language, immigration policies, anti-immigrant sentiments, and racism, in addition to other social determinants of health, are influencing Latinos' inability to access oral health care.

Now, under the partnership between CareQuest Institute and HDA, the HDA Research Team (HDART) is working to collect and analyze data approaching Hispanic Population Oral Health and the Hispanic dental health workforce, expecting to influence several policies that will be summarized within the joint white paper.

Among the topics analyzed to influence current health policies are the dental workforce planning at the national and state level, oral health status by age, use of dental services, the dental insurance market, increasing scope and options of dental services, and the equity in public insurance advocacy.

In addition, other priority topics connected to workforce training include the U.S. dental diversity in teaching and students, the promotion of postdoctoral dental training in dental shortage areas, and the increase of the presence of minority dental providers such as Hispanics.

This white paper and gallery report will allow the HDART to perform evidence-based data analyses and provide data-driven health policy recommendations. This framework can be used for multi- and interdisciplinary approaches to engage public and private stakeholders. All this is for the purpose of developing action plans to improve oral health and reduce inequalities among Hispanics in the U.S.

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"To significantly improve the nation's oral health, policy changes are needed to reduce or eliminate social, economic, and other systemic inequities that affect oral health behaviors and access to care."[1]

Oral Health in America 2020

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1 U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research. (2021). *Oral Health in America: Advances and Challenges* (Executive Summary).

METHODS

Overview Data Collection

The *HDA White Paper and Gallery Report* integrates information from existing datasets and from publications in scientific literature. It is developed in three phases. In *Phase 1*, the research team conducted primary and secondary data analysis from representative datasets at the national and state levels. *Phase 2* consisted of secondary data analysis to integrate the information with estimates obtained in *Phase 1*. *Phase 3* included data visualization, data synergy, and review of the literature.

Research Questions

- What is the oral health status of Hispanics in the United States (U.S.)?
- What are the trends regarding the use of dental services by Hispanics in the U.S.?
- What is the current participation of Hispanics in the diverse dental workforce in the U.S.?
- What are the future projections regarding the diverse oral health workforce for the U.S.?

Population of Study

The HDA Research Team reviewed all federal, state, and organizational datasets that could answer all research questions related to the oral health status in the Hispanic American populations, and to the Hispanic dental workforce.

Objectives and Outcomes

According to the National Oral Health Surveillance System (NOHSS), the adult and children oral health indicators included in Phase 1 are:

1. Estimates of *tooth loss*
2. Estimates of *edentulism* (*complete tooth loss*)
3. Estimates of *dental visits* in general and for national and state populations
4. Estimates of *dental cleaning* in general and for specific populations (e.g., pregnant woman) representing national and state populations
5. Estimates of *dental caries* (prevalence and severity) in all age groups
6. Estimates of *sealant* among children and adolescents
7. Estimates of self-reported *periodontal* status
8. Self-reported *oral health status* for all age groups

Additionally, several outcomes were included, to cover dental workforce issues in Phase 1:

9. Estimates of *current dental workforce,* including Hispanic trends
10. Estimates of *projected dental workforce* influencing Hispanic trends

Data Universe and Selected Datasets — Data Sources

The research team reviewed the list of surveys included at the National Oral Health Surveillance System (NOHSS), U.S. Census Bureau, Centers for Disease Control and Prevention (CDC), and Agency of Healthcare for Research and Quality (AHRQ), to define the datasets included in this project.

Table A-1. Selected Data Sources

Federal Survey	Acronym	Agency	Dataset Options OBS=	Oral Health Question(s)
Annual Synopsis of State Oral Health Programs	ASTDD-BSS Part of the National Oral Health Surveillance System (NOHSS)	Association of State and Territorial Dental Directors (ASTDD)	Include state-specific data on oral health	Yes
Behavioral Risk Factor Surveillance System	BRFSS Part of the NOHSS	Centers for Disease Control and Prevention (CDC)	Include oral health data by race	Yes
National Hospital Ambulatory Medical Care Survey	NHAMCS	Centers for Disease Control and Prevention (CDC)	Include ambulatory health care data, as emergency dental visit rates, principal payer, and primary diagnosis	Yes
The Nationwide Emergency Department Sample	NEDS from Healthcare Cost and Utilization Project (HCUP)	Agency for Healthcare Research and Quality (AHRQ)	Largest all-payer emergency department (ED) dataset, yielding national estimates of hospital-owned ED visits, including dental-related ED visits	Yes
National Birth Defects Prevention Network	NBDPN	National Birth Defects Prevention Network (NBDPN)	Population-based birth defects, including cleft lip and palate	Yes
Medical Expenditure Panel Survey	MEPS	Agency for Healthcare Research and Quality (AHRQ)	Include if person was delayed in getting medical care, dental treatment, others	Yes

Federal Survey	Acronym	Agency	Dataset Options OBS=	Oral Health Question(s)
National Health and Nutrition Examination Survey	NHANES	Centers for Disease Control and Prevention (CDC)	Include last dental visit, oral cancer screening, oral hygiene home care, periodontal disease self-report, and other oral health measures	Yes
National Health Interview Survey	NHIS	Centers for Disease Control and Prevention (CDC)	Include dental insurance, social determinants of health, and patients with special needs	Yes
National Survey of Children's Health	NSCH	U.S. Census Bureau (USCB)	Include questions related to children's oral health status reported by caregivers	Yes
Pregnancy Risk Assessment Monitoring System	PRAMS	Centers for Disease Control and Prevention (CDC)	Include last preventive dental visit, dental insurance status, and oral and systemic health questions related to pregnancy	Yes
State-Based Oral Health Data Systems	Varies by state	Each state	Include questions related to last dental visit, nutrition, and behavior	Yes
Youth Risk Behavior Surveillance System	YRBSS	CDC	Include questions related to last dental visit, nutrition, and behavior	Yes
Dental Workforce	DW	U.S. Bureau of Labor Statistics (BLS), Health Resources and Services Administration (HRSA), American Dental Education Association, (ADEA), American Dental Association (ADA)	Include all indicators related to current dental workforce and projected dental workforce	Yes

DATASETS

Most datasets were readily available and required either downloading or selecting options through query systems. For example, NHANES datasets were downloaded directly from the National Center for Health Statistics and analyzed in SAS using standard procedures. BSS, YRBSS, and BRFSS data were downloaded as population estimates from their websites. All data were tabulated and screened by secondary data analysis to find answers to the research questions. Key findings from the data are displayed in graphs or figures.

Dataset Limitations

The analysis of dental visits by pregnant women and access to care using the Pregnancy Risk Assessment Monitoring System (PRAMS), and Medical Expenditure Panel Survey (MEPS) data, was deferred to Phase 2 because of limited access to the datasets by race/ethnicity. The National Survey of Children's Health (NSCH), MEPS, the Nationwide Emergency Department Sample (NEDS), and the National Hospital Ambulatory Medical Care Survey (NHAMCS) were deferred to Phase 2 because of the adjustment of its research questions. According to the initial findings, State Oral Health Surveys' (SOHS) staff coordinators were contacted to provide additional questions for PRAMS and YRBSS therefore, data were presented in Phase 2. To address the oral health workforce by state, the team sent an electronic survey to the 50 states and Puerto Rico dental and/or licensing board. By the close of this report, only 10 states had submitted their information. Thus, the analysis and key findings for this part of our research were presented in Phase 2, including data provided by the ADA Health Policy Institute (HPI) at the American Dental Association (ADA).

RESULTS (ALL PHASES)

The HDA Research Team has organized this *gallery report* into five sections or subsections covering results and analysis from:

- oral health status
- utilization of dental services
- dental workforce diversity

Table A-2. Study Outcomes & Data Sources

Data Collection Areas	Study Outcomes	Study Sources Phase 1	Study Sources Phase 2 & 3
Oral Health Status	*Dental Caries*	NHANES 2017–2020 BSS ASTDD	MEPS
	Periodontal Status	NHANES 2017–2020	MEPS
	Birth Defects (Cleft Lip and Palate)		NBDPN
Utilization of Dental Services	*Dental Visits*	NHANES BRFSS YRBSS PRAMS	MEPS NSCH NHIS PRAMS
	Dental Emergency Visits		NHAMCS NEDS
	Dental Sealants	BSS ASTDD NHANES 2011–2016	
	Dental Source of Payment		MEPS NHAMCS NEDS
Current and Projected Dental Workforce	*Diversity Data*	BLS HRSA ADEA In-House HDA Survey	BLS HRSA HPI at ADA ADEA In-House HDA Survey

Each section contains:

- A brief description of the data source collection status
- Methods, if a secondary analysis was required
- Key findings
- Terms and acronyms
- Tables

Table A-3. Phase 1 Study Life Course Scope

PREGNANCY	CHILDREN	YOUTH	ADULT	ELDERLY
PRAMS	NHANES			
	BIRTH DEFECTS	YRBSS	BRFSS	
	BSS			
	NSCH		MEPS	
NHIS				
NEDS				
NHAMCS				
State-Based Oral Health Data Systems				
Diversity Dental Education				
Diversity Dental Workforce				

Disclaimer: The findings in this report are those of the authors and do not represent the official position of the U.S. agencies and other organizations from which the data were collected, derived, or downloaded.

Oral Health Outcomes

CHAPTER 1:
NATIONAL HEALTH AND NUTRITION EXAMINATION SURVEY (NHANES) AND BASIC SCREENING SURVEY (BSS)

Oral Health Status and Outcomes Overview

In December 2021, the National Institute of Dental and Craniofacial Research (NIDCR) and National Institutes of Health (NIH) released the "Oral Health in America: Advances and Challenges" report. Despite important advances in the understanding and treatment of oral diseases and conditions, many people in the U.S. still have chronic oral health problems and lack of access to care. These are also oral health inequities for many in the Latino/Hispanic community. Using data provided by surveys like NHANES, BSS, YRBSS, and BRFSS, the most comprehensive surveys on oral health status in the U.S., the assessment concluded that "Americans of all ages continue to experience improvements in their oral health" (Dye et al., 2007).

Tooth decay is a serious public health problem that can affect a child's overall health and well-being. It can lead to pain and disfigurement, low self-esteem, nutritional problems, and lost school days. Children with oral health problems are three times more likely to miss school due to dental pain, and absences caused by pain are associated with poorer school performance (Jackson et al., 2011). Even though tooth decay can be prevented, many children in the U.S. still get cavities. To assess the current oral health status of U.S. elementary school children, each state conducts an oral health survey of third-grade children, generally every five years.

Background

- **National Health and Nutrition Examination Survey (NHANES)**

  The Centers for Disease Control and Prevention National Center for Health Statistics is the government agency in charge of the NHANES. NHANES is the most comprehensive surveillance system, providing normative, self-reported, and laboratory indicators on health and nutrition in a representative sample of the non-institutionalized U.S. population.

  The initial NHANES surveys, dating to the 1960s, were periodic complex data collection processes. The current cycle, designed as an ongoing process, started in 1999 but, due to the COVID pandemic, was discontinued in March 2020.

  The present analysis of oral health indicators for Hispanics and other racial/ethnic groups used the public data release for 2017–2020. This dataset has a set of specific weighting and sampling design variables to accommodate the missing data not collected after March 2020.

- **Basic Screening Survey (BSS)**

  This section of the analysis uses the results from each state's most recent BSS, a standardized surveillance tool that the Association of State and Territorial Dental Directors (ASTDD) developed to help states collect oral health data.

  This survey collects oral health data from third-grade children by each state in the U.S. However, not all the states collect data every year for all the estimators or for all racial/ethnic groups. Also, states use various categories and terminology for racial/ethnic populations.

  To present the data clearly, the following racial/ethnic identifications were used: Black, Hispanic, and White. Other racial/ethnic populations are not displayed.

  Forty-seven states reported data on dental outcomes, but only twenty-eight included Hispanic among their socio-demographic characteristics. In this report, we include the most recent data for each state.

  Survey teams followed the protocol of BSS from ASTDD. The use of this standard methodology allows for comparison between and among states and submission of these oral health status data to the National Oral Health Surveillance System. Dental screenings were collected by calibrated and trained survey teams consisting of dentists, dental hygienists, and project staff (ASTDD, 2017).

Methods

- **NHANES**

  We followed all technical recommendations from NCHS regarding the NHANES 2017–2020 analysis. We calculated estimates for normative outcome measures of dental caries, tooth loss, edentulism, and dental sealants, obtained by trained examiners (CDC, 2021).

  Also, we obtained self-reported estimates for dental visits and measures of periodontal status from the home interviews. These measures are presented by race/ethnicity using an NHANES recoded variable. This report includes data from participants who identified as Mexican American separately from those who identified as Hispanic.

  In addition, we used the recommended set of age groups for stratification (CDC, 2022). All analyses were done in SAS in duplicate. We used the number of decayed, missing, and filled teeth (dmft=primary teeth; DMFT=permanent teeth) to measure dental caries occurrence.

  However, to make a fair comparison among age groups, we kept the number of missing teeth separate. Therefore, we provide measures of prevalence of decayed and filled teeth (dft>0 or DFT>0) and severity (mean dft or mean DFT).

  Also, due to the low prevalence and severity of decayed teeth (dt or DT), we report the mean number of filled and missing teeth separately, the latter only among adults. We did not perform formal statistical tests to avoid the issue of multiple comparisons.

  Missing information in the tables and graphs corresponds to censored data. These were data points where the coefficient of variance was greater than 30% and assumed to be not reliable (NR). In the tables, they appear as NR followed by a footnote, and in the graphs with a "Not Reliable" label.

  The charts include error bars corresponding to alpha=0.05. However, because the confidence intervals are approximations, they should not be used to determine statistical differences.

- **BSS**

  The following is a list of outcomes included in this section:
  - Estimates of caries experience
  - Estimates of untreated decay
  - Estimates of dental sealant

  One investigator transferred the weighted estimates into Excel tables, from which we derived the final set of tables and graphs.

- **NHANES**
  - ○ **Dental caries in primary teeth (Figures A-1 to A-5)**
    - — Mexican American children had the highest prevalence of dental caries (dft>0) in both the 2–5 (39%) and 6–11 (64%) age groups.
    - — Mexican American children aged 2–5 years had a higher prevalence of untreated decay (dt>0) than their racial/ethnic counterparts.
    - — Mexican American children aged 2–5 years had the highest mean number of filled teeth than their counterparts.
    - — Among participants with one or more decayed or filled teeth, filled teeth were at a higher proportion than decayed teeth in both age groups and with no racial/ethnic differences. The mean contribution of filled teeth is higher in the 6–11 age group, suggesting continued access to restorative care.

Around one-fifth (22%) of children surveyed aged 2–5 years had one or more decayed or filled primary teeth (dft>0, Figure A-1). The prevalence was higher for Mexican American children (39%). The prevalence of dft for Mexican American children aged 6–11 years (64%) remained the highest compared with all children aged 6–11 years (47%). Mexican American children aged 6–11 years have a higher prevalence of decayed teeth (64%) than the average among children aged 2–5 years, but the a similar difference is not seen in children aged 6–11 years (Figure A-2).
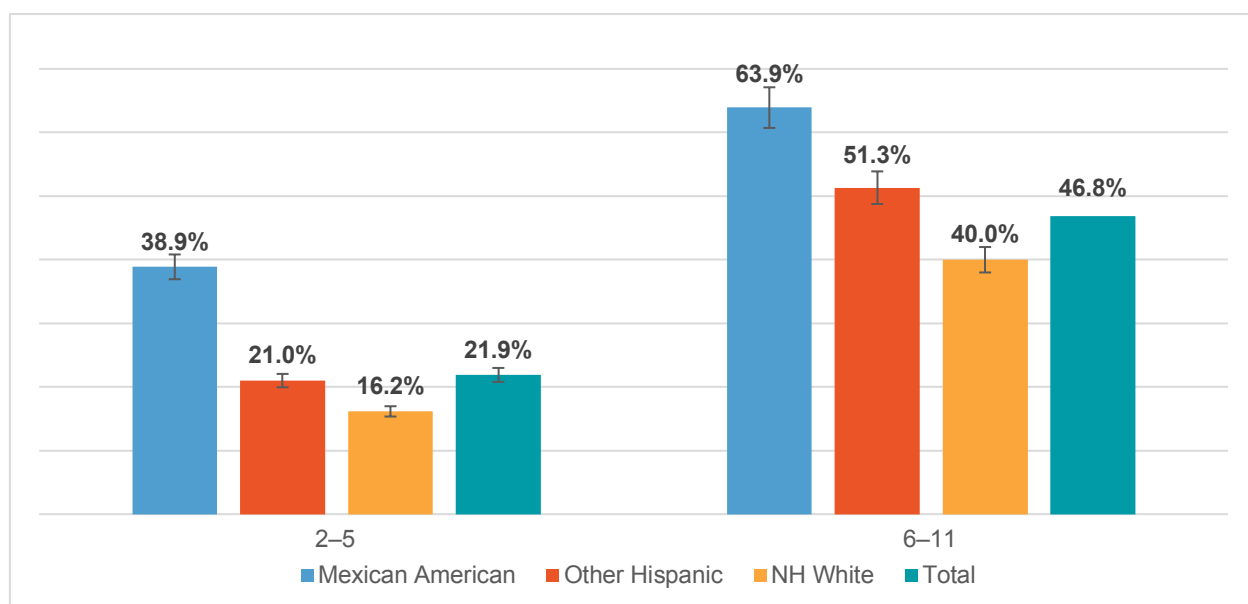

Figure A-1: Prevalence of Decayed and Filled Primary Teeth (dft>0) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.
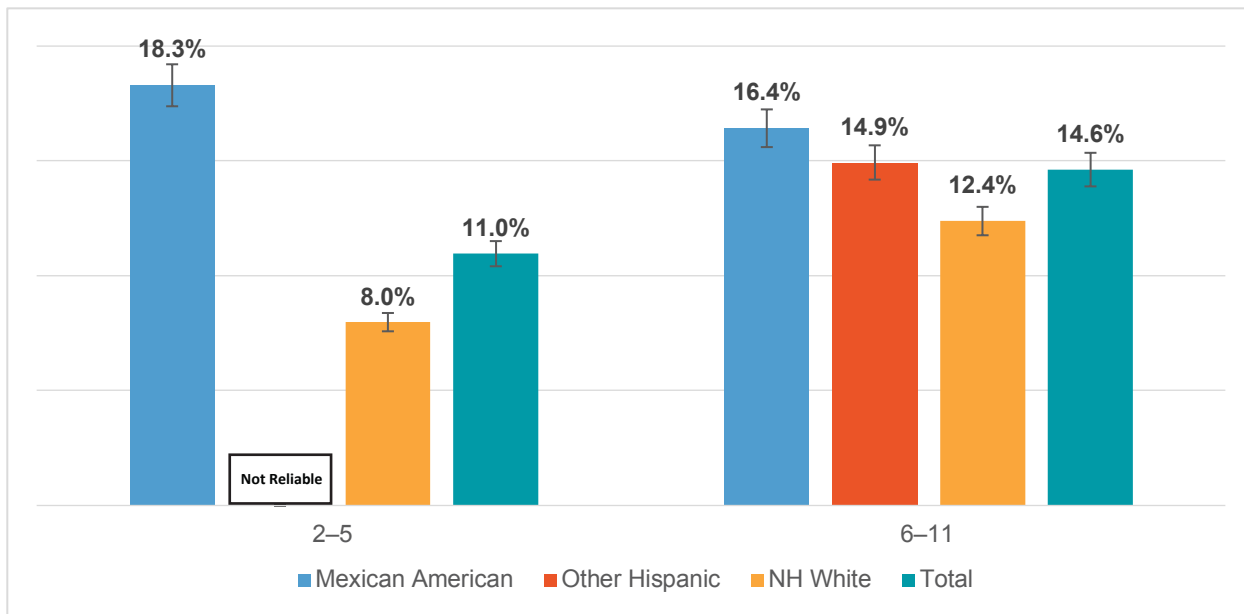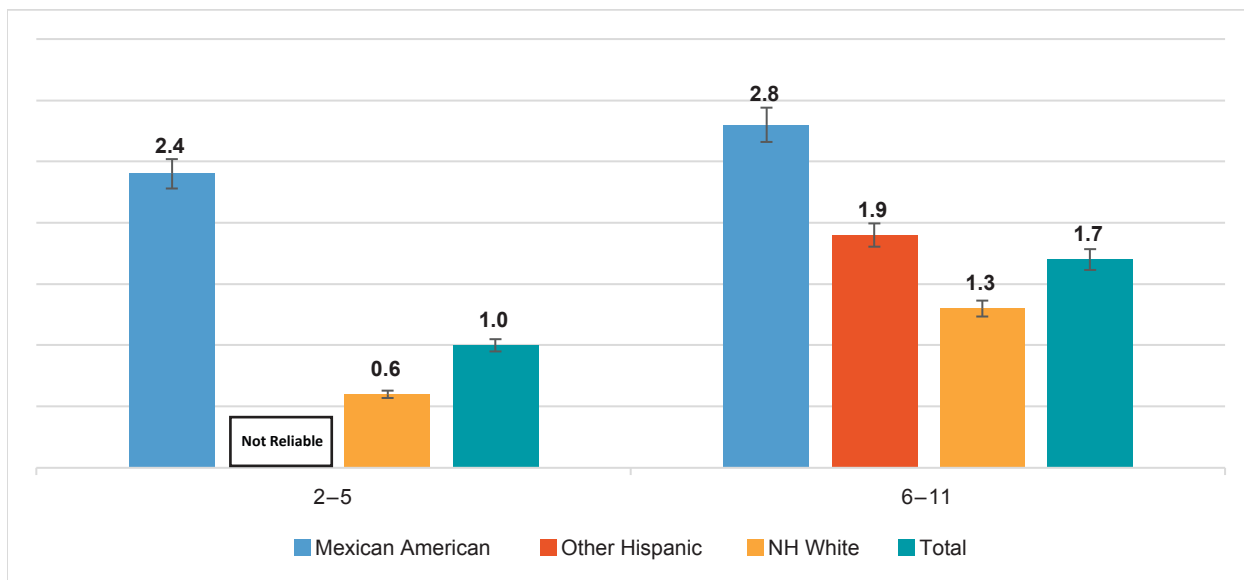
Figure A-2: Prevalence of Decayed Primary Teeth (dft>0) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

Mexican American children also had the highest mean number of decayed and filled teeth in both age groups (Figure A-3), compared with the categories of other Hispanic and non-Hispanic White (Figure A-3), with a strong contribution of filled teeth (Figure A-4). Indeed, the mean number of decayed teeth alone was too small to produce reliable estimates.

Figure A-3: Mean Number of Decayed and Filled Primary Teeth (dft) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.
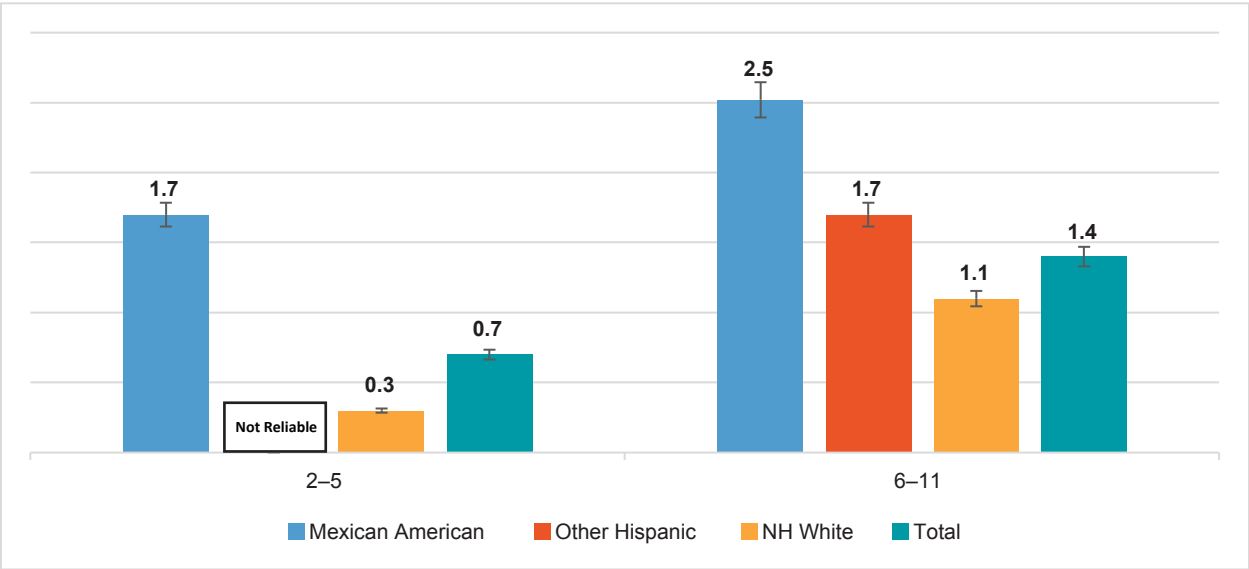
Figure A-4: Mean Number of Filled Primary Teeth (ft) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

The highest proportion of children with filled teeth were in the 6–11 age group (78%), followed by ages 2–5 years (57%), with no significant differences by race/ethnicity (Figure A-5).
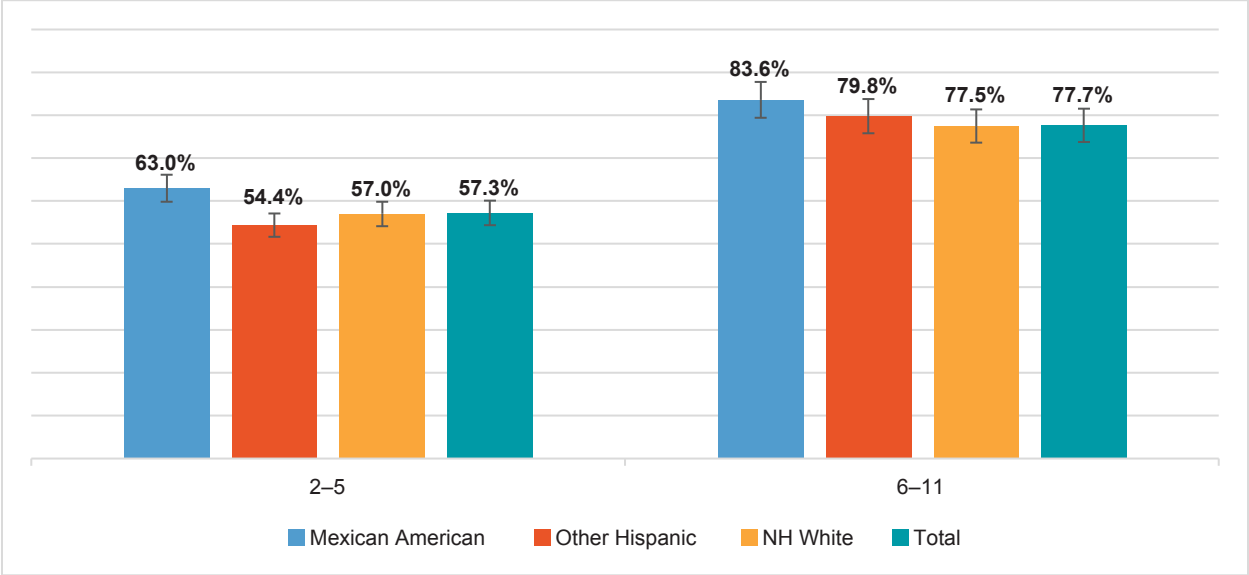

Figure A-5: Mean Percent Contribution of Filled Primary Teeth Over the Number of Decayed and Filled Teeth (ft/dft) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

- ○ **Dental caries in permanent teeth (Figures A-6 to A-11)**
    - — Regardless of age and race/ethnicity, NHANES participants have a higher proportion of restored permanent teeth than untreated permanent teeth (Figs. A-7 and A-11).
    - — Hispanic children aged 6–11 years had the highest prevalence of decayed and filled teeth (DFT>0) compared to other children in that age group.
    - — Hispanic adults aged 65 years and older had the lowest mean number of decayed and filled teeth (DFT>0; Figure A-8) compared to other adults in that age group.
    - — Hispanic adults aged 65 years and older had the highest mean number of missing teeth (MT>0; Figure A-10) compared to other adults in that age group.

The overall prevalence of decayed and filled teeth (DFT>0) was lower in children aged 6-11 (15%) compared to the prevalence in adults aged 20 years or higher (76%; Figure A-6). There was a lower prevalence of decayed and filled teeth among adults aged 65 and above than for younger adults (Figure A-6), which may by explained by the higher mean number of missing teeth in this age group (Figure A-10).

Hispanic children aged 6–11 years had a higher prevalence of decayed and filled teeth (21% to 24%) than the overall prevalence for that age group (Figure A-6). The same trend was observed in Hispanic children aged 12–15 years and 16–19 years. There were no significant differences in the prevalence of decayed and filled teeth between racial/ethnic groups in adults. Hispanic adults aged 75 years or older had a lower prevalence of decayed and filled teeth than the overall prevalence, but there is an overlap in all 95% confidence intervals.
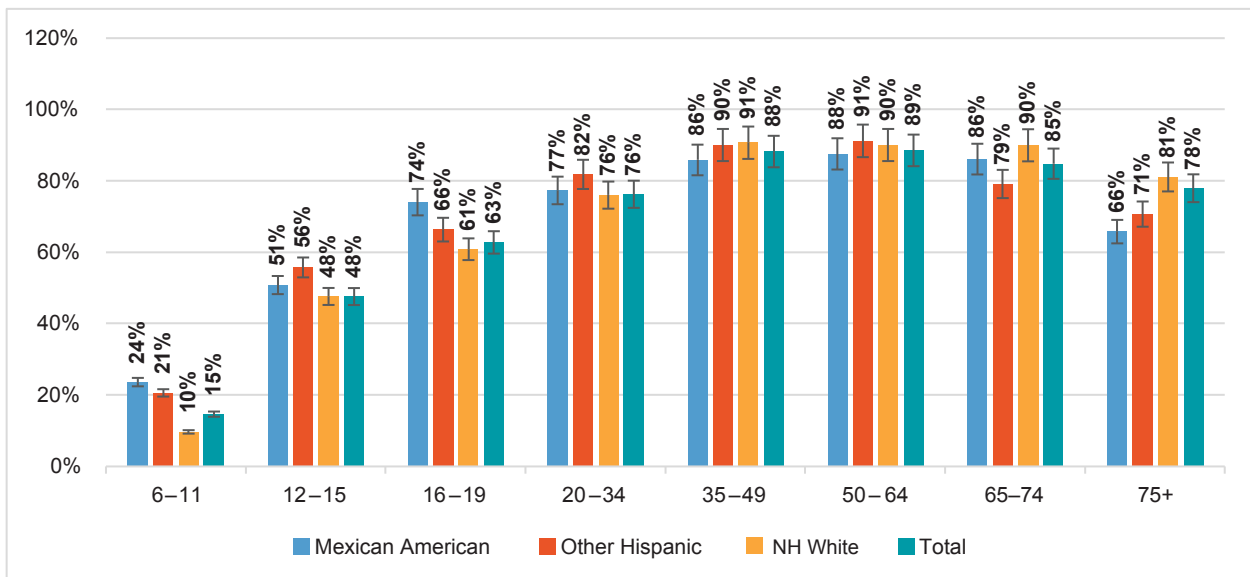

Figure A-6. Prevalence of Decayed and Filled Teeth (DFT>0) in Permanent Teeth by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

The prevalence of untreated decayed teeth (DT>0) was below 15% for children and adolescents aged 19 and younger, and adults aged 75 and over. The DT prevalence for most adults aged 20 to 74 was in the 15%–25% range. There were no apparent differences among racial/ethnic groups in age groups with available data. As data for Hispanic adults aged 75 and older were either unavailable or incorrect, it is not possible to draw conclusions about the DT prevalence in this age group.

The distributions of the mean number of decayed and filled teeth (DT, Figure A-8) and filled teeth alone (FT, Figure A-9) were similar, similar to one another, suggesting that the majority of DFT was accounted for by restored teeth.
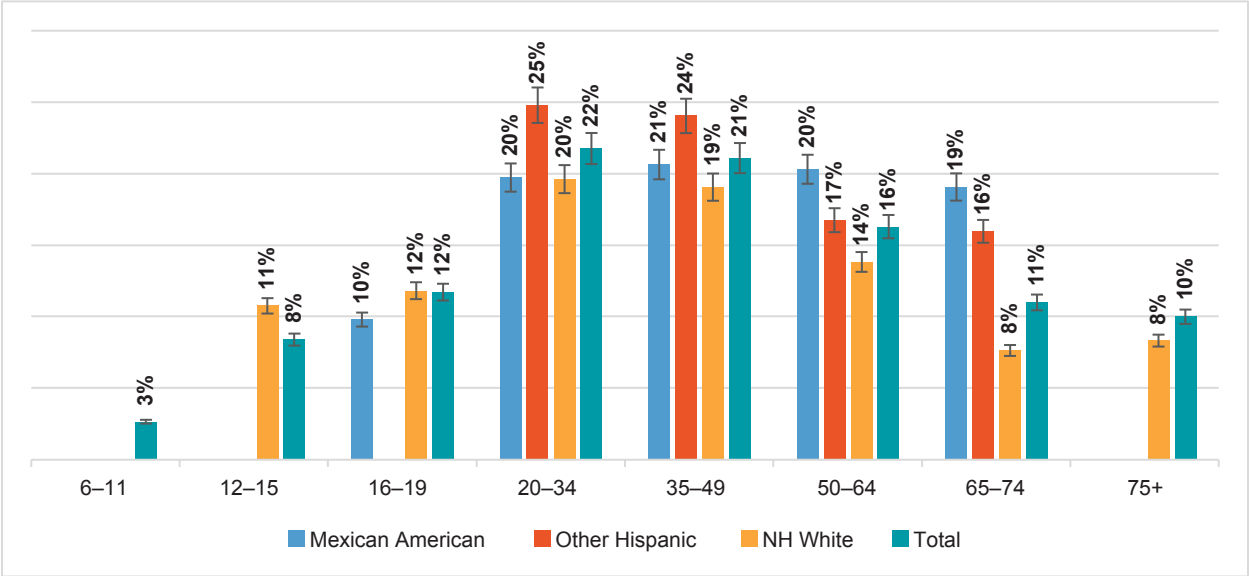

Figure A-7. Prevalence of Untreated Decay (DT>0) in Permanent by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.
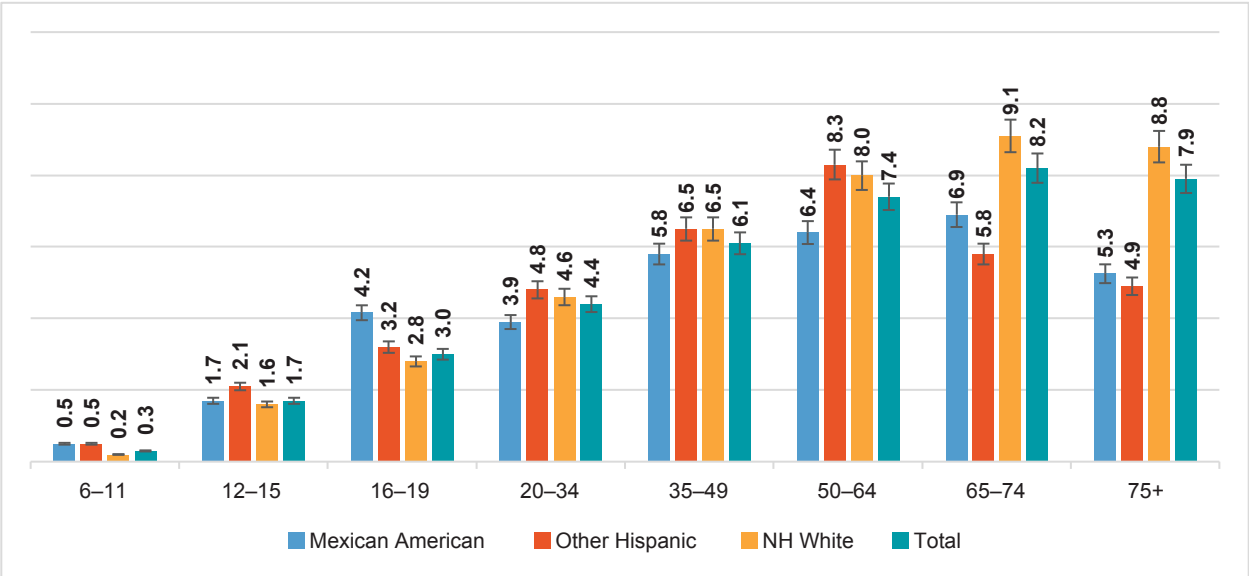

Figure A-8. Mean Number of Decayed and Filled Permanent Teeth (DFT) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.
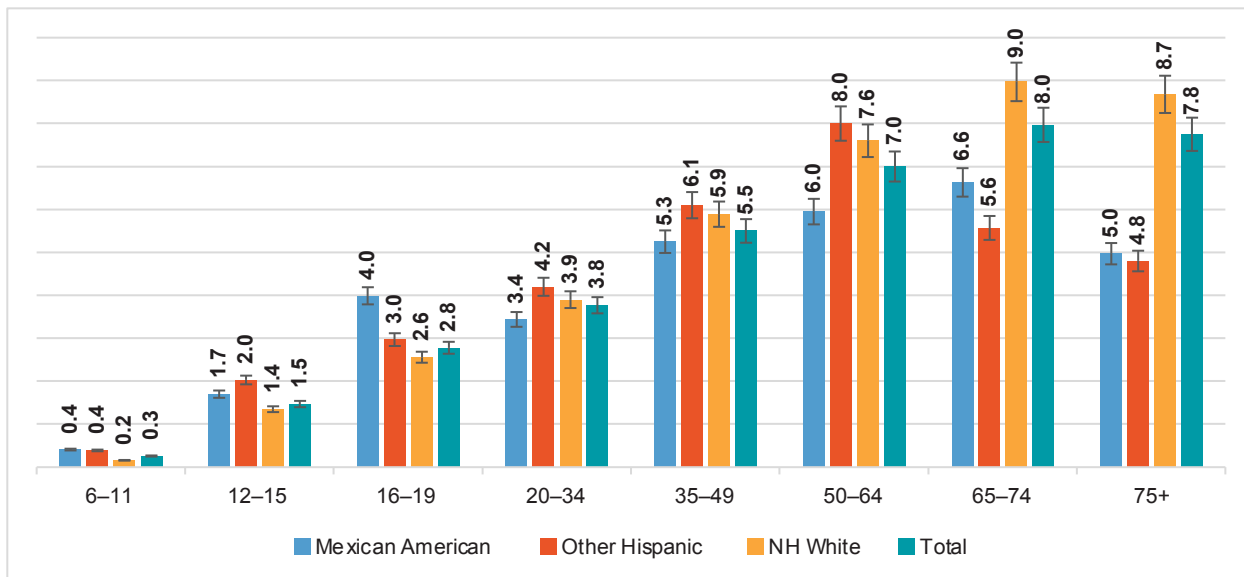
**Figure A-9. Mean Number of Filled Permanent Teeth (FT) by Age Group and Race/Ethnicity.
United States, NHANES 2017–2020 Pre-Pandemic Data.**

There were no significant differences in the mean number of decayed and filled teeth or mean of filled teeth among racial/ethnic groups across age group (Figures A-8 and A-9). The exception was Mexican American participants, who showed higher mean numbers than their counterparts in the 16–19 age group for FT and lower mean numbers of FT for adults aged 50–64.

Mexican American and Hispanic participants aged 65 and older showed a lower mean number of decayed and filled teeth compared to other adults in the same age group (Figure A-8). The mean number of missing teeth increased steadily from less than one in the 20–34 age group to 11 among those 75 years and older (Figure A-10).
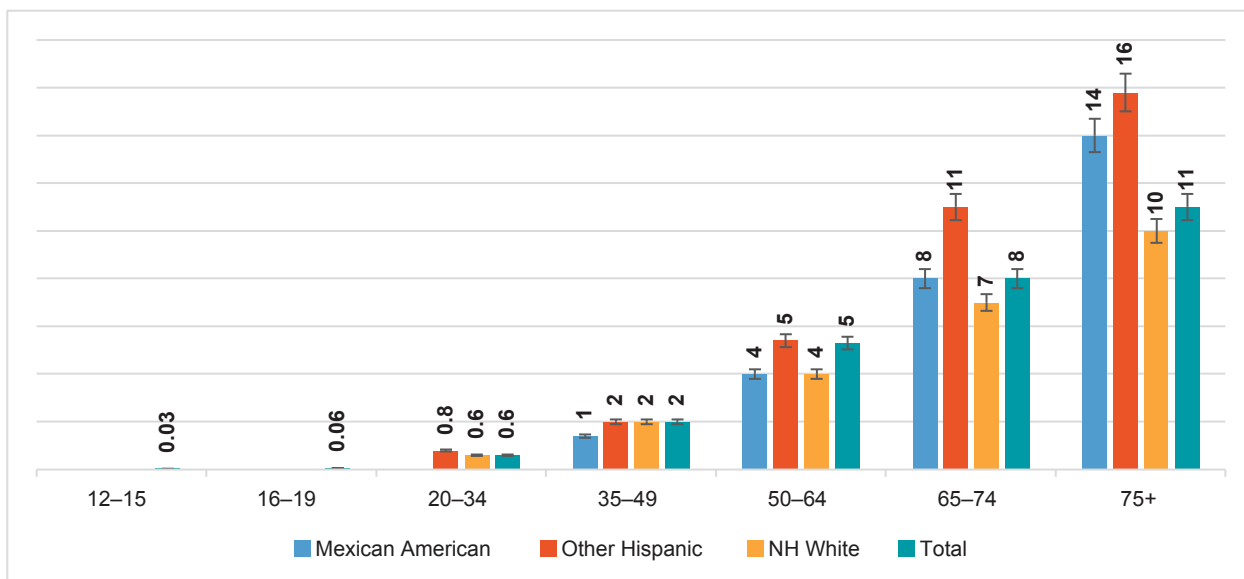

**Figure A-10. Mean Number of Missing Permanent Teeth Due to Disease by Age Group and Race/Ethnicity.
United States, NHANES 2017–2020 Pre-Pandemic Data.**

Hispanic older adults had a higher mean number of missing teeth (14–16 teeth), compared with the overall mean (11 teeth, Figure A-11). Among those with decayed and filled teeth (DFT>0), filled teeth contributed over 77% of the score and increased bimodally between 6 and 19 years and then from 20 to 75+ years. There were no significant differences in the percent contributed by filled teeth by race/ethnicity.
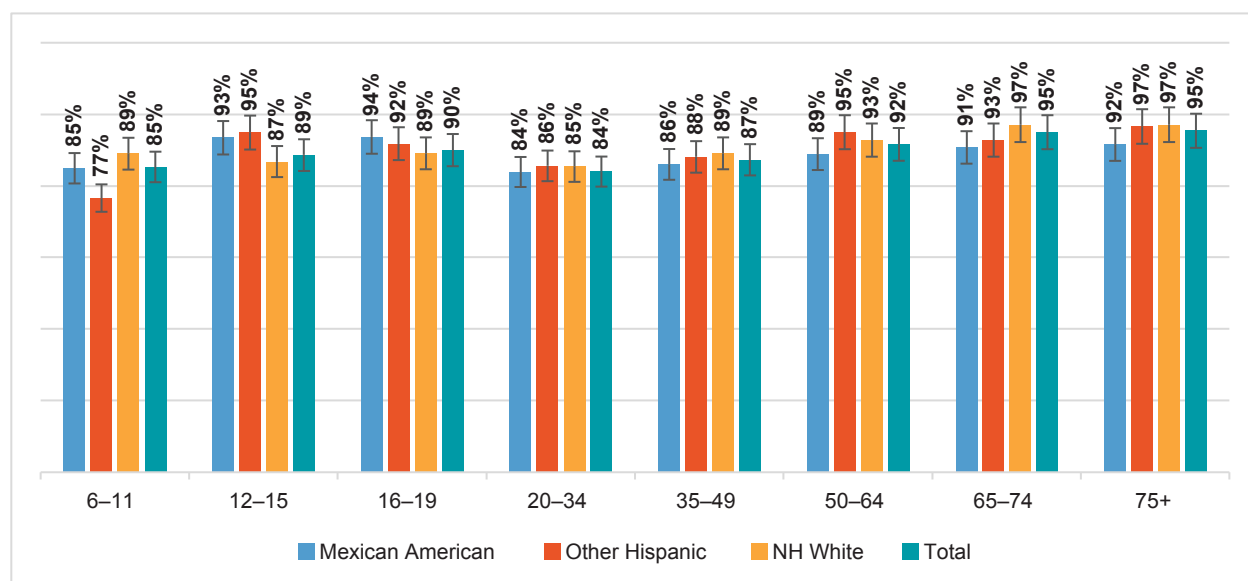

Figure A-11. Mean Percent Contribution of Filled Teeth Over the Number of Decayed and Filled Permanent Teeth (%FT/%DFT) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

○ **Tooth Retention and Edentulism (Figures A-12 and A-13)**

Hispanic adults aged 65 and older retained a lower mean number of permanent teeth than other adults in the same age range (Figure A-12). This finding is consistent with the higher number of missing teeth in the same age groups (Figure A-10).

— There were no significant differences in edentulism between Hispanics and non-Hispanic Whites (Figure A-13).

— The mean number of teeth calculations did not include third molars. As expected, the mean number of retained teeth decreased with age (Figure A-12). The mean number of retained teeth did not include third molars.

— There were no apparent differences by race/ethnicity in the mean number of retained teeth within the adult population. However, following the trend of missing teeth (Figure A-10), the mean number of retained teeth was lower among Hispanic older adults compared to non-Hispanic adults (Figure A-12).
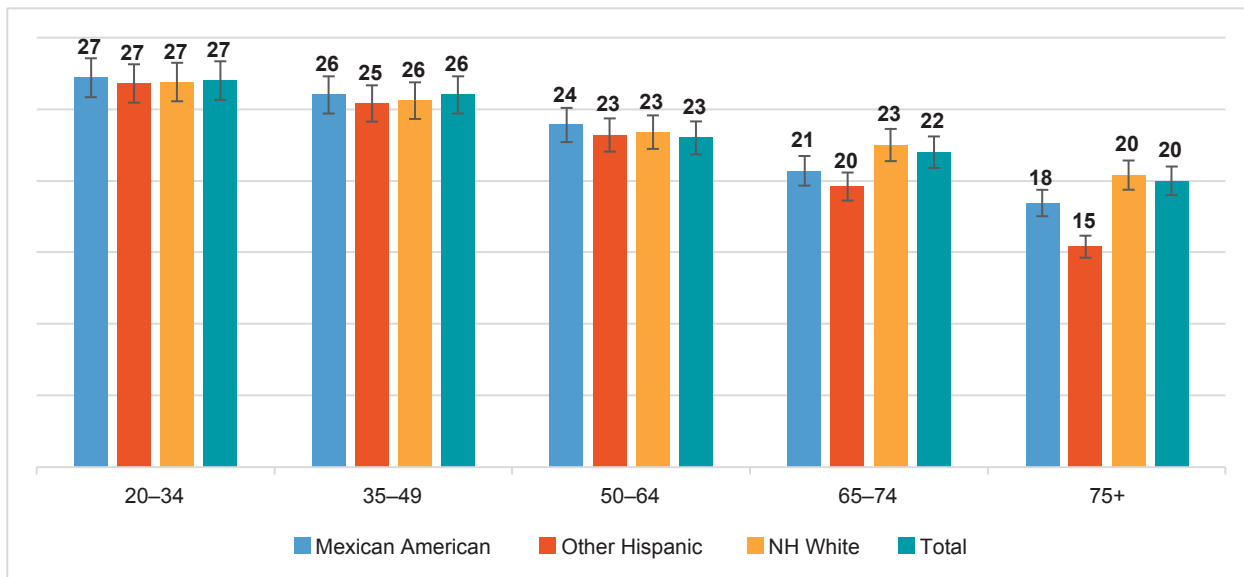
Figure A-12. Mean Number of Teeth Based on 28 Permanent Teeth by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

We estimated the prevalence of edentulism including third molars. The overall prevalence of edentulism was 2.6% among adults aged 20–64 years (Figure A-13), with reliable data only for other Hispanics (1.5%). The prevalence among adults aged 56 and older was 15% with no significant differences by race/ethnicity.
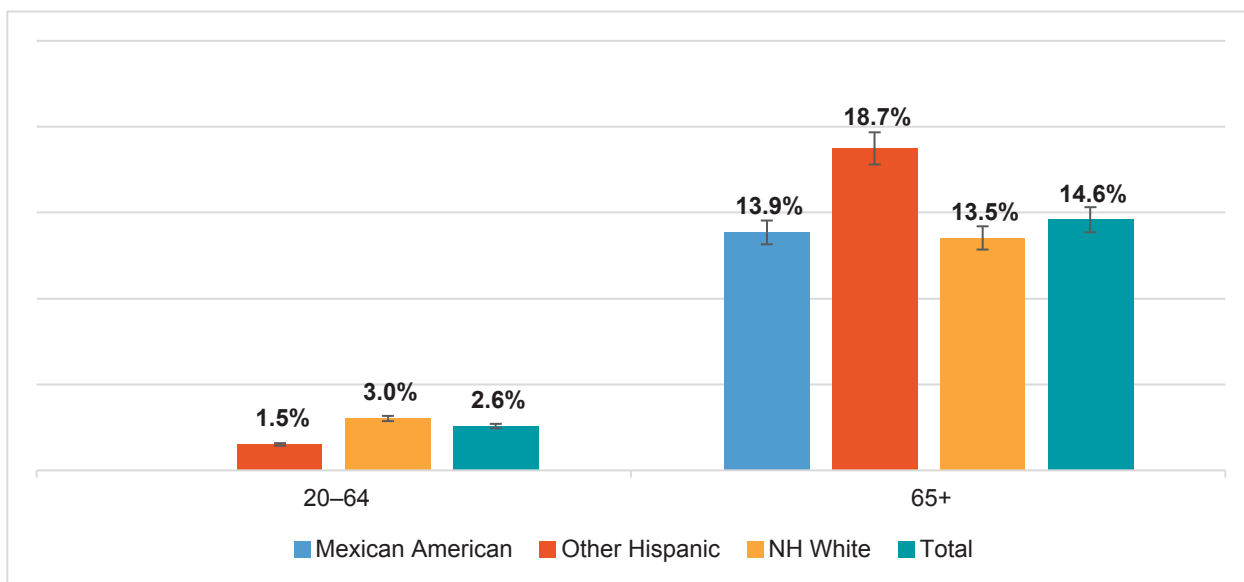

Figure A-13. Prevalence of Participants Who Have Lost All Their Teeth (Edentate) by Age Group and Race/Ethnicity. United States, NHANES 2017–2020 Pre-Pandemic Data.

○ **Self-Reported Periodontal Status Questions (Figure A-14)**

— Around 20% of participants reported having gum disease. There were no clear differences by age or by race/ethnicity.

— Between 15% and 35% of adults aged 35 and above reported being treated for gum disease. Hispanics reported higher percentages of being treated for gum disease than other racial/ethnic groups, especially in the 35–49 year old age group.

— The percentage of participants who reported they have been told they had bone loss increased by age. There were no apparent differences among the race/ethnic groups included.
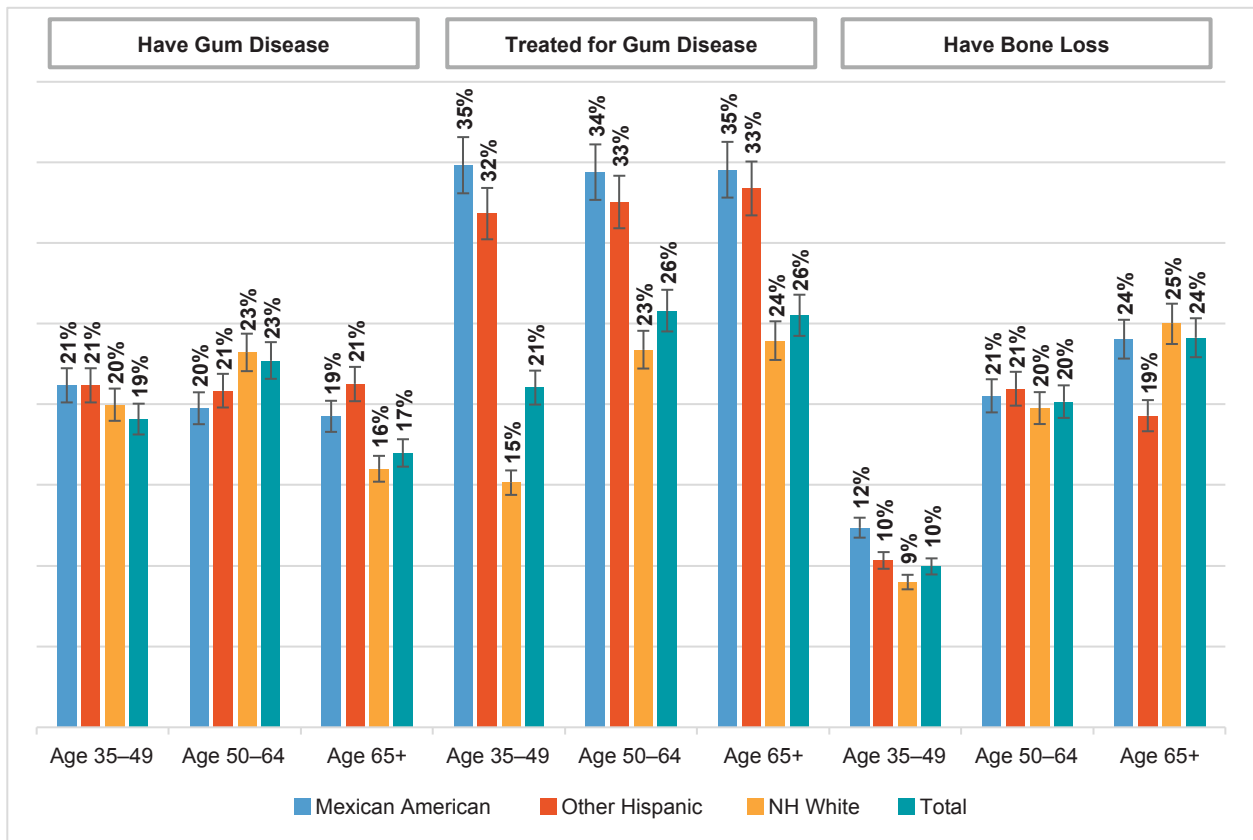

Figure A-14. Self-Reported Measures of Periodontal Status by Selected Racial/Ethnic Group. United States, NHANES 2017–2020 Pre-Pandemic Data.

- ○ **Dental Visits (Figure A-15)**
  - — The proportion of participants reporting having a dental visit in the previous 12 months was higher for children and adolescents aged 19 and younger compared to adults aged 20 and older.
  - — There were no significant differences by race/ethnicity in the proportion of participants reporting a dental visit in the previous 12 months across all age groups.
  - — Hispanic adults aged 65 were less likely than non-Hispanic adults in that same age group to report having a dental visit in the prior 12 months.
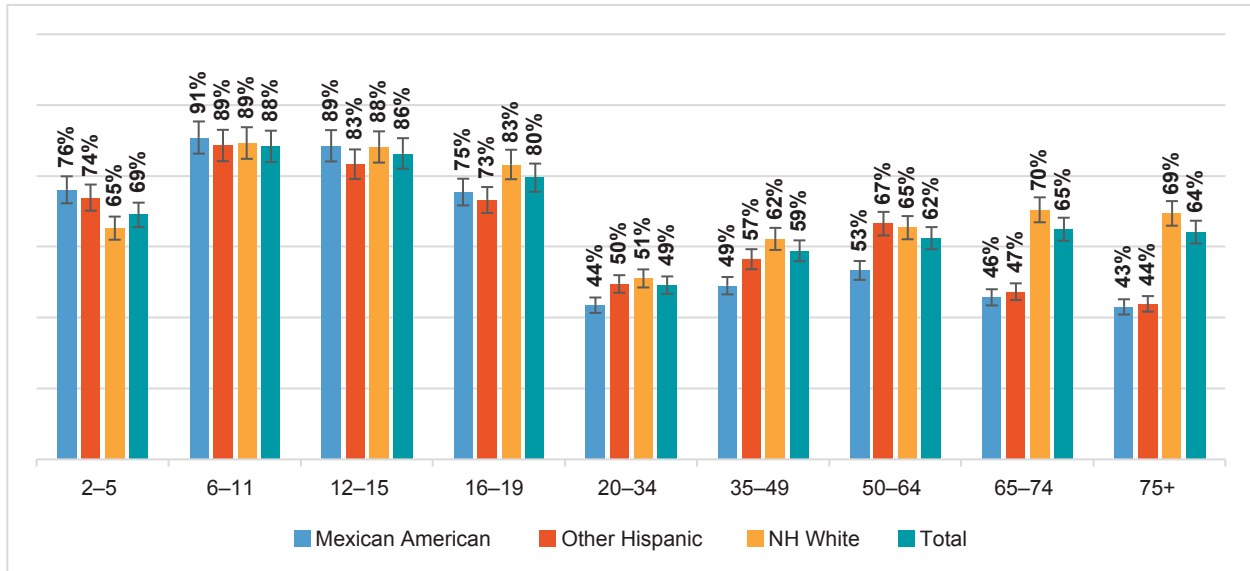

Figure A-15. Reporting Having a Dental Visit in the 12 Months Before the Interview by Selected Racial/Ethnic Group. United States, NHANES 2017–2020 Pre-Pandemic Data.

- ○ **Self-Reported Status of Teeth and Gums (Figure A-16)**
  - — A lower proportion of Mexican Americans and other Hispanics reported the status of their teeth and gums as "excellent" or "very good" compared to non-Hispanic individuals, with the exception of the 16-19-year-old group.
  - — Conversely, Mexican Americans and other Hispanics were more likely to report the status of their teeth and gums as "fair" or "poor" compared to non-Hispanic individuals in most age groups.
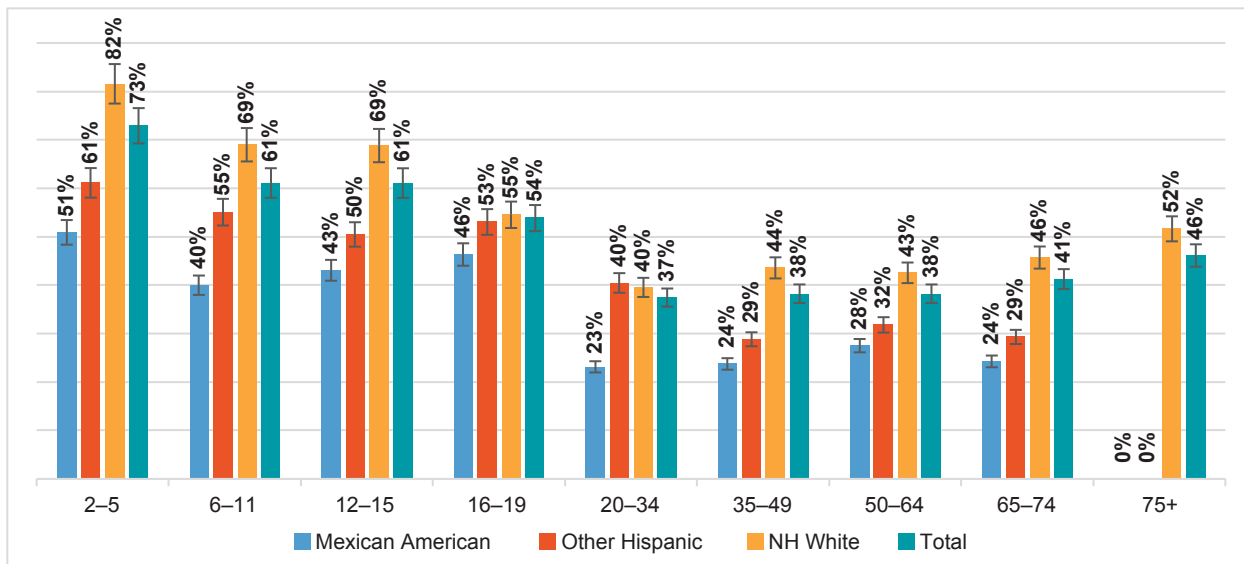
Figure A-16. Reporting Excellent or Very Good Status of Teeth and Gums by Selected Racial/Ethnic Group. United States, NHANES 2017–2020 Pre-Pandemic Data.

- Prevalence and Number of Dental Sealants (Figures A-17 and A-18)

  — The prevalence of dental sealants and the mean number of sealants was lower among Hispanic children aged 16–19 years, compared to non-Hispanics. There were no significant differences in sealant prevalence or mean number of sealants in the two younger age groups (6–11 and 12–15 years).

  — The prevalence of children and adolescents with dental sealants increased from 43% at 6–11 years to 52% at 12–15 years and 45% at 16–19 years (Figure A-17). Hispanics had comparable prevalences of sealants in the younger age groups but a lower prevalence in the 16–19 age group.

  — The disparity in dental sealants is less evident in the mean number of sealed teeth (Figure A-18), but the trend is similar. For example, the mean number of sealed teeth in adolescents aged 16-19 is 2.4 among Mexican Americans and 2.5 among other Hispanic adolescents, but 2.8 in total.
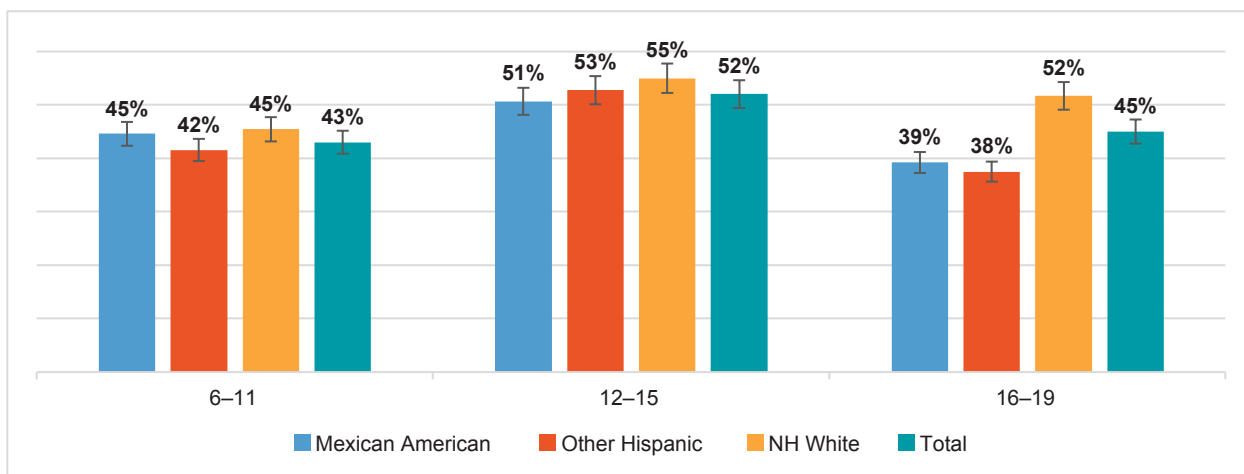

Figure A-17. Prevalence of Dental Sealants Among Those With One or More Eligible Tooth by Age and Race/Ethnicity. United States, NHANES 2011–2016.
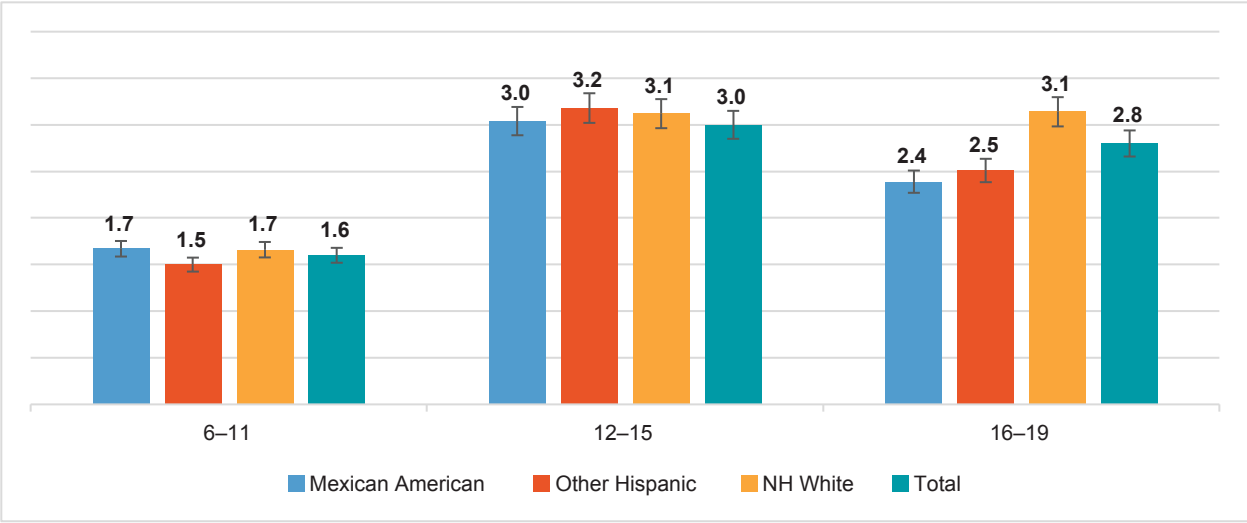
Figure A-18. Mean Number of Sealants Among Those With One or More Eligible Tooth by Age and Race/Ethnicity. United States, NHANES 2011–2016.

Second Round of Key Findings from BSS and NHANES Data

- **BSS**

  - **Prevalence of Dental Sealants, NHANES and BSS (Figure A-19)**

    — In comparing the percentages of 6–11 year-old Hispanic children with dental sealants, no significant differences were found between NHANES (43%) and BSS (45%).
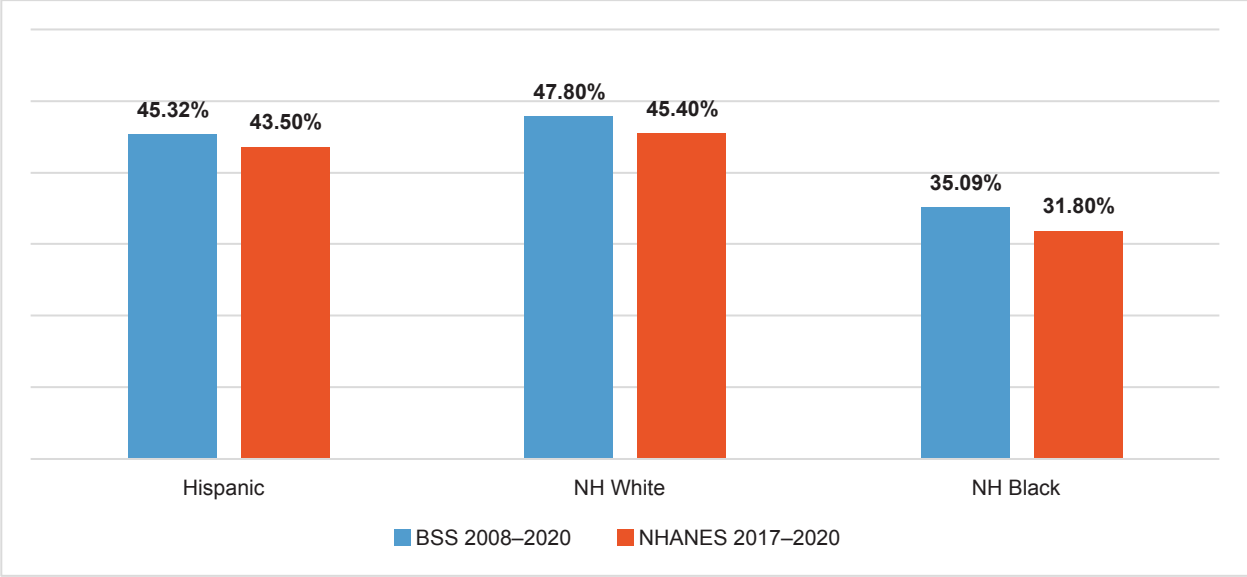

Figure A-19. Prevalence of Dental Sealants Among Those With One More Eligible Tooth by Age and Race/Ethnicity. United States, NHANES 2017–2020/BSS 2008–2020.

○ **Caries Experience (Figure A-20)**

We calculated treated and untreated decay in both primary and permanent dentitions using BSS data across 28 states by race/ethnicity.

— Among states reporting data for Hispanics or Latinos, the lowest caries experience was in Maine (24%), while the highest caries experience was in Idaho (79%) and Nebraska (79%).

— In the 10 states with the highest Hispanic population, the range of caries experience ranged from 45% in Florida to 72% in California (Figure A-20).
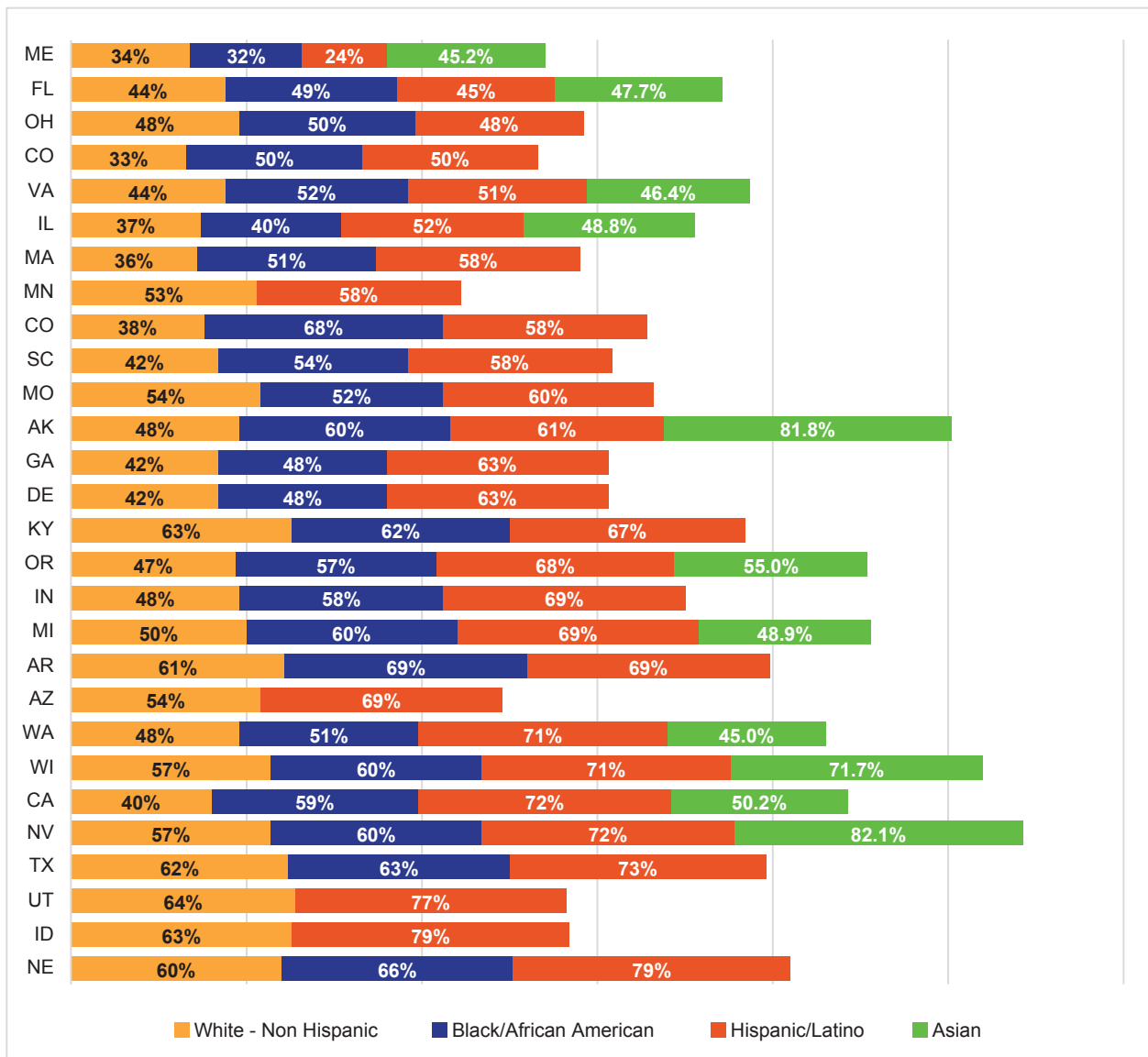

Figure A-20. Caries Experience in 28 States by Race/Ethnicity. United States, BSS 2018–2020.
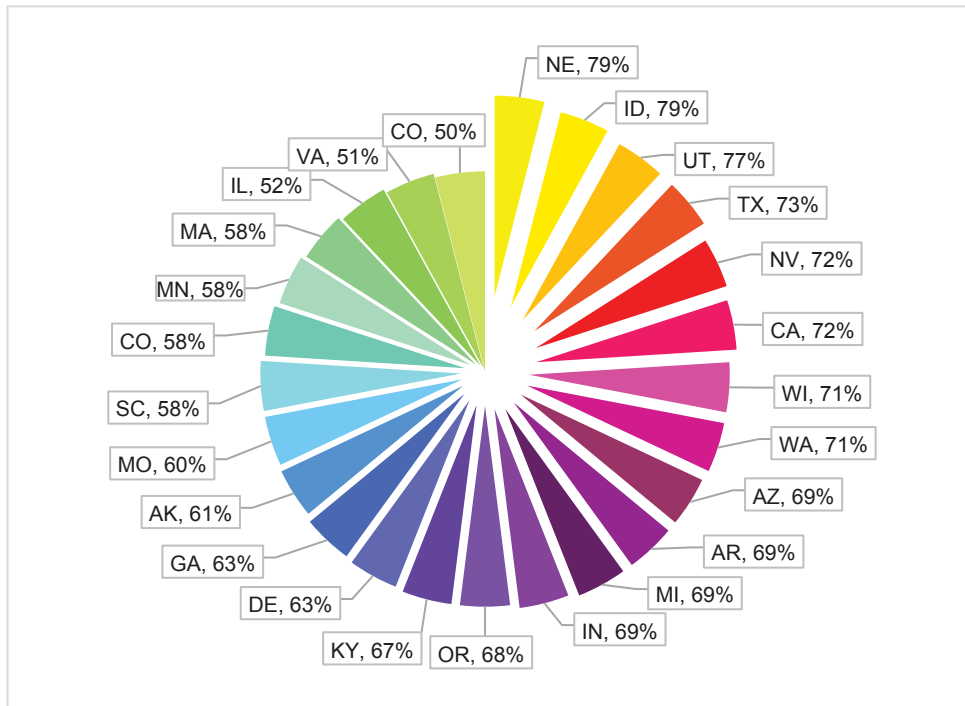
Figure A-21. Caries Experience Among Hispanic/Latino Third Graders in States With Available Data. United States, BSS 2008–2019.

○ **Untreated Tooth Decay (Figures A-22 and A-23)**

Untreated tooth decay was defined as the presence of one or more teeth with cavitated lesions, including lesions that visually appear to be clinically arrested. Data were presented only for 27 states reporting Hispanic/Latino for race/ethnicity.

— Among states reporting data for Hispanics or Latinos, the lowest prevalence of untreated tooth decay was in Maine (8%) and Washington (14%) (Figure A-22), while the highest prevalence was in Nebraska (36%) and Kentucky (41%).

— Sixteen states have reported oral health data for Hispanic third graders since 2010. In 11 states, Hispanic third graders were up to 1.5 times more likely to have untreated decay than White third graders. In the other five states, Hispanic third graders were less likely to have untreated decay than White third graders (Figure A-23).
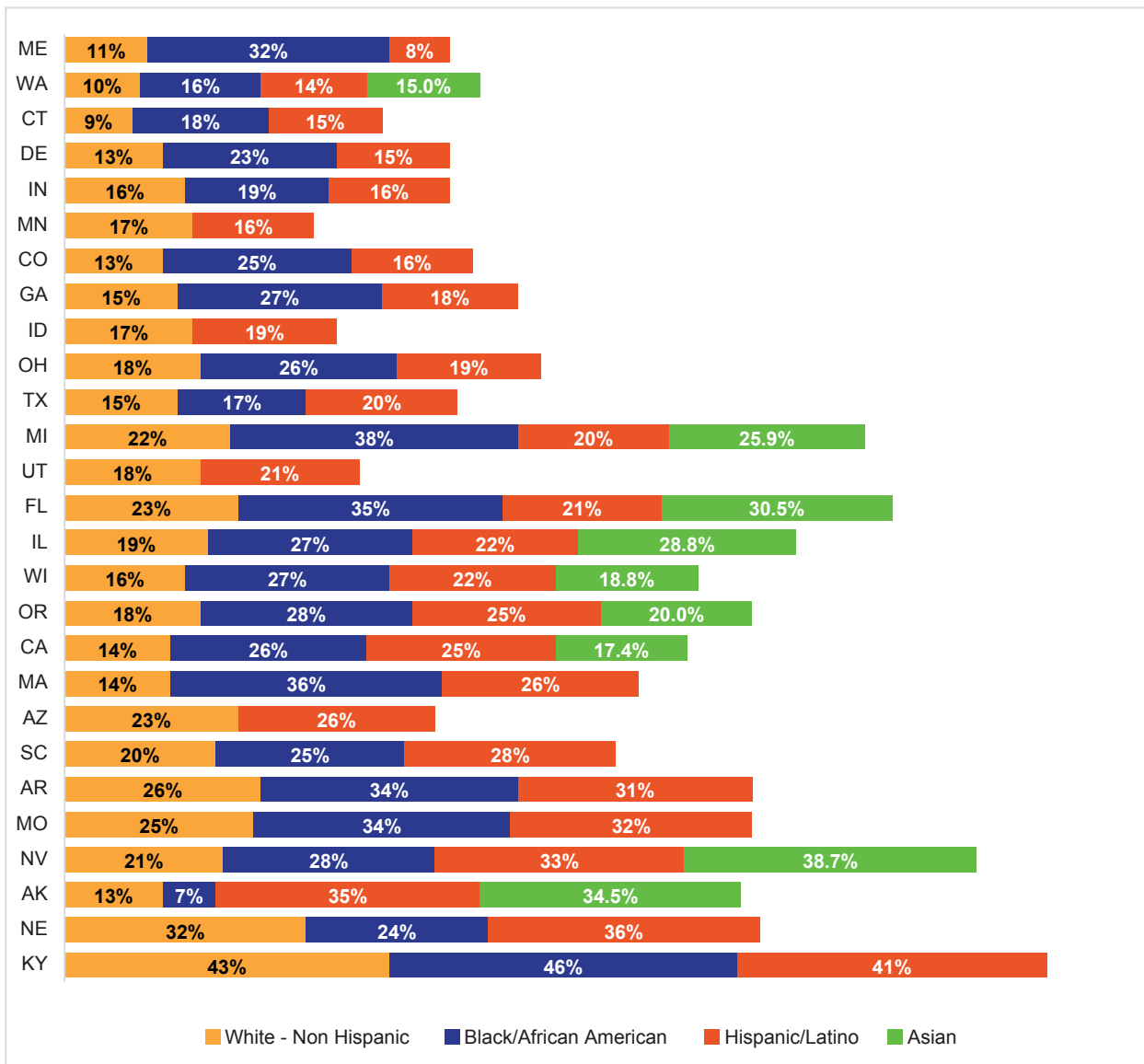
Figure A-22. Untreated Tooth Decay by Race/Ethnicity in 27 States. United States, BSS 2008–2019.
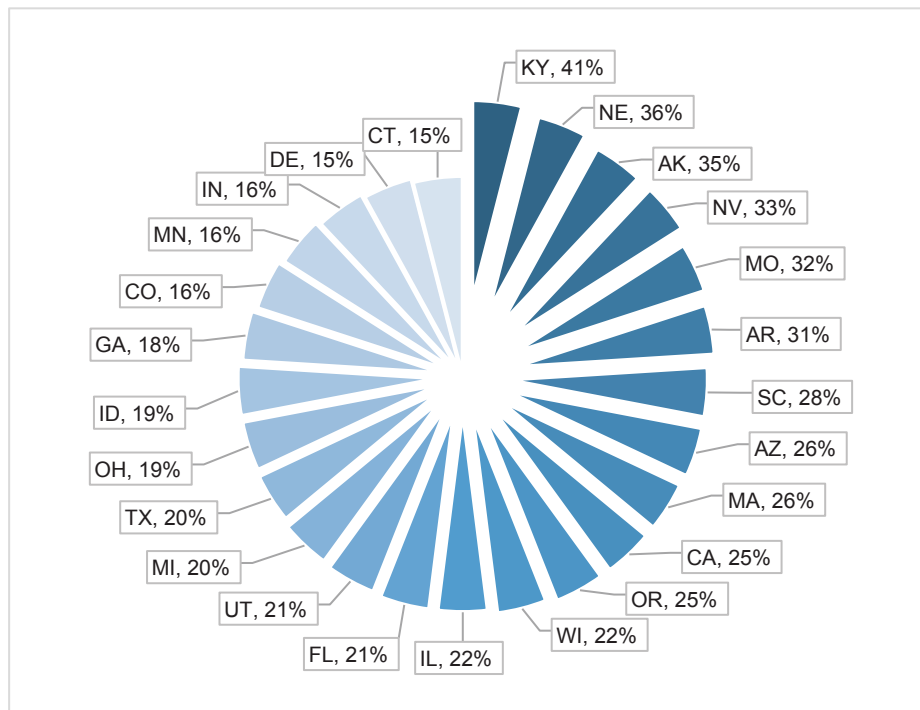
Figure A-23. Untreated Dental Decay Among Hispanic/Latino Third Graders in States With Available Data. United States, BSS 2008–2019.

○ **Dental Sealants (Figures A-24 and A-25)**

We calculated the prevalence of dental sealants using BSS data across 25 states by race/ethnicity.

— Overall, the lowest prevalence of dental sealants was reported in South Carolina (24%), while the highest prevalence was reported in Wisconsin (70%) and Idaho (68%).

— Among states reporting data for Hispanics or Latinos, the lowest prevalence of dental sealants was reported in Alaska and South Carolina (26% each), while the highest prevalence was reported in Idaho (67%) and Wisconsin (68%) (Figure A-24).

— In seven out of 25 states that reported dental sealant data for Hispanic third graders, non-Hispanic White third graders were up to 2.1 times more likely to have sealants than Hispanic third graders. In the other eight states, Hispanic third graders were equally likely or up to 1.3 times more likely to have dental sealants than non-Hispanic White third graders (Figure A-25).
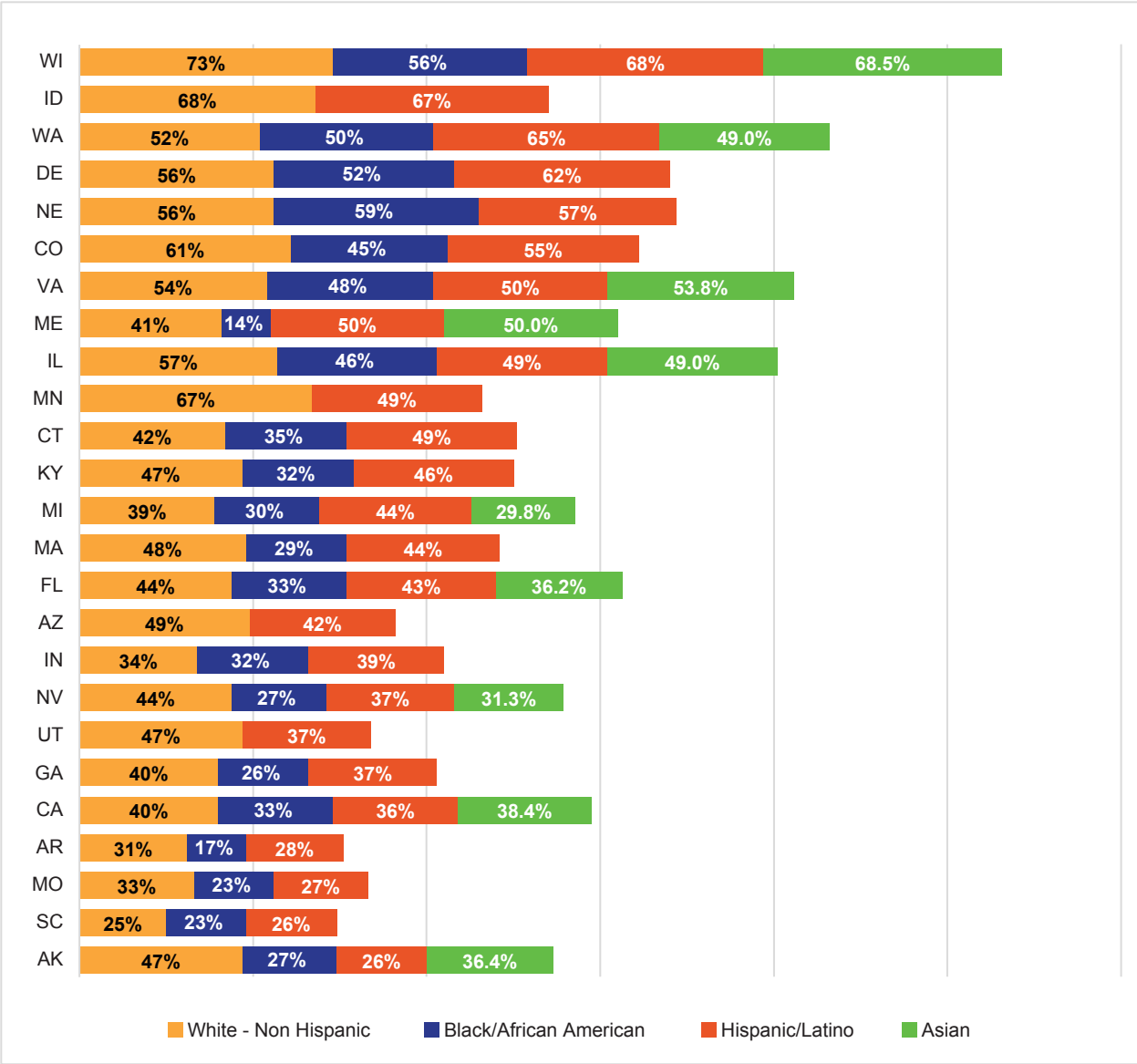
Figure A-24. Prevalence of Dental Sealants by Race/Ethnicity in 27 States. United States, BSS 2008–2019.
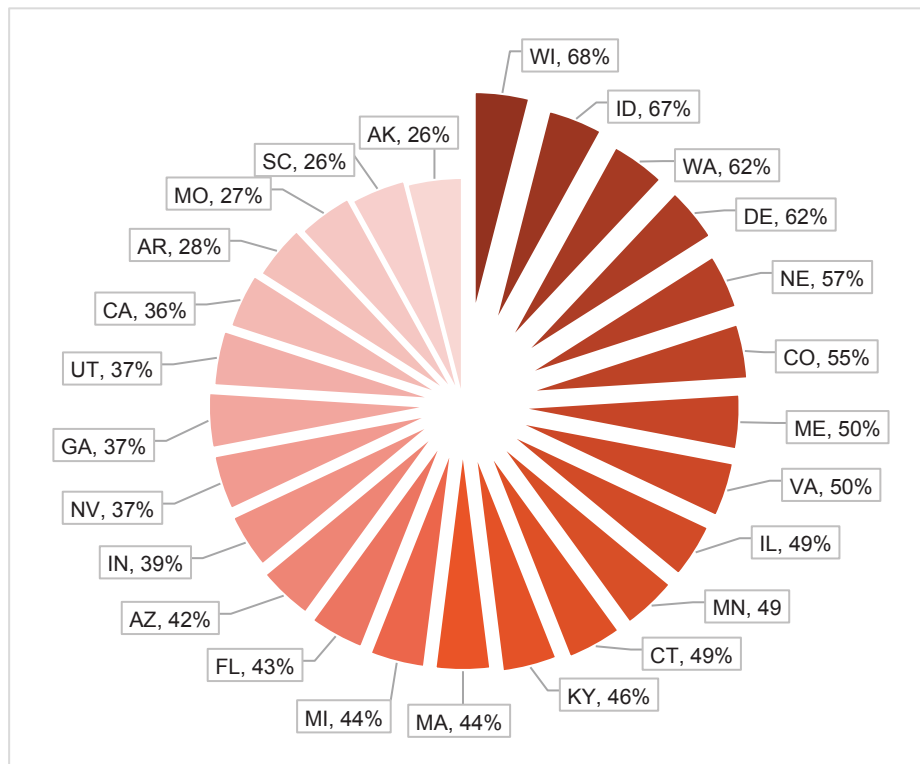
Figure A-25. Prevalence of Dental Sealants Among Hispanic/Latino Third Graders in States With Available Data. United States, BSS 2008–2019.

Third Round of Key Findings from BSS and NHANES Data

The researchers expanded the analysis of NHANES data and obtained estimates for 1988–1994, 1999–2004, 2011–2016, and 2017–2020, the latter two to check for consistency in the estimates. We estimated the prevalence of untreated decay, the mean number of decayed teeth, and the mean number of filled teeth.

We restricted the analysis to children aged 2–11 for primary teeth and 12–19 for permanent teeth because they show a steady increase in dental utilization as represented by the number of filled teeth (Figure A-9). We did not age-adjust the estimates. However, we compared our estimates with those published and found little difference (less than 2% difference by age group in prevalence).

Figures A-26 and A-27 show data for dental caries in primary teeth. There was a steady decline in the prevalence of dental caries in the primary teeth of Hispanic children, from 38% in 1988–1994 to 16% in 2017–2020. There were smaller declines in the prevalence of untreated decay among non-Hispanic Black and White children from 1999–2004.

Figure A-26. Prevalence of Untreated Dental Caries in Primary Teeth, Age 2–11, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.
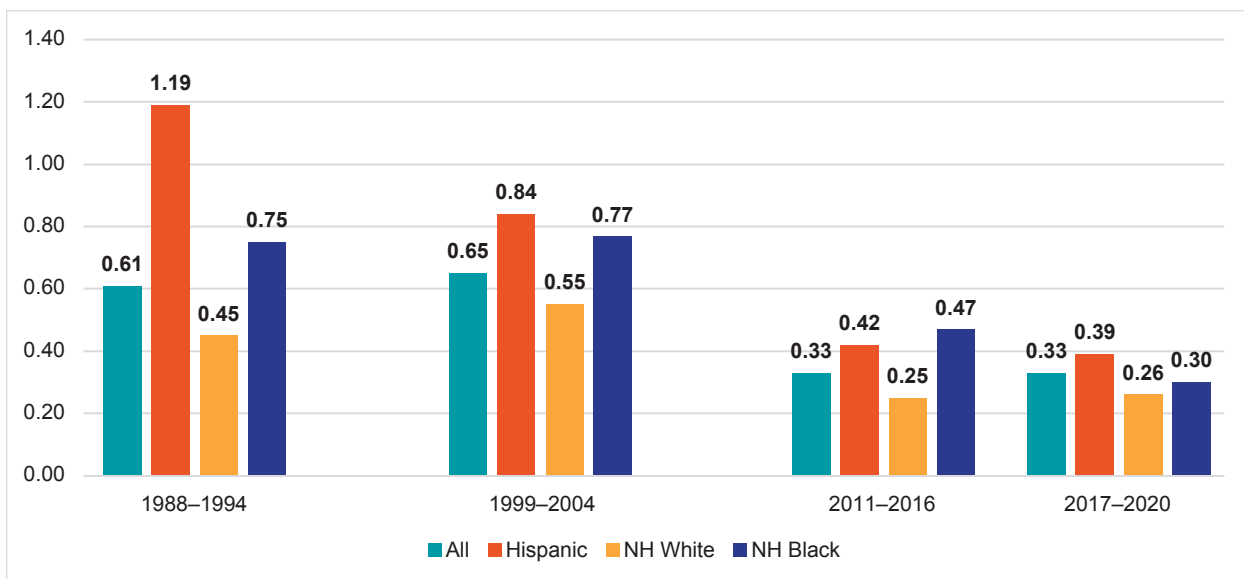
Figure A-27. Mean Number of Decayed Primary Teeth, Age 2–11, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.

The mean number of decayed primary teeth remains small through all the surveys (less than 1.2 teeth, Figure A-27), but the estimates follow the same pattern as prevalence (Figure A-26).

Conversely, the mean number of filled teeth increased across time periods for all groups, particularly for Hispanic children (Figure A-28).

Figure A-28. Mean Number of Filled Primary Teeth, Age 2–11, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.

These data show that the increase in dental visits reported above paralleled a decrease in dental caries, a slight decrease in the mean number of untreated decayed teeth, and an increase in the mean number of filled teeth.

Still, there are inequities in the prevalence of dental caries and the mean number of decayed teeth. Regarding restored primary teeth, Hispanic children showed an advantage over other racial/ethnic groups.

Figures A-29 to A-31 show data for caries in permanent teeth. There were declines in the prevalence of dental caries in the permanent teeth in Hispanic and non-Hispanic Black children, from 33% in 1988–1994 to 7% and 12%, respectively, in 2017–2020.

There were no significant changes in the prevalence of untreated decay in permanent teeth across time periods for non-Hispanic White participants.
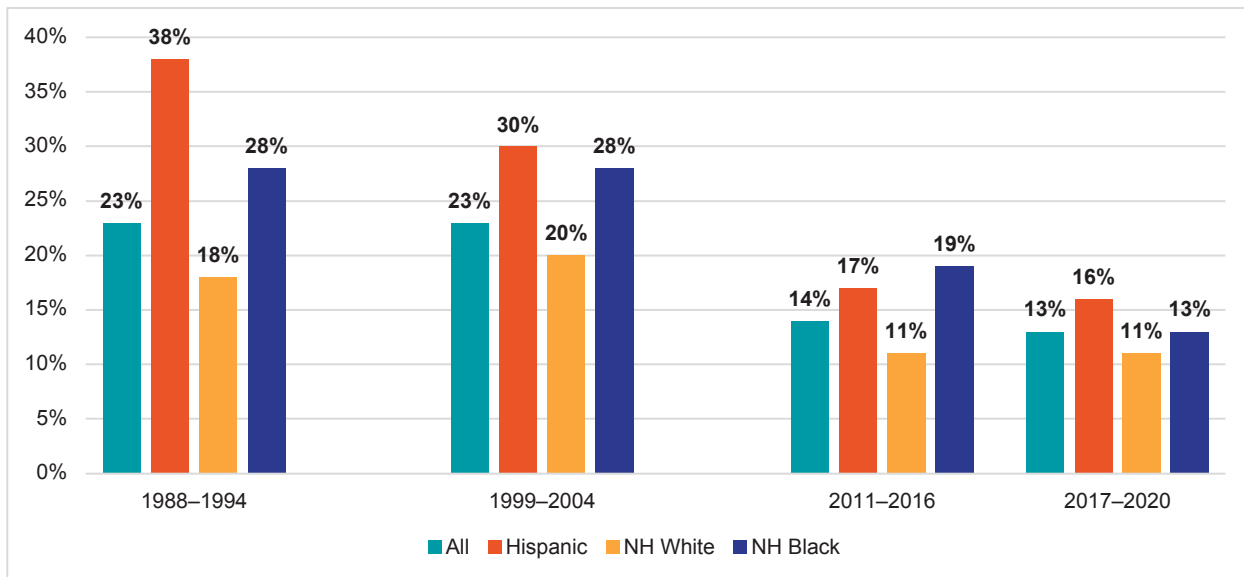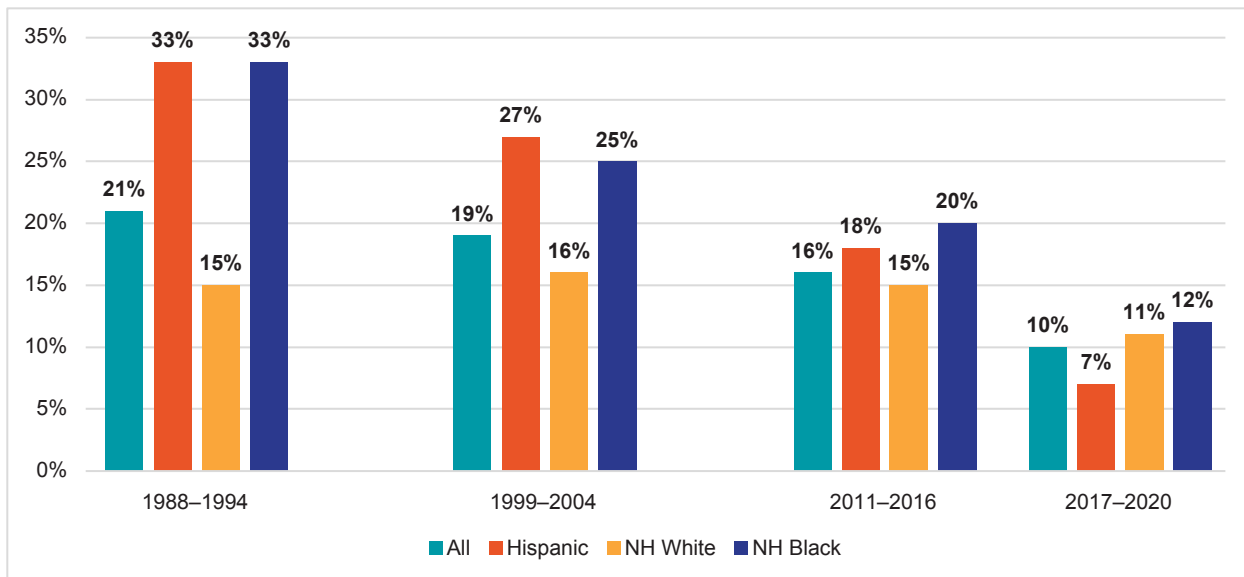
Figure A-29. Prevalence of Untreated Dental Caries in Permanent Teeth, Age 12–19, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.

A similar pattern was observed for the mean number of decayed teeth as for prevalence of decayed permanent teeth (Figure A-30).

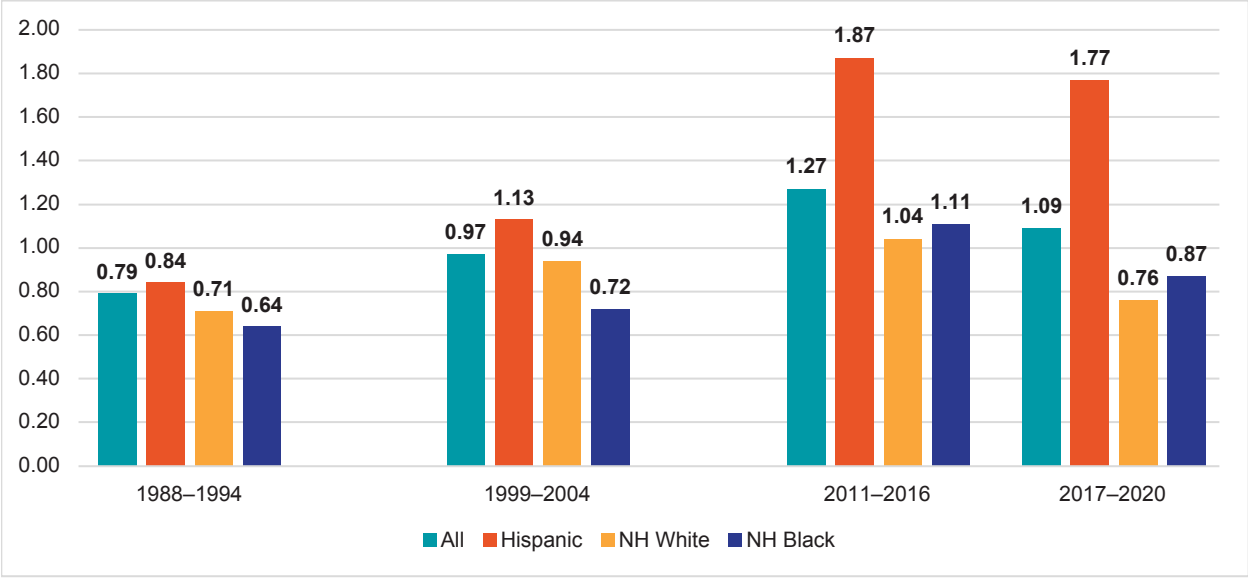**Figure A-30. Mean Number of Decayed Permanent Teeth, Age 12–19, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.**

There was an increase in the mean number of filled teeth among Hispanic participants aged 12–19 across time periods (Figure A-31), but that represented an average change of less than one tooth in total. The changes among other racial/ethnic groups were smaller and relatively stable after 1999.
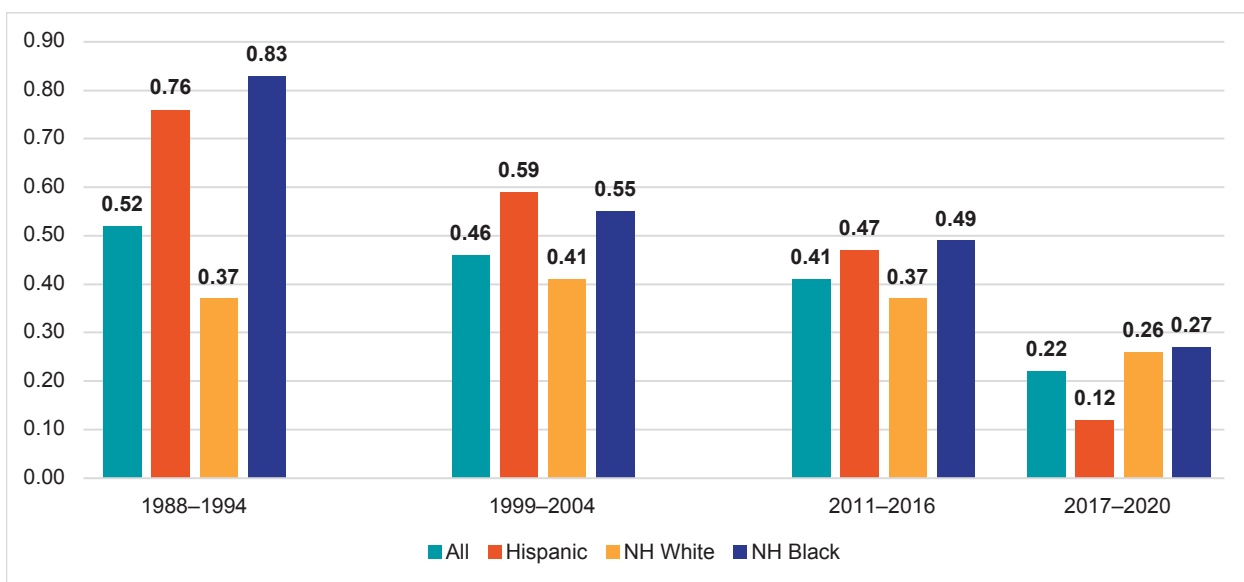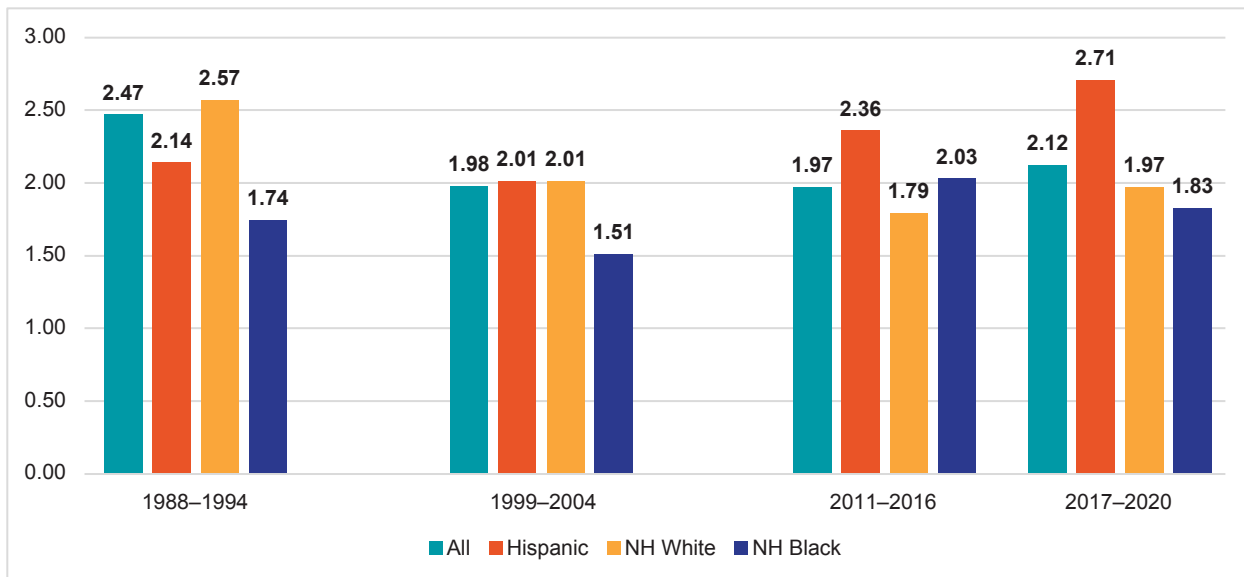
Figure A-31. Mean Number of Filled Permanent Teeth, Age 12–19, by Selected Racial/Ethnic Groups. United States, NHANES 1988 to 2020.

Data for decayed and filled permanent teeth among adolescents 12–19 years also paralleled the increase in dental visits, especially among Hispanic adolescents. Compared with 1988–1994 data, the racial/ethnic inequities were smaller but still detectable. We observed a marked decrease in the prevalence and severity of untreated decay between 2011–2016 and 2017–2020, which is biologically implausible. This may be an error in coding or a data artifact of contiguous data points.

Data System Limitations

Several limitations should be noted. The BSS protocol involves a visual screening with a mirror and headlamp and does not include the use of dental explorers, which may result in an underestimation of all estimates compared with those using tactile reference.

However, the protocol was not designed to provide complete comparability with visual-tactile data, but to offer a surveillance approach for monitoring disease over time. It should be noted that most contemporary modifications of visual-tactile approaches do not use the dental explorer as a detection tool, especially in pit and fissures. Thus, the lack of tactile "confirmation" may not be so critical.

Another issue is that BSS stops the assessment of prevalence once a tooth with the condition is detected. Thus, children with just one untreated decay lesion, one restoration, or one sealant may be misclassified as not having the condition if the examiner does not detect the condition. Therefore, it is possible that the population prevalence may not be critical to surveillance efforts.

All states have different approval processes for participating in the BSS protocol, and a mix of active and passive consent processes resulted in differing student participation rates across schools. The more heterogenous the consent and participation processes within a state, the greater the chance for selection bias to impact the results.

CHAPTER 2:
BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS) RELATED TO ORAL HEALTH STATUS

BRFSS Background

This section describes U.S. adult dental visits and tooth loss by race/ethnicity and Hispanic origin using data from the 2020 Behavioral Risk Factor Surveillance System (BRFSS).

BRFSS is an annual state-based telephone survey of noninstitutionalized adults 18 years and older, developed by the Centers for Disease Control and Prevention in 1984. The survey is administered by all state health departments, including the District of Columbia, Puerto Rico, U.S. Virgin Islands, and Guam. The BRFSS is designed to provide information on health risk behaviors, health care access, preventive health practices, and utilization of preventive services related to the leading causes of chronic and infectious diseases, disability, injury, and death. BRFSS data are collected and used to plan, evaluate programs, monitor objectives, and improve health programs.

Methods

We obtained the data and estimates from the BRFSS website through its query system. We limited the analysis to the following indicators by state and race/ethnicity:

1. Loss of all natural teeth

2. Loss of one or more permanent teeth

Not all state health departments included these indicators. For those reporting, the estimates were calculated for the calendar year 2020, which is the most recent available.

Loss of Permanent Teeth in the U.S., BRFSS 2020 (Figures B-1 to B-4)

The outcome variable was one or more teeth extracted: *Not including teeth lost forom injury ororthodontics, how many of your permanent teeth have been removed because of tooth decay or gum disease?*

Responses could range from one tooth to all teeth extracted.

Key Findings from BRFSS Data

- The median percentage of Hispanic adults who had lost at least one tooth was 37% (Figure B-1).

- There was a wide range in prevalence of tooth loss. The highest prevalence rates were in Puerto Rico (57%), followed by Guam (52%), Wyoming (50%) and Florida (50%). The lowest prevalence rates were in New Hampshire (18%), Vermont (20%), Illinois (22%), and Alabama (23%) (Figures B-1 and B-2).

- The prevalence of losing at least one permanent tooth in Puerto Rico (57%) was three times higher than the prevalence in New Hampshire (18%).

- The prevalence for loss of any permanent teeth was higher for Hispanic adults compared to White, non-Hispanic adults (Figure B-3).

- When looking at states/territories with the highest proportion of Hispanic residents, Hispanic adults had similar rates of having lost at least one permanent tooth compared to other racial/ethnic groups (except in California and Colorado) (Figure B-3).

- Despite the high within- and between-state variability in states/territories with a higher proportion of Hispanic population, there was little change in the prevalence of losing at least one tooth from 2016 to 2020 (Figure B-4). Except for Florida, most states showed a decrease in 2020 compared with previous years, but this change was 5% or less across states.
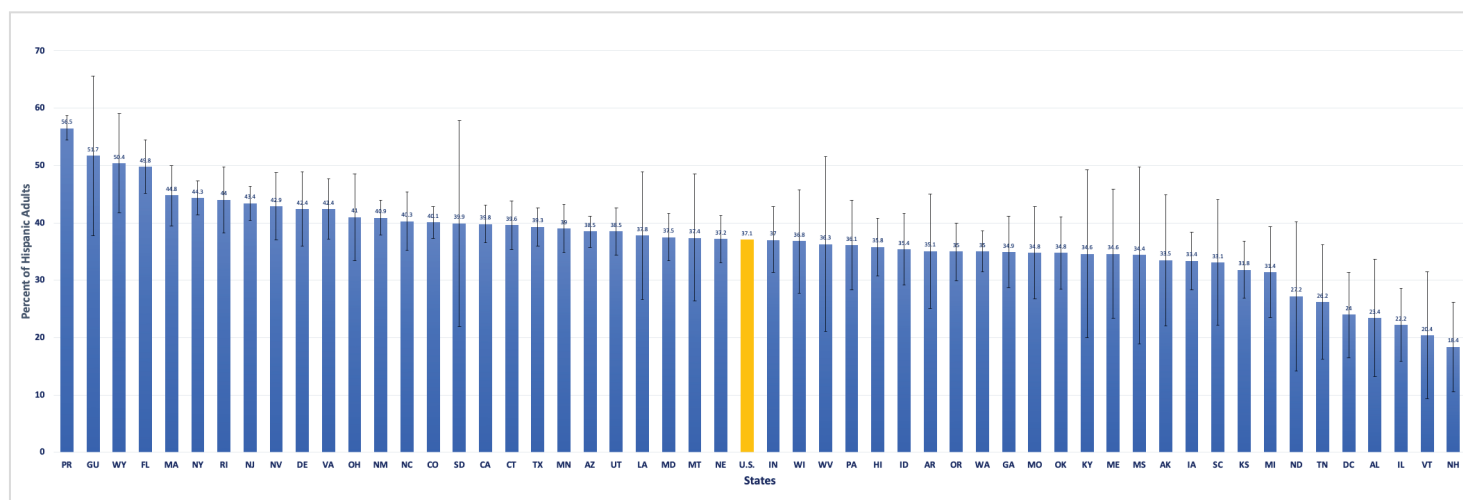

**Figure B-1. Prevalence of Permanent Tooth Loss Among Hispanic Adults. United States, BRFSS 2020.
(95% CI Not Available for Overall Estimates Because It a Median.)**
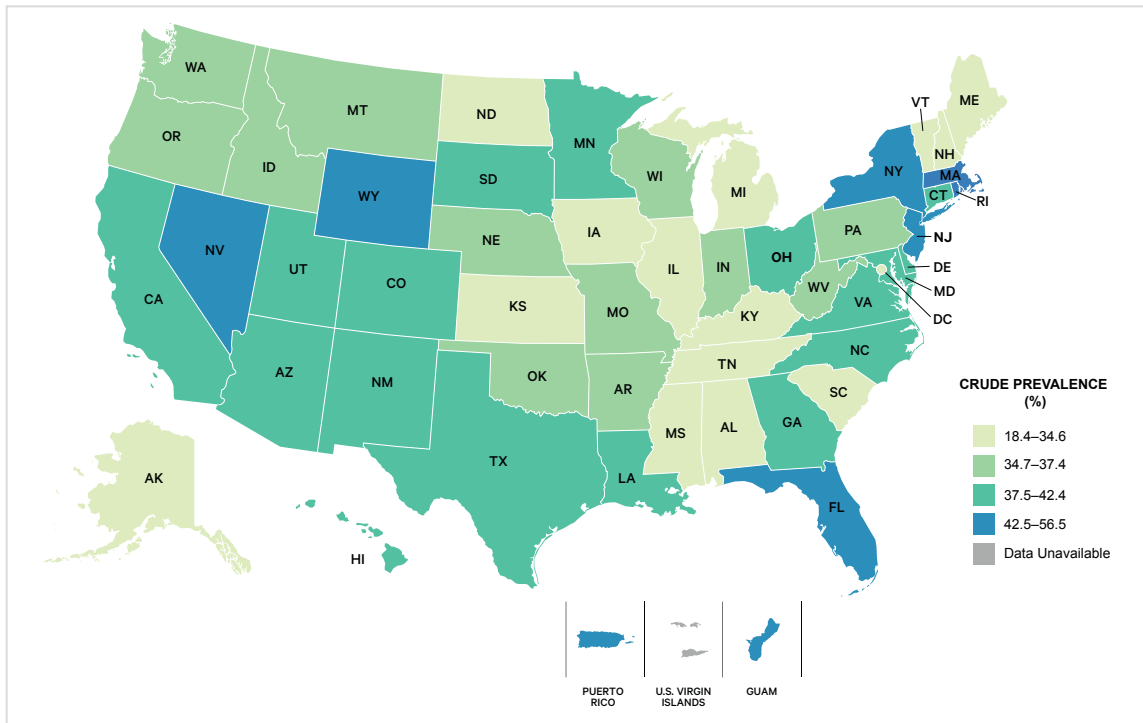
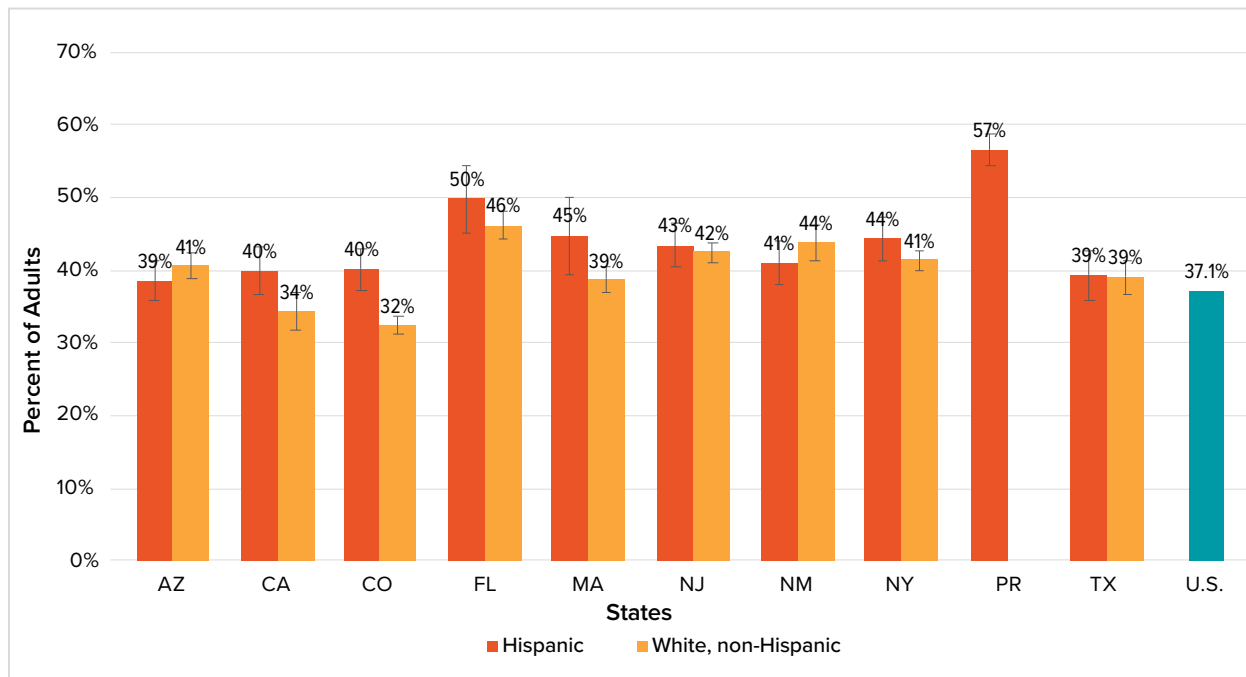Figure B-2. Prevalence of Permanent Tooth Loss Among Hispanic Adults. United States, BRFSS 2020.

Figure B–3. Prevalence of Permanent Tooth Loss among Adults by Race/Ethnicity in Selected States. United States, BRFSS 2020.
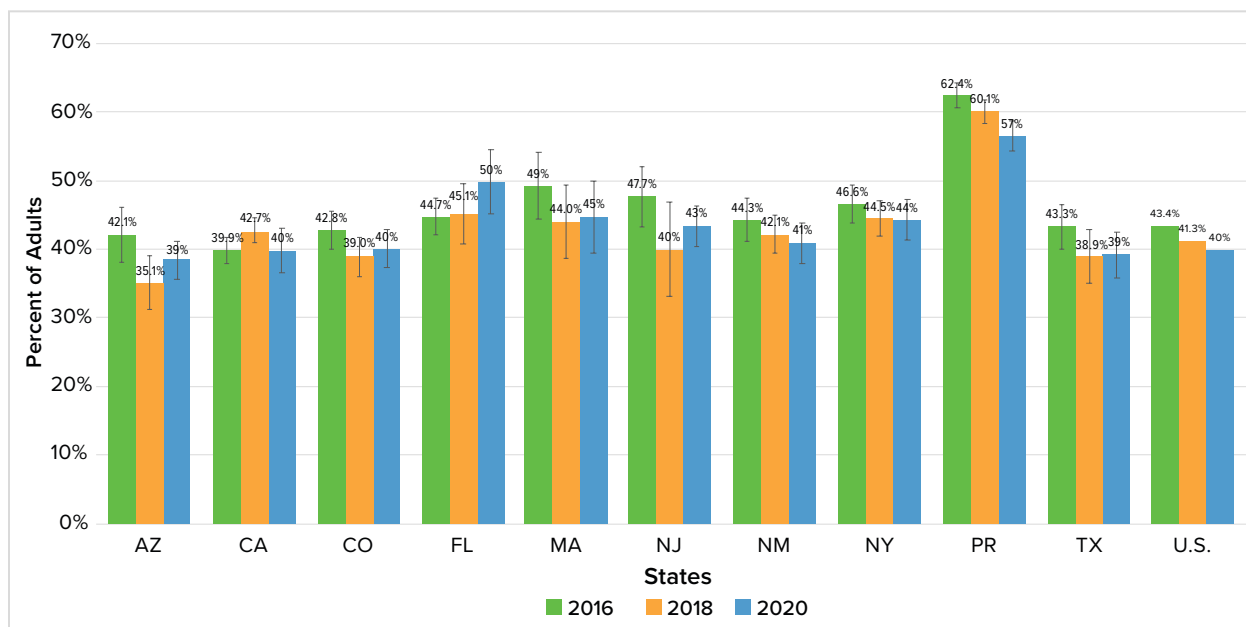
Figure B—4. Prevalence of Permanent Tooth Loss among Hispanic Adults by Year in Selected States. United States, BRFSS 2016—2020.

Loss of All Natural Teeth (Edentulism), BRFSS 2020 (Figures B-5 to B-8)

Key Findings from BRFSS Data

- In 2020, prevalence estimates for loss of all natural teeth in Hispanic adults aged 65 and older were not available for 41 states, the District of Columbia, and Guam (Figure B-6). Data were available only for Arizona, Colorado, California, Florida, Massachusetts, New Jersey, New York, New Mexico, Texas, and Puerto Rico.

- Nearly 15.4% of Hispanic adults aged 65 and older reported being edentulous in 2020 (Figure B-5). This number lies between the 14% and 19% for Mexican Americans and other Hispanics, respectively, from NHANES in the same age group (Figure A-13).

- Among Hispanic adults aged 65 and older, the prevalence was the highest in Massachusetts (21%) and the lowest in New Jersey (12%) (Figure B-5).

- Due to the high degree of variability, it is difficult to reach conclusions regarding racial/ethnic differences within and between states. In states showing differences, such as Massachusetts, Colorado, and California, there is an overlap in the 95% confidence intervals (Figure B-7).

- The overall edentulism rates for Hispanic adults aged 65 and over in the U.S. were the same in 2016 and 2020 (15.4%) and slightly lower in 2018 (13.9%) (Figure B-8).

- The prevalence estimates of edentulism of Hispanic adults in New Mexico and New York were lower in 2020 compared to 2018 (Figure B-8).

- There were small differences (1.5%) in edentulism rates when all participating states were included (Figure B-8). There were different patterns among states, but all 95% confidence intervals were wide and appear to be overlapping.
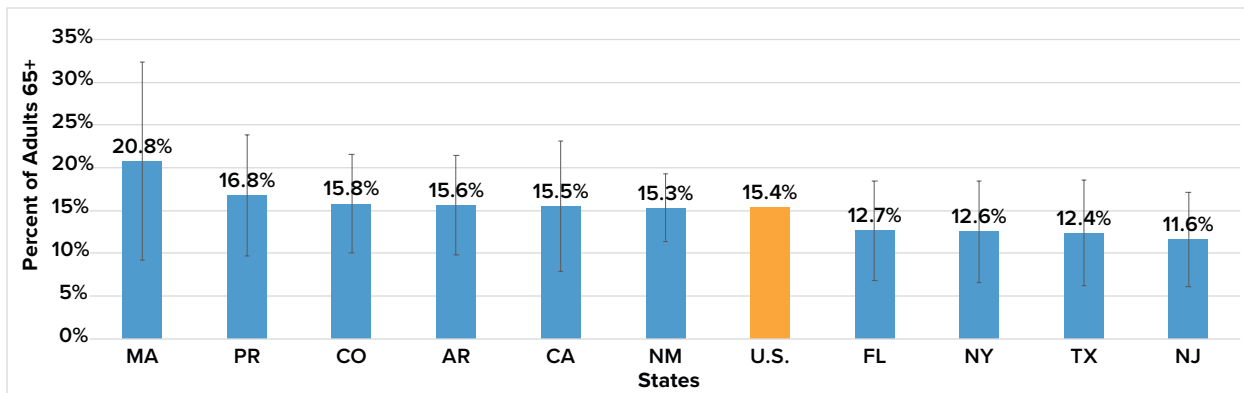
Figure B-5. Prevalence of Complete Tooth Loss (Edentulism) among Hispanic Adults Aged 65+ in Selected States. United States, BRFSS 2016–2020. (95% CI not available for overall estimates).
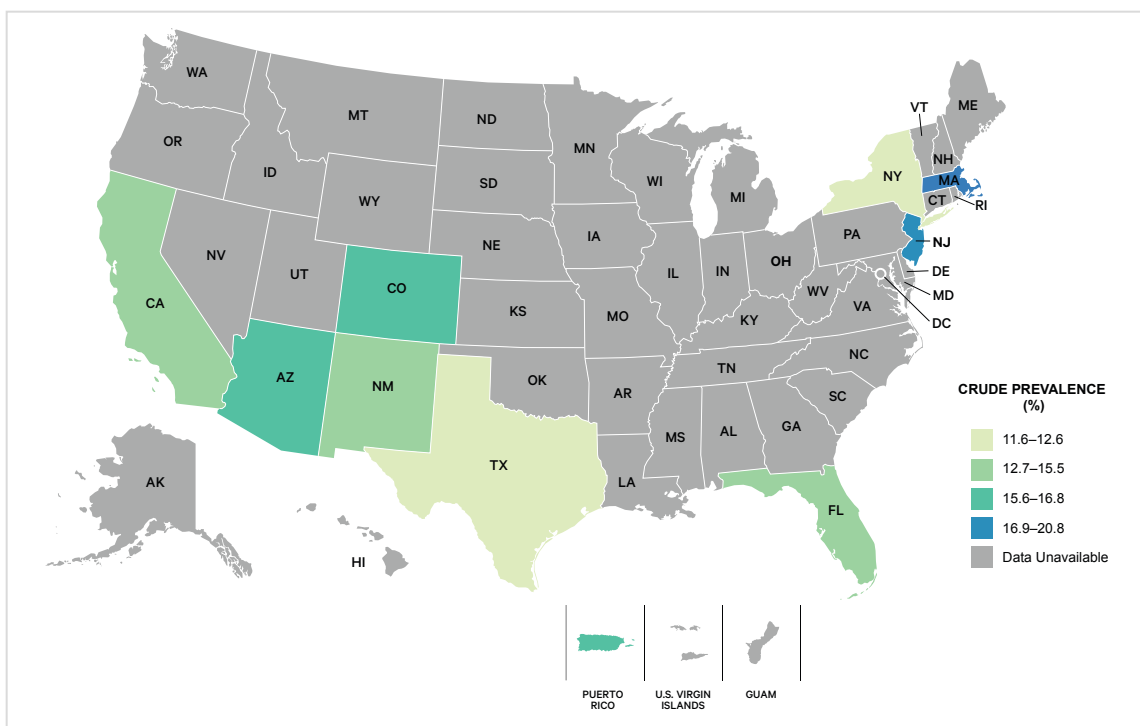
Figure B-6. Prevalence of Complete Tooth Loss (Edentulism) among Hispanic Adults Aged 65+, United States, BRFSS 2020.
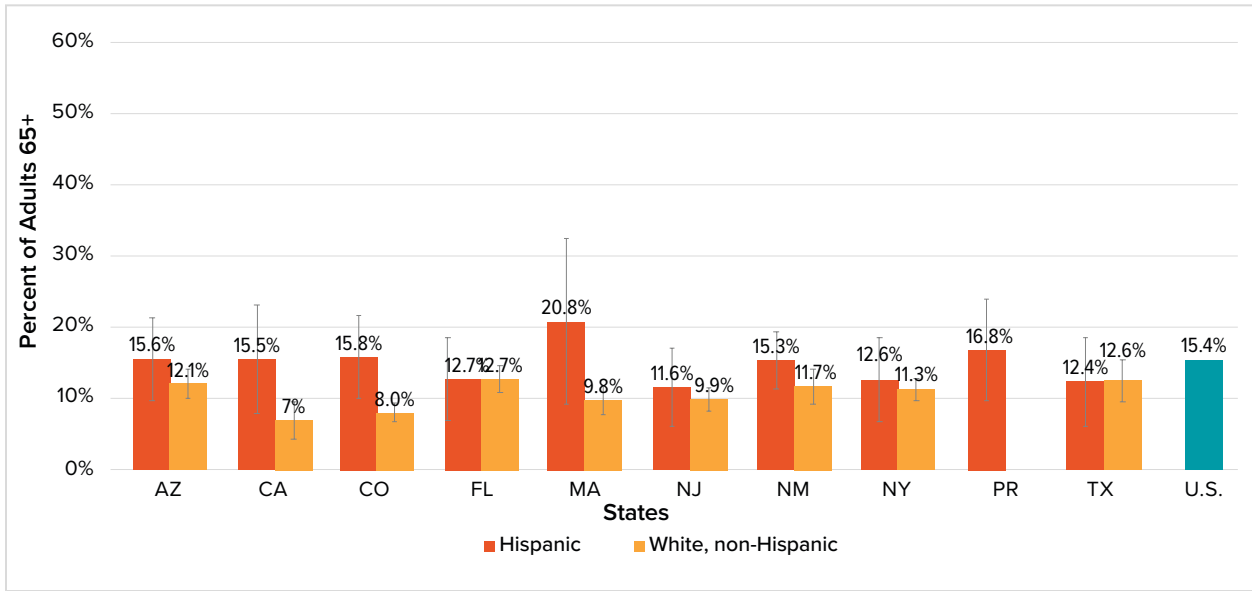
Figure B–7. Prevalence of Complete Tooth Loss (Edentulism) among Adults Aged 65+ by Race/Ethnicity in Selected States. United States, BRFSS 2020.
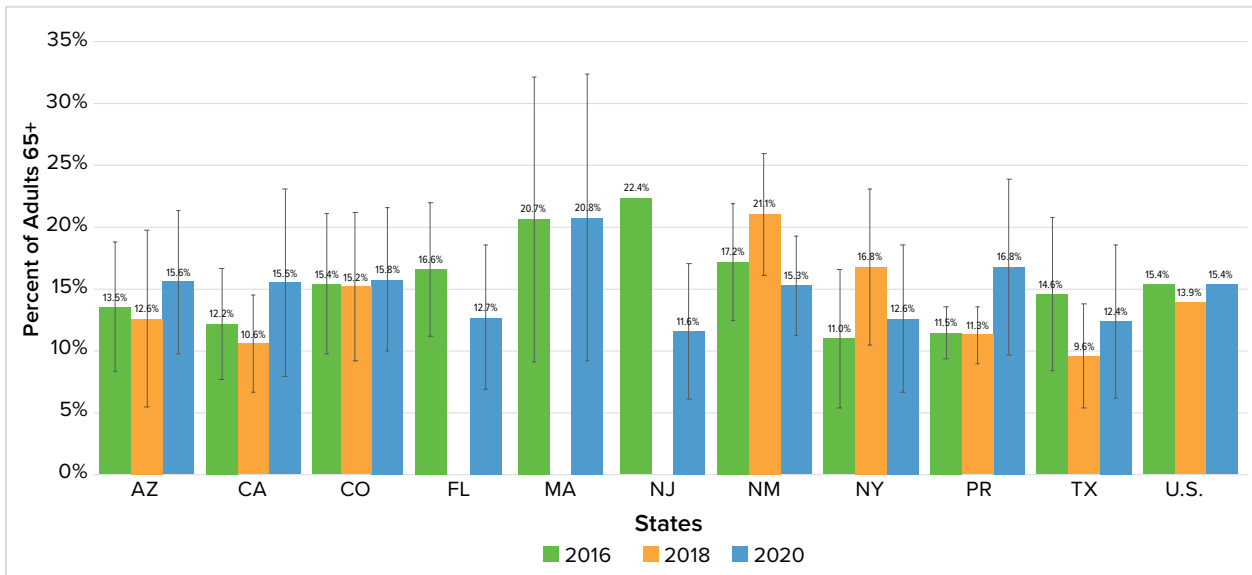
Figure B–8. Prevalence of Complete Tooth Loss (Edentulism) among Hispanic Adults Aged 65 and Over in Selected States. United States, BRFSS 2016, 2018, and 2020.

Figure B-9 summarizes changes in the three indicators from the four most recent BRFSS biennial cycles (2014 to 2020). In general, there have been no significant changes in these outcomes across time.
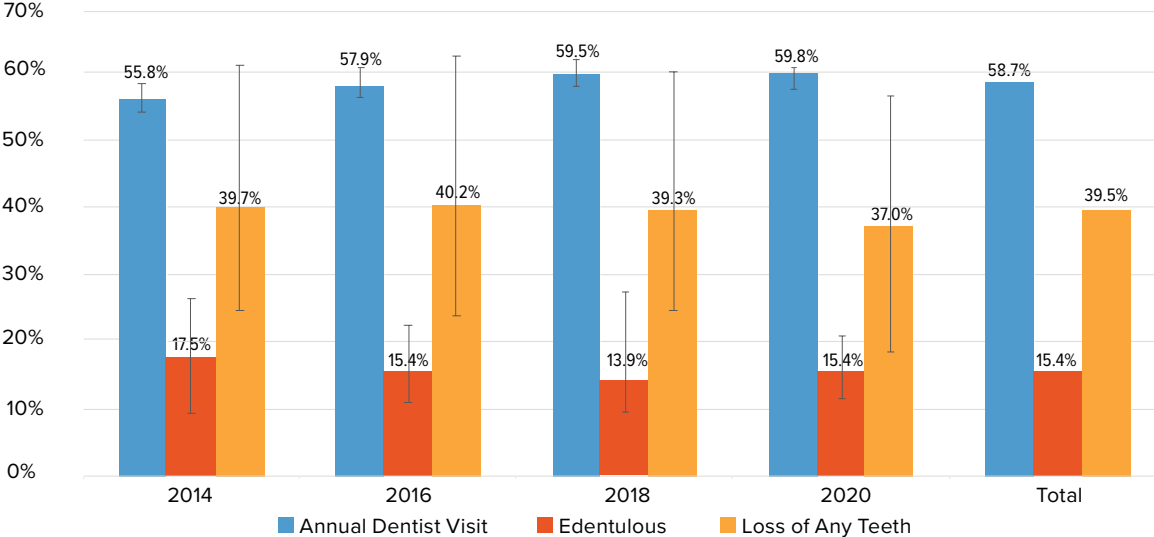
**Figure B-9. Dental Outcomes in Hispanic Adults, by Year.
United States, BRFSS 2014 to 2020.**

CHAPTER 3:
NATIONAL BIRTH DEFECTS PREVENTION NETWORK (NBDPN) RELATED TO ORAL HEALTH STATUS

NBDPN Background

Public health surveillance of birth defects is focused on congenital anomalies, defined as abnormalities of body structure or function that have a prenatal origin and are evident or not at birth. Birth defects are a diverse group of conditions that can be caused by chromosomal disorders, single-gene defects, multifactorial inheritance, environmental teratogens or micronutrient malnutrition, and maternal illness (WHO CDC ICBDSR, 2020).

Craniofacial anomalies result from variations in the growth pattern of the head and the face. These congenital conditions have multiple causes, including genetics and environmental exposures, as well as a combination of these two factors. Most craniofacial anomalies are serious lifelong disabilities that require extensive treatment and have an impact on oral function, appearance, and quality of life across the lifespan (Parker et al., 2010; Sischo et al., 2017).

Serious birth defects are estimated to occur in 6% of births worldwide, or about 7.9 million infants each year. Most of these birth defects are associated with a wide variety of craniofacial anomalies, including orofacial clefts, skull deformities, malformation and malalignment of the jaws, missing and malformed teeth, and premature tooth loss arising as a result of complications from the anomalies. Craniofacial birth defects, and, in particular, cleft lip and/or palate, occur as often as 1 in 700 live births and represent the most common congenital disorder after Down Syndrome (Parker et al., 2010). Clefts are associated with a variety of physical, nutritional, and emotional limitations, as well as increased risk of dental caries and periodontal disease (Christianson et al., 2006; Mai et al., 2019; Gaggl et al., 1999).

Cleft lip, cleft palate, and both (CL/CP), a separation of the lip, palate, or both, include alterations in tooth size, shape, and number, as well as malocclusions and nasal deformities.

The Centers for Disease Control and Prevention (CDC) estimates that each year in the U.S., about 2,650 babies are born with a CP (1 in 1,574 newborns) and 4,440 babies are born with a CL, with or without a CP (1 in 1,000 newborns). These birth defects occur more often in Asian and American Indian/Alaska Native individuals and less often in African Americans. Cleft palate seems to be slightly more common in females, whereas cleft lip, with or without cleft palate, is more common in males (Michalski et al., 2015).

The National Birth Defects Prevention Network (NBDPN) is the principal source to review data of the lives of children with birth defects on intersecting aspects, including information collected by population-based birth defect surveillance systems by each state in the U.S. NBDPN is a valuable resource for a variety of stakeholders concerned with the occurrence and prevention of birth defects. The NBDPN publishes its annual report in a special issue of *Birth Defects Research*. The annual report includes directory information for birth defects programs, state-specific data on 45 selected birth defects, and journal articles on birth defects surveillance and epidemiology.

National Context

Birth defects affect approximately 1 in 33 newborns and are a leading cause of infant mortality in the U.S. (Centers for Disease Control and Prevention, 2008; Heron et al., 2009). Given the heterogeneity of the U.S. population, it is important to understand how birth defects are affecting different racial/ethnic communities.

Health disparities in both prevalence and survival are well described in non-Hispanic (NH) Black as well as Hispanic children with birth defects compared with NH-White children (Broussard et al., 2012; Centers for Disease Control and Prevention, 2010; Nembhard, Pathak, & Schocken, 2008; Nembhard et al., 2011; Reddy et al., 2011; Yang et al., 2006).

Birth defects are generally referred to as abnormalities of structure, function, or metabolism body chemistry present at birth that result in physical or mental disabilities, or death. Most states (44 states and Puerto Rico) have a type of birth defects surveillance system. Surveillance data are used to detect birth defects trends, suggest areas for further research, and link people to needed services. States report data on birth defects within their population to NBDPN.

For states that have data available, a list of birth defects will appear as subtopics in the NBDPN search menu to the right once the Birth Defects topic has been chosen. The differences found in survival, particularly the rates for cleft lip (highest in Iowa and lowest in Kentucky), for cleft palate (highest in Maine and lowest in Maryland), and for cleft lip and palate combined (also highest in Maine and lowest in Maryland), underscore the importance of assessing Hispanic ethnic subgroups, as differences among subgroups appear to exist.

From Oral Health America

Craniofacial disorders can directly influence risk for and resistance to common oral diseases such as dental caries and periodontal disease (Gaggl et al., 1999; Mucci et al., 2005; Huynh-Ba et al., 2009; Antonarakis et al., 2013; Vieira et al., 2014).

"The separation of the lip and/or palate seen in CL/CP occurs when the medial nasal process and the maxillary process fail to fuse early in fetal development. Although 70% of both cleft types result from unknown causes, other cases involve known risk factors, including genetics, exposure to toxic or environmental substances, and nutritional deficiencies during fetal development.

Among persons with both CL and CP, about 30% have an associated genetic defect. Genes associated with clefting include IRF6, MSX1, FGF, and BMP4 (Twigg and Wilkie, 2015). Other factors known to increase the risk for CL/CP malformations include maternal smoking, insufficient folic acid, family cleft history, child's gender, maternal education, and maternal race and ethnicity (Raut et al., 2019).

Key findings from NBDPN Data

- **Cleft Lip Alone (Figure C-1)**
  - The incidence of CL for Hispanic infants in 2014–2018 was highest in Iowa (5.8 in 10,000 live births), followed by Delaware (5.4 in 10,000 live births), Kansas (5.0 in 10,000 live births), and Utah (4.8 in 10,000 live births). The lowest was in Kentucky and Mississippi (0.7 and 1.2 in 10,000 live births, respectively).
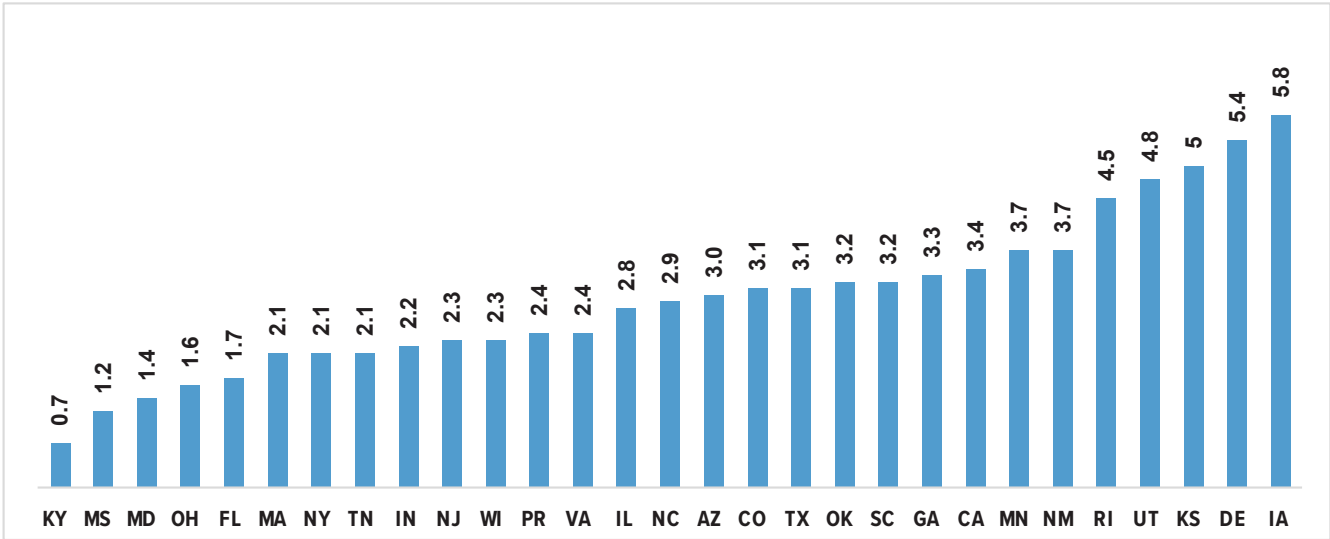
Figure C-1. Cleft Lip Alone by Hispanic/Latino. United States, NBDPN 2014 to 2018.

- **Cleft Palate Alone (Figure C-2)**
  - The incidence of CP for Hispanic infants in 2014–2018 was highest in Maine (23.1 in 10,000 live births), followed by Vermont (16.5 in 10,000 live births), Utah (10.5 in 10,000 live births), and Louisiana (10.0 in 10,000 live births). The lowest incidence of CP was in Maryland and Mississippi (1.00 and 1.2 in 10,000 live births, respectively).
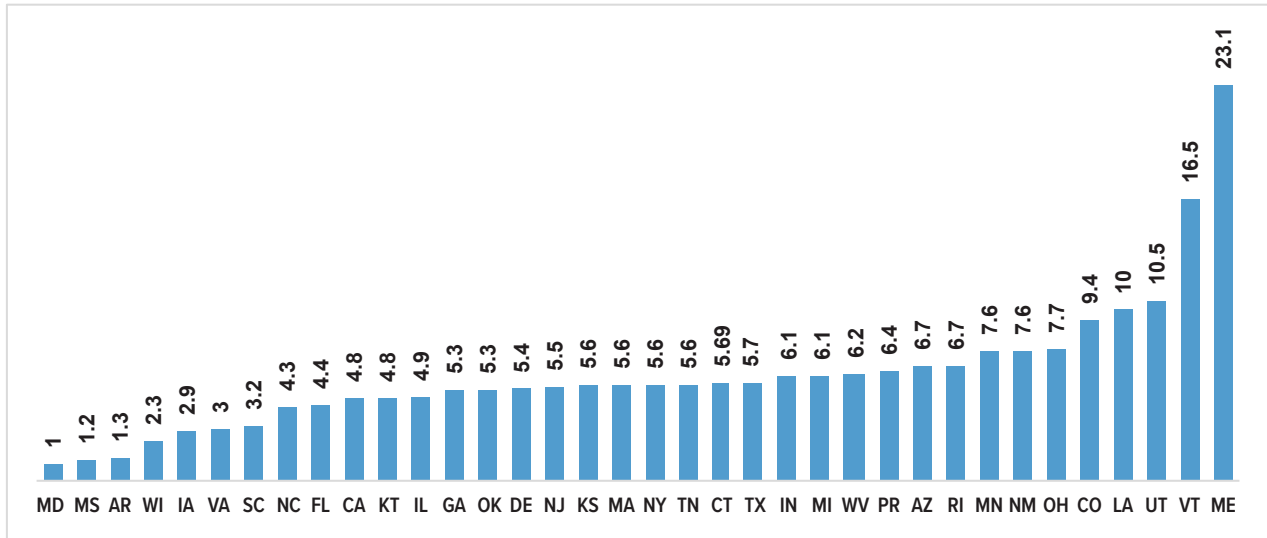
Figure C-2. Cleft Palate Alone by Hispanic/Latino. United States, NBDPN 2014 to 2018.

- **Cleft Lip and Cleft Palate (Figure C-3)**
  - The incidence of CL/CP for Hispanic infants in 2014–2018 was highest.s highest in Maine (11.5 in 10,000 live births), followed by Michigan (10.5 in 10,000 live births), Indiana (10.4 in 10,000 live births) and Kentucky (8.9 in 10,000 live births). The lowest incidence of CL/CP was in Maryland (1.00 in 10,000 live births).
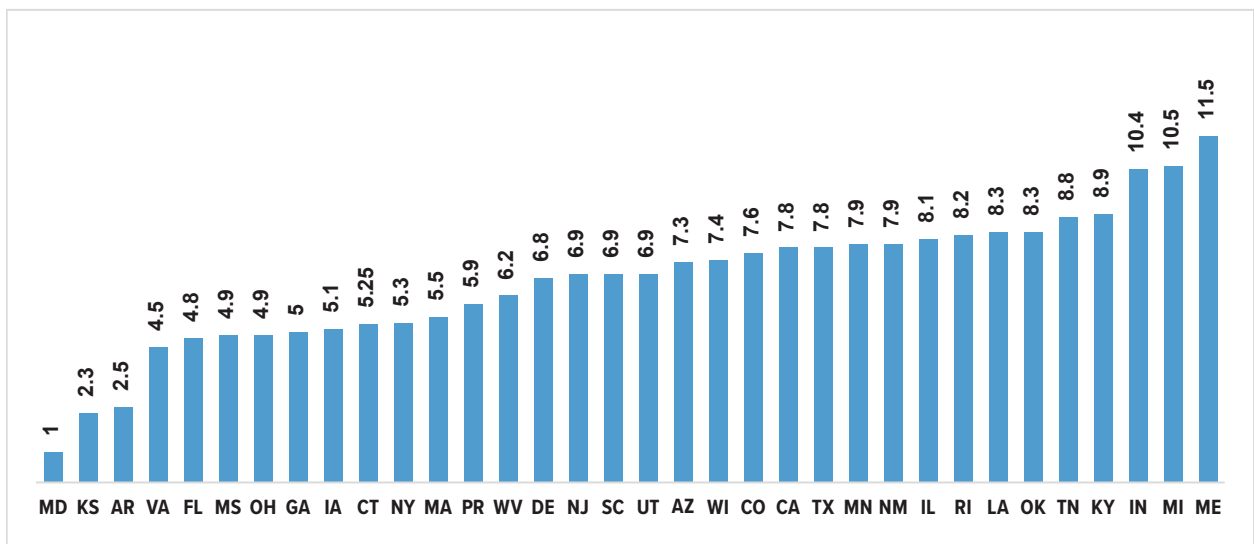
Figure C-3. Cleft Lip and Cleft Palate by Hispanic/Latino. United States, NBDPN 2014 to 2018.

Summary NBDPN Data

Birth defects affect approximately 1 in 33 newborns and are a leading cause of infant mortality in the U.S. (Centers for Disease Control and Prevention, 2008; Heron et al., 2009). Given the heterogeneity of the U.S. population, it is important to understand how birth defects are affecting different racial/ethnic communities. Health disparities in both prevalence and survival are well described in non-Hispanic (NH) Black as well as Hispanic children with birth defects compared with NH-White children (Broussard et al., 2012; Centers for Disease Control and Prevention, 2010; Nembhard, Pathak, & Schocken, 2008; Nembhard et al., 2011; Reddy et al., 2011; Yang et al., 2006).

Every 4½ minutes, a baby is born with a birth defect in the U.S.

Prevalence estimates reported by NBDPN for select states and birth defects are now available on Peristats.

SECTION 2

Dental Utilization

CHAPTER 4:
MEDICAL EXPENDITURE PANEL SURVEY (MEPS) RELATED TO DENTAL UTILIZATION

Overall Oral Health Status

MEPS Background

The Agency for Healthcare Research and Quality is the government agency in charge of the Medical Expenditure Panel Survey (MEPS). This survey began in 1996 as a set of large-scale surveys of families and individuals, their medical providers (doctors, hospitals, pharmacies, etc.), and employers across the U.S. MEPS collects data on the specific health services that Americans use, how frequently they use them, the cost of these services, and how they are paid for, as well as data on the cost, scope, and breadth of health insurance held by and available to U.S. workers.

MEPS has two major components: the Household Component and the Insurance Component. The Household Component provides data from individual households and their members, which is supplemented by data from their medical providers. The Insurance Component is a separate survey of employers that provides data on employer-based health insurance.

Related to dental care, MEPS collects information about dental care visits, dental use, type of event, type of dental care provider, treatments and services performed, and prescribed medicines. Dental expenditures include all direct payments by individuals, public or private insurance, and other sources.

MEPS Methods

MEPS is a complex survey using a subsample of National Health Interview Survey respondents. The subsample represents the noninstitutionalized U.S. population aged 2 years and older and includes individuals, families, and a sample of medical providers and employers. MEPS data consists of responses from panels of participants who are interviewed three times over the course of two years.

Figure D-1 describes the MEPS Panels included in the 2019 calendar year. The 2019 MEPS data consisted of all participants in Panel 23, rounds 4 and 5, and Panel 24, rounds 1 and 2. In addition, some participants from Panels 23 and 24 round 3 were included if they were interviewed during the 2019 calendar year.

Data were collected by interviews and computer-assisted personal interviewing (CAPI) from a single household respondent.

Following the methods from previous MEPS data analysis (Christian et al. 2013), our outcome was a binary version (yes, no) from the MEPS-derived variable "Number of dental visits in the previous year" (DVTOT19) localized in the Household Component.

The variable includes dental visits with any type of dental provider. We did not use the dental data file (DN) or try to derive a new variable for dental utilization as Zhang did (Zhang, 2016).

We opted for this option to maximize comparability and reduce potential differences in building estimates from individual variables compared with other publications using MEPS.
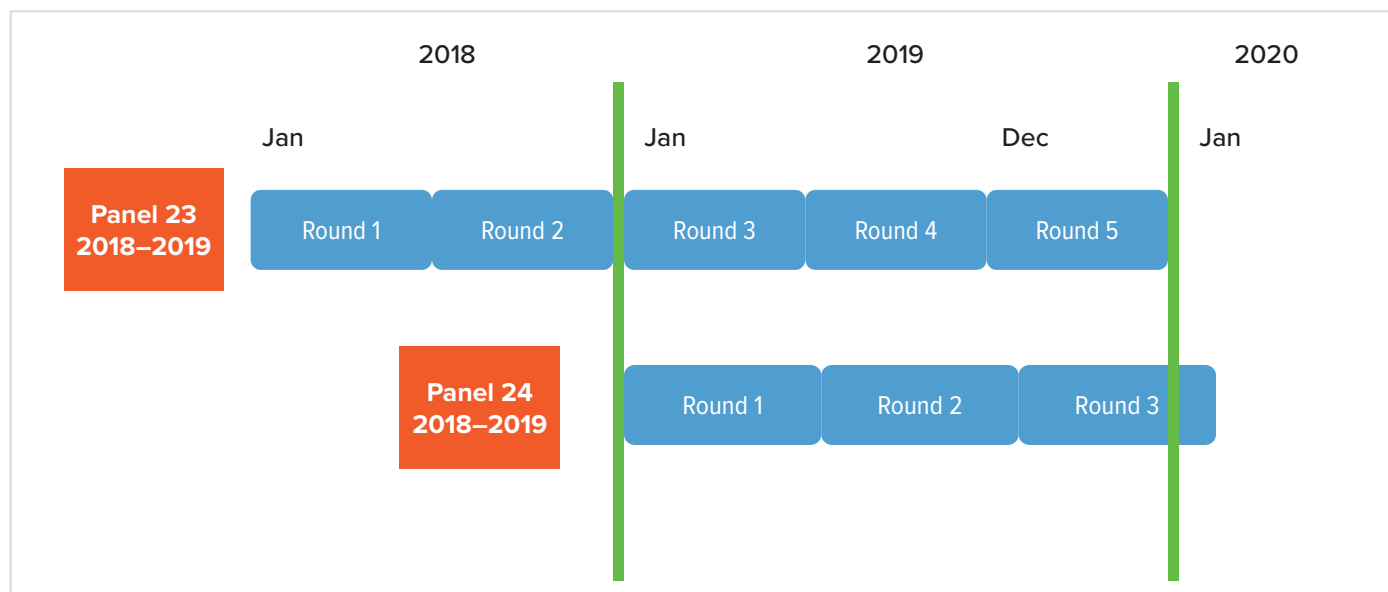

Figure D-1. MEPS Panels Used in the Present Analysis

The datasets and codebooks were downloaded from the AHRQ website. The downloaded datasets for 2006 and 2019 were read in SAS using the provided code. We completed variable transformations in SAS for dental visits (no/yes), family poverty level (three levels), sex, race/ethnicity (Hispanic, and non-Hispanic White, Black, and Asian), and age groups.

We used the stratification and individual weight variables provided by MEPS. We did not perform formal statistical tests to avoid the issue of multiple comparisons.

Key Findings from MEPS Data

- In 2019, less than half of the U.S. population (46%) reported having a dental visit in the previous year. These estimates are lower than those obtained from other data sources, such as NHANES and NHIS.

- MEPS data detected inequities in the utilization of dental services by race/ethnicity. Non-Hispanic White and non-Hispanic Asian participants reported higher levels of dental utilization than Hispanic participants and non-Hispanic Black participants (up to 18 percentage points). Inequities are less evident in NHANES and NHIS data.

- There were differences in the utilization of dental services by age. Participants reported higher utilization in the 2–19 age group than in the adult and senior age groups.

- The inequities in the utilization of dental services between racial/ethnic minorities and non-Hispanic White participants were larger in adults and seniors than in children.

Results from MEPS Data

Figure D-2 provides the overall and cross-tabulated results by race/ethnicity and family poverty levels for all participants in MEPS 2019. Overall, 46% of participants reported having a dental visit across all race/ethnicity and family poverty levels (FPLs). For example, while 52% of non-Hispanic White participants reported a dental visit, only 34% of non-Hispanic Black and Hispanic participants reported a dental visit. On the other hand, 51% of those living in families with greater than 200% of the FPL had a dental visit. In comparison, only 36% and 29% of those living in families with 100% to 199% or less than 100% of the FPL had a dental visit, respectively. Furthermore, the race/ethnic inequity persisted in each poverty level, with non-Hispanic White and non-Hispanic Asian participants consistently reporting the highest proportion of dental visits.

The racial/ethnic inequity persisted in each poverty level, with non-Hispanic White and non-Hispanic Asian participants consistently reporting the highest proportion of dental visits.

Figure D-2. Participants Aged 2 Years or Older Reporting Having Dental Visits in the Previous Year by Race/Ethnicity and Income Level. United States, MEPS 2019.

Figure D-3 displays the same information for NHANES 2017–2020. Sixty-four percent of all participants aged 2+ years reported a dental visit. There were differences by family poverty level, but inequities by race/ethnicity were not as evident as with MEPS. For example, the greatest inequities in MEPS were 20 percentage points between Non-Hispanic White and Hispanic participants in the >200% FPL.

A similar pattern was observed in the 2018 NHIS data (Figure D-4). It should be noted that NHIS estimates were taken from a publication by the Centers for Disease Control and Prevention. The published table included an additional category in the family poverty level but only three racial/ethnic groups. (https://www.cdc.gov/nchs/hus/topics/dental-visits.htm).

Figure D-3. Participants Aged 2 Years or Older Reporting Having Dental Visits in the Previous Year by Race/Ethnicity and Income Level. United States, NHANES 2017 to 2020.
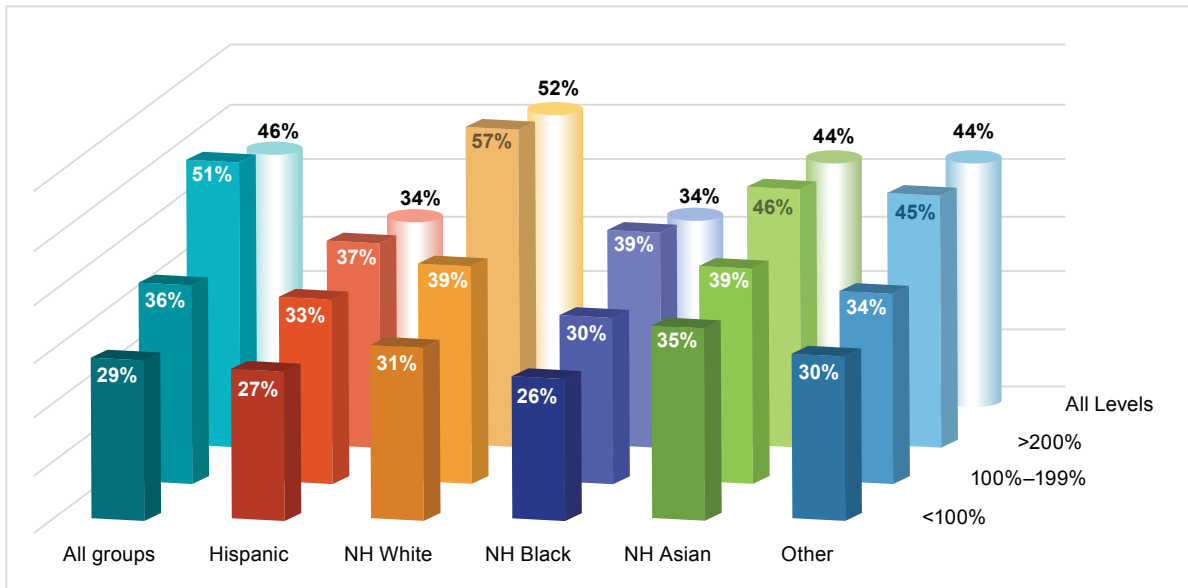
Figure D-4. Participants Aged 2 Years or Older Reporting Having Dental Visits in the Previous Year by Race/Ethnicity and Income Level. United States, NHIS 2018.

We assessed changes over time in all three data systems. We compared estimates from MEPS 2006, MEPS 2019, NHANES 1999–2002, and NHANES 2017–2020. We recalculated the NHANES data in tables to include all Hispanics in one group. In addition, we used two different cutoffs for age (participants 2 years to 17 years old and participants 18 years and older) to facilitate comparisons with other data published in the literature.

Figures D-5 and D-6 show differences between NHANES and MEPS estimates and inequities by racial/ethnic groups in all data systems.

While estimates from NHANES are around the low 60s, those for MEPS are in the mid-40s.

Figure D-5. Participants Aged 2 to 17 Years Reporting Having Dental Visits in the Previous Year by Race/Ethnicity. United States, NHANES and MEPS 1999 to 2020.
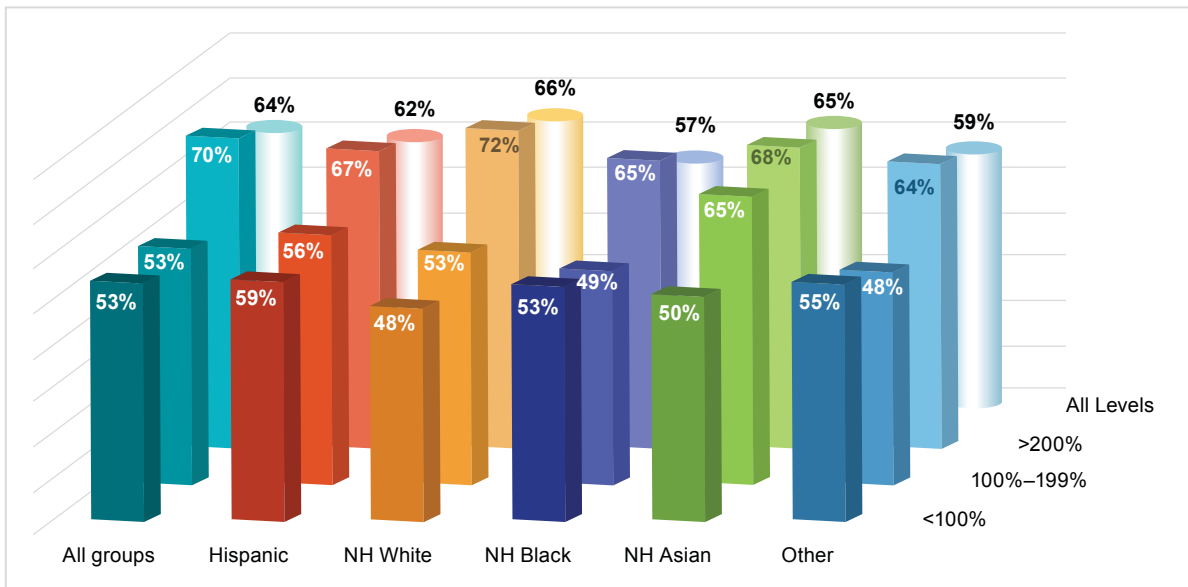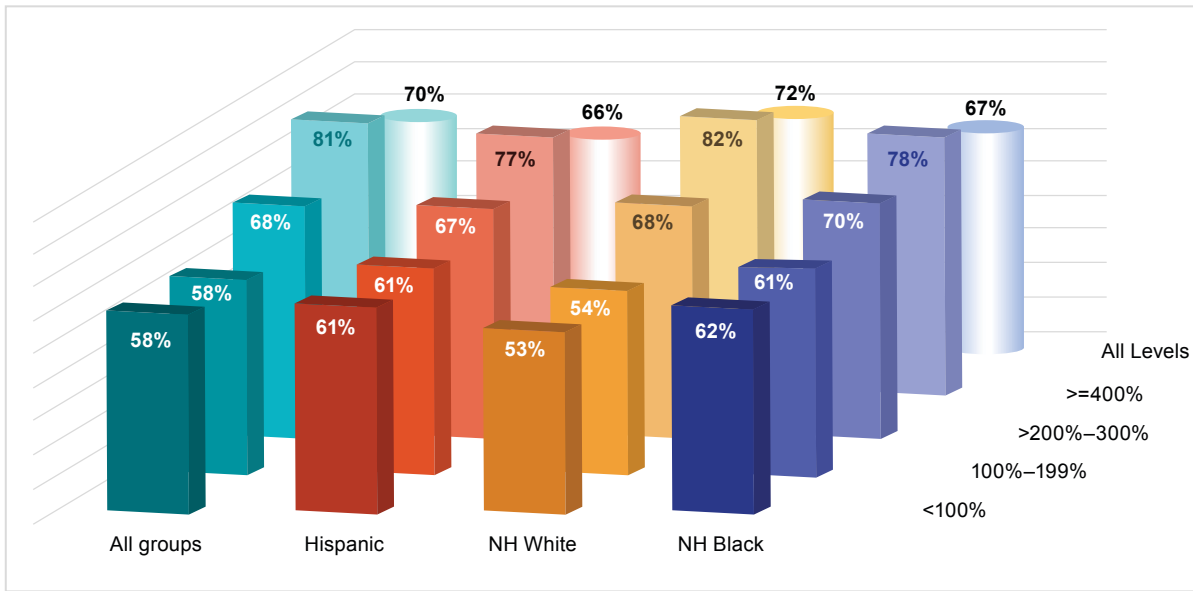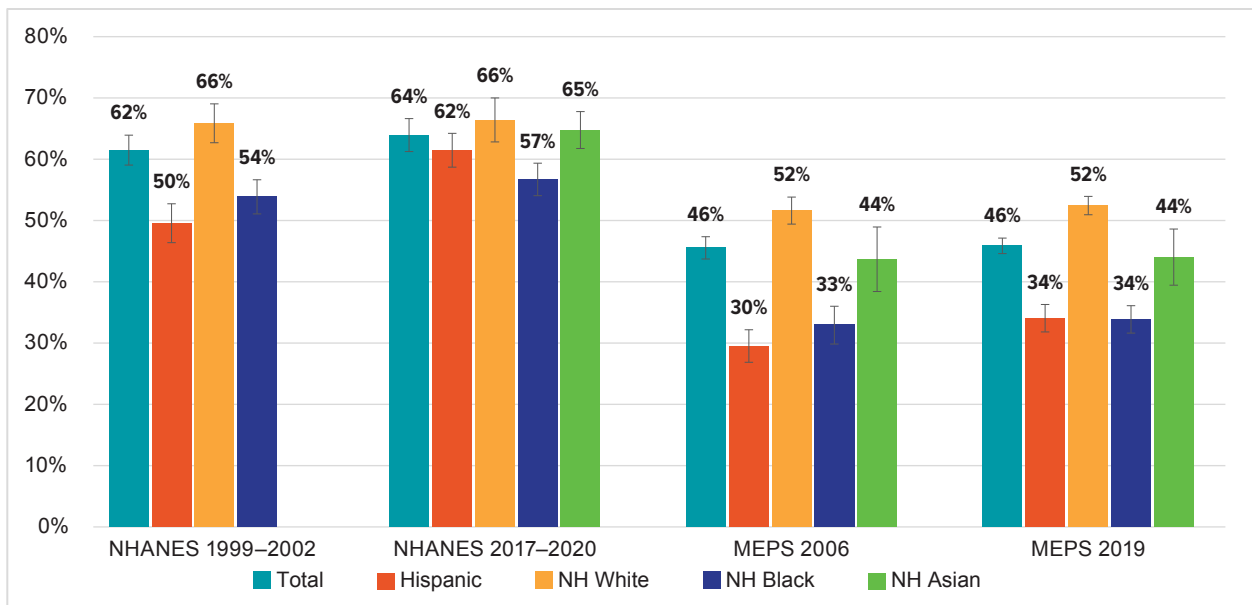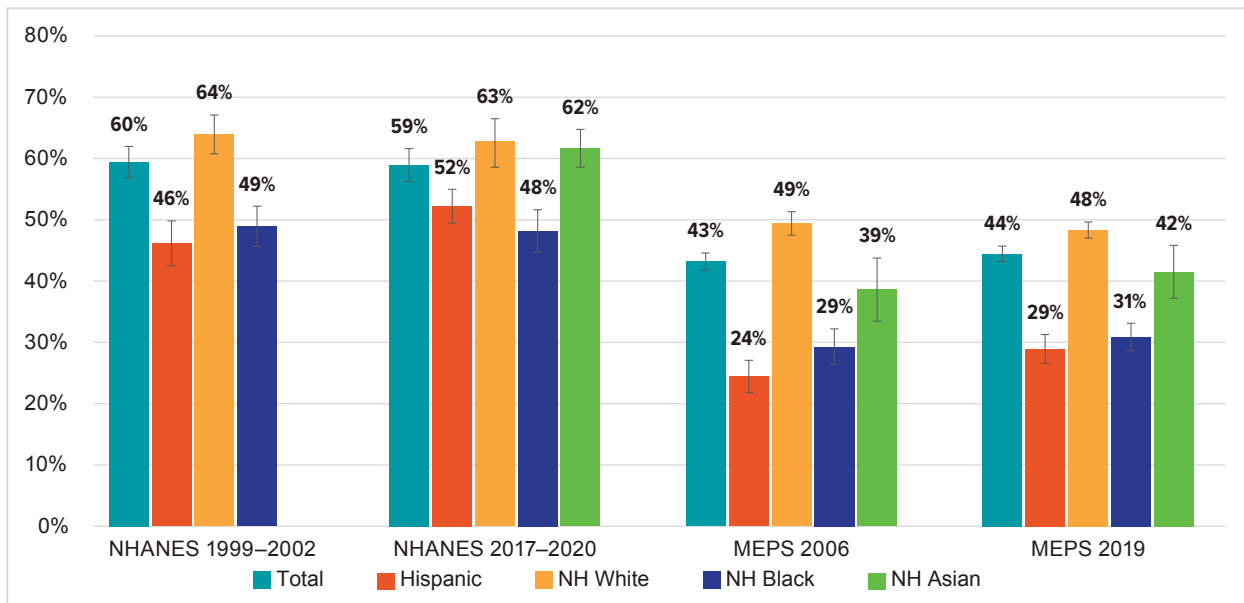
Figure D-6. Participants Aged 18 Years or Older Reporting Having Dental Visits in the Previous Year by Race/Ethnicity. United States, NHANES and MEPS 1999 to 2020.

Inequities by race/ethnicity are more evident among participants aged 18 years and older using MEPS data (Figure D-6). Consistently, non-Hispanic White and non-Hispanic Asian participants had higher utilization rates than Hispanic and non-Hispanic Black participants.

Both data systems detected increased dental utilization among Hispanics, increasing 6 percentage points between NHANES 1999–2002 and 2017–2020. Smaller increases were observed for MEPS and adults 18 years and older. There were no other recognizable improvements in the prevalence of dental visits overall and by racial/ethnic group between 2006 and 2019 (Figures D-5 and D-6).

Due to the differences in dental utilization by age reported in the literature (Christian et al., 2013; Macek et al., 2002; Selden and Hudson, 2006; Simpson et al., 2005; Wall and Brown, 2008; Zhang, 2016), we stratified the MEPS 2019 estimates into three age groups (Figure D-7).

We included 19-year-olds in the youngest age group to make the data comparable to NHANES estimates. Higher estimates of dental visits were reported in the 2–19 age group than among adults and senior adults. Consistently, non-Hispanic White and non-Hispanic Asian participants in the 2–19 age group had higher prevalence rates of dental visits than other racial/ethnic groups.

One-third or fewer of Hispanic and non-Hispanic Black adults and senior adults reported a dental visit in the previous year. These estimates were below the lower 80s reported elsewhere using data from the National Health Interview Survey for 2019 and 2020 among participants aged 1 to 17 (Adjaye-Gbewonyo and Black, 2021). Unfortunately, that study did not stratify by race/ethnicity.
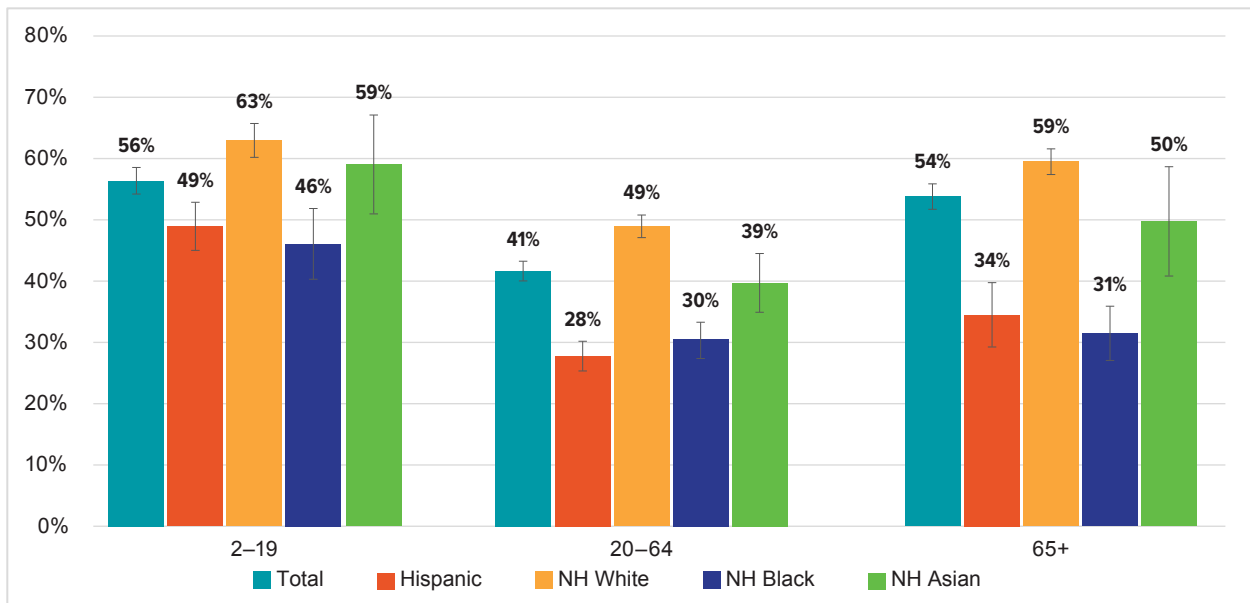
Figure D-7. Participants Aged 2 Years or Older Reporting Having a Dental Visit in the Previous Year by Age Group and Race/Ethnicity. United States, MEPS 2019.

We used NHIS data to assess temporal changes in dental utilization. The NHIS website includes a file with tabulated data by race/ethnicity from 1997 to 2008. We plotted these values overall, by age group, and by race/ethnicity (Figures D-8–D-11). We use the actual data points (connected by straight lines) and the moving average (connected by dotted lines).

The estimates were relatively stable until 2009, when all estimates increased steadily. Due to this differential growth in dental utilization, the differences between racial/ethnic groups in 2018 were smaller than in 1997, suggesting a reduction in inequities.

The stratification by age group allowed us to identify which age and racial/ethnic groups have shown meaningful increases in dental utilization. Figure D-9, with data for children and adolescents aged 2–17, shows a steady rise in dental utilization for all racial/ethnic groups starting in 1997.

These results from NHIS also suggest that racial inequities in dental utilization for children and adolescents aged 2–17 were significantly reduced in the last decade.

Figure D-8. Participants Aged 2 Years or Older Reporting a Dental Visit in the Previous Year by Selected Racial/Ethnic Groups. United States, NHIS 1997 to 2018.
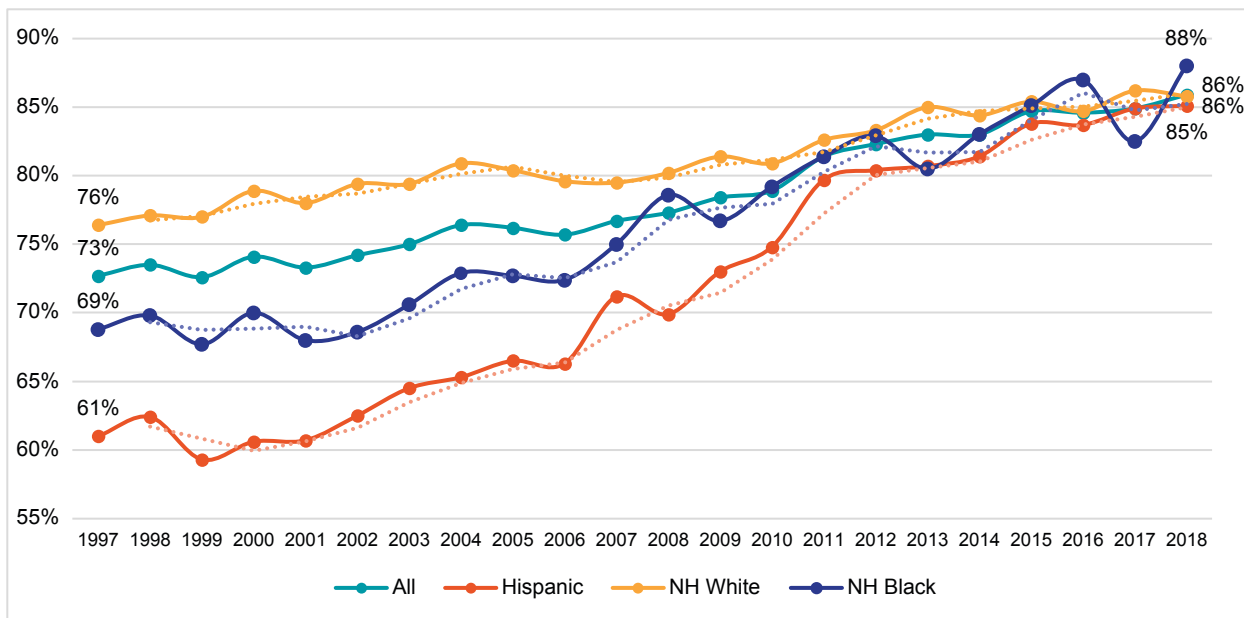
Figure D-9. Participants Aged 2 to 17 Years Reporting a Dental Visit in the Previous Year by Selected Racial/Ethnic Groups. United States, NHIS 1997 to 2018.

Among adults, on average, there have been no perceivable changes in dental utilization since 1997, but since 2015, there has been a slight increase among minority groups (Figure D-10). The effect is a reduction in racial inequities in 2018. However, further data may be needed to confirm a trend.

Figure D-10. Participants Aged 18 to 64 Years Reporting a Dental Visit in the Previous Year by Selected Racial/Ethnic Groups. United States, NHIS 1997 to 2018.
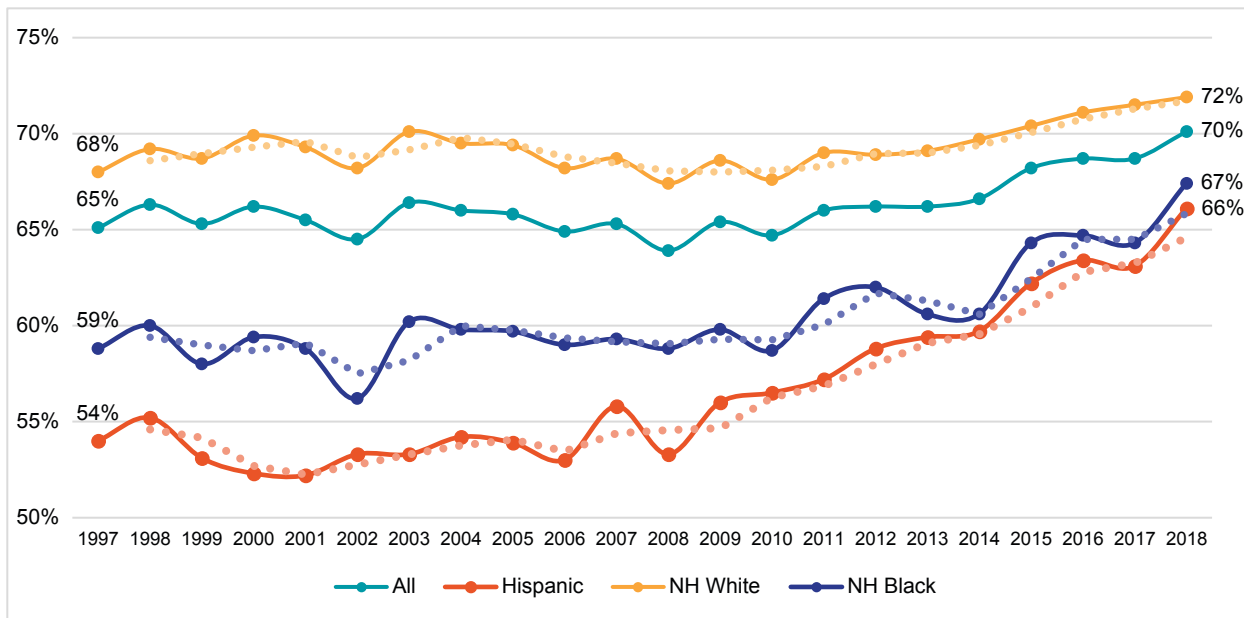

Figure D-11. Participants Aged 65 Years or Older Reporting a Dental Visit in the Previous Year by Selected Racial/Ethnic Groups. United States, NHIS 1997 to 2018.
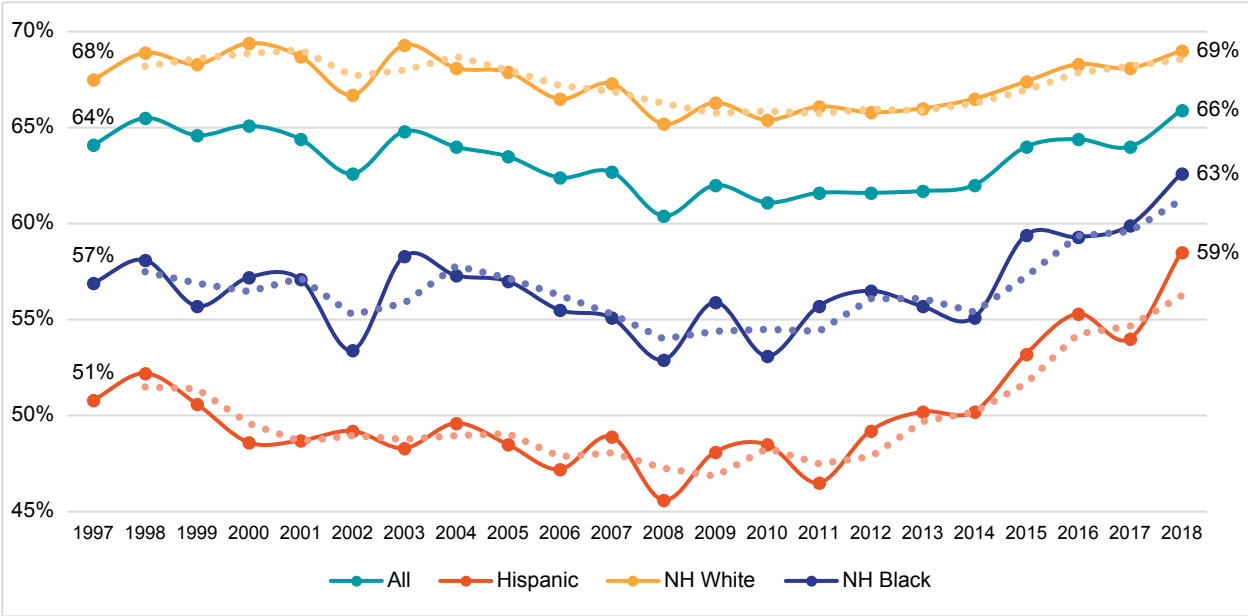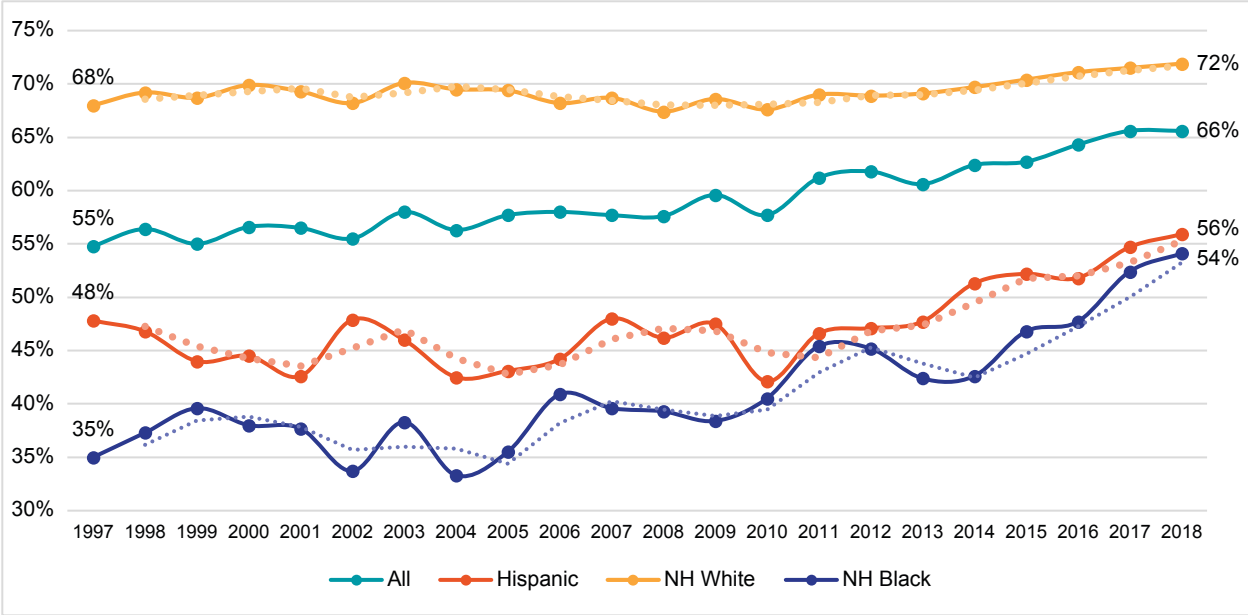
A similar increase pattern of dental utilization was observed for racial/ethnic minorities in older adults (Figure D-11). In this case, the gap with non-Hispanic White participants had decreased and may continue if the trends continue to the same degree.

Key Findings and Conclusions from MEPS

1. There is considerable variability in the national data for dental utilization. Dental utilization in the most current data among participants 2+ years old ranges from 46% in MEPS (2018) to 70% in NHIS (2018). However, the estimates from these sources are somehow consistent over time regarding inequities.

   Healthy People National Objectives use MEPS (OH-7 in 2020, OH-8 in 2030):

   a. Baseline data: 43.3% (2016)

   b. Most recent data: 46.2% (2018)

   c. Target: 45%

   Thus, we have already reached the overall Objective for 2030. However, Hispanic and non-Hispanic Black individuals are still 11% below the target.

2. The utilization of dental services varies by age group. Utilization rates are greater among children 2–17 and less among adults and senior adults.

3. Inequities by race/ethnicity are observed in all national data sources but are most notable in MEPS. NHIS trend data show equity in the utilization of dental services among children 2–17 years, but inequities in other age groups persist.

4. NHIS data show a steady increase in dental visits since 1997 among children 2–17 of all racial/ethnic groups. Also, there were increases among Hispanic and non-Hispanic Black adults and senior adults after 2010.

5. The increase in the utilization of dental services among children 2–17 years paralleled a decrease in the prevalence of dental caries, a slight decrease in the mean number of teeth with untreated decay, and a slight increase in filled teeth (primary and permanent). Hispanic children show the most substantial change towards equity over time.

6. Factors affecting the utilization of dental services and delivery of care are reducing some inequities by race/ethnicity among young children.

CHAPTER 5:
BEHAVIORAL RISK FACTOR SURVEILLANCE SYSTEM (BRFSS) RELATED TO DENTAL UTILIZATION

General Background

This section describes U.S. adult dental visits by race/ethnicity and Hispanic origin using data from the 2020 Behavioral Risk Factor Surveillance System (BRFSS).

Methods

We obtained the data and estimates from the BRFSS website through its query system. We limited the analysis to the following indicators by state and race/ethnicity: dental visits within the past year for any reason.

Not all state health departments included the three indicators defined by the BRFSS: all teeth removed, dental visit, and one or more teeth removed. For those reporting, the estimates were calculated for the calendar year 2020, which is the most recent available.

Dental Visits Within the Past Year in the U.S., BRFSS 2020 (Figures E-1 to E-4)

Key Findings from BRFSS Data

- About 60% of Hispanic adults visited the dentist or a dental clinic for any reason in the U.S. in 2020 (Figure E-1). This value represents the median of all states, DC, and territories and is higher than the reported for Mexican American and Hispanic adults participating in NHANES 2017–2020, (range across ages = 43–53%, Figure A-15).

- However, BRFSS included participants aged 18 and 19 years (Figure E-1), who were not included in NHANES.

- There is a wide variation in the utilization of dental services by Hispanics, e.g., 46% in Tennessee and 73% in Maine (Figure E-1, Figure E-2).

- Hispanic adults in some states/territories with a higher proportion of Hispanic residents had a lower utilization of dental services compared to overall estimates (Figure E-3).

- In states/territories with a higher proportion of Hispanic residents, there was no change in the utilization of dental services from 2016 to 2020. The exception was Puerto Rico, which decreased in utilization of dental visits by 13% in 2020 compared with previous years (Figure E-4).
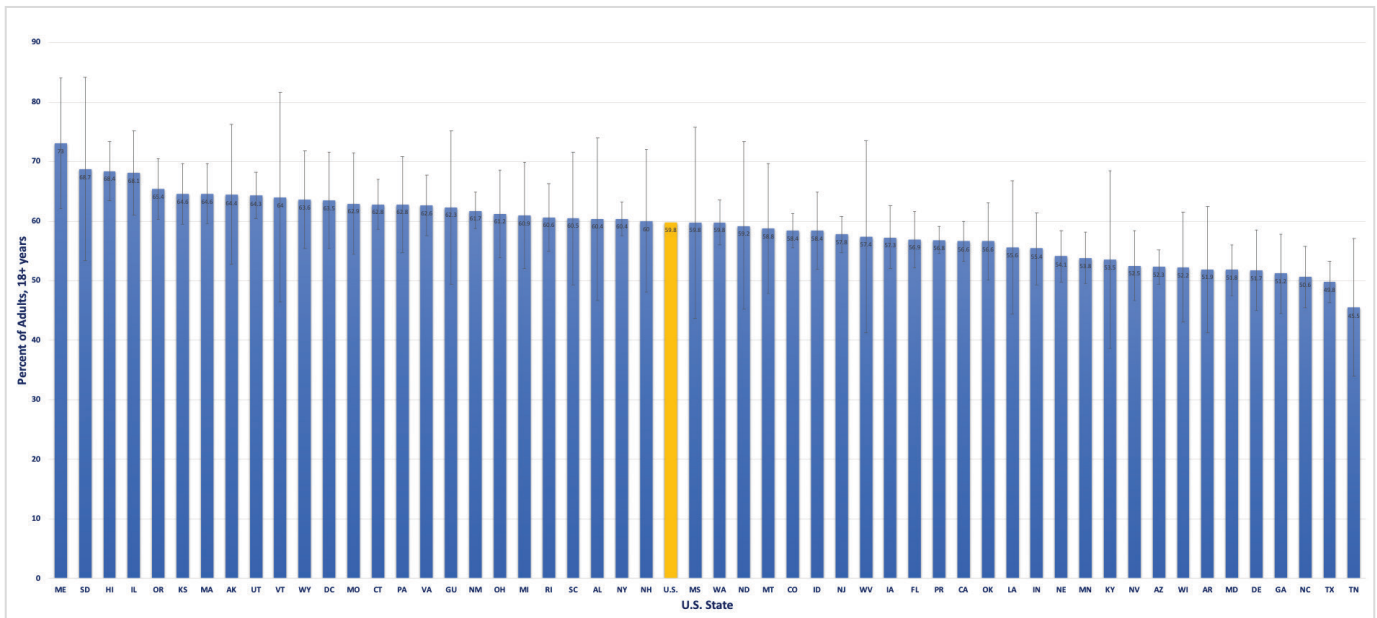
Figure E–1. Dental Visits in the Previous Year Among Hispanic Adults by State. United States, BRFSS 2020. (95% CI not available for all estimates).

**Figure E-2. Dental Visits in the Previous Year Among Hispanic Adults.
United States, BRFSS 2020.**

**Figure E-3. Dental Visits in the Previous Year Among Adults by Race/Ethnicity in Selected States.
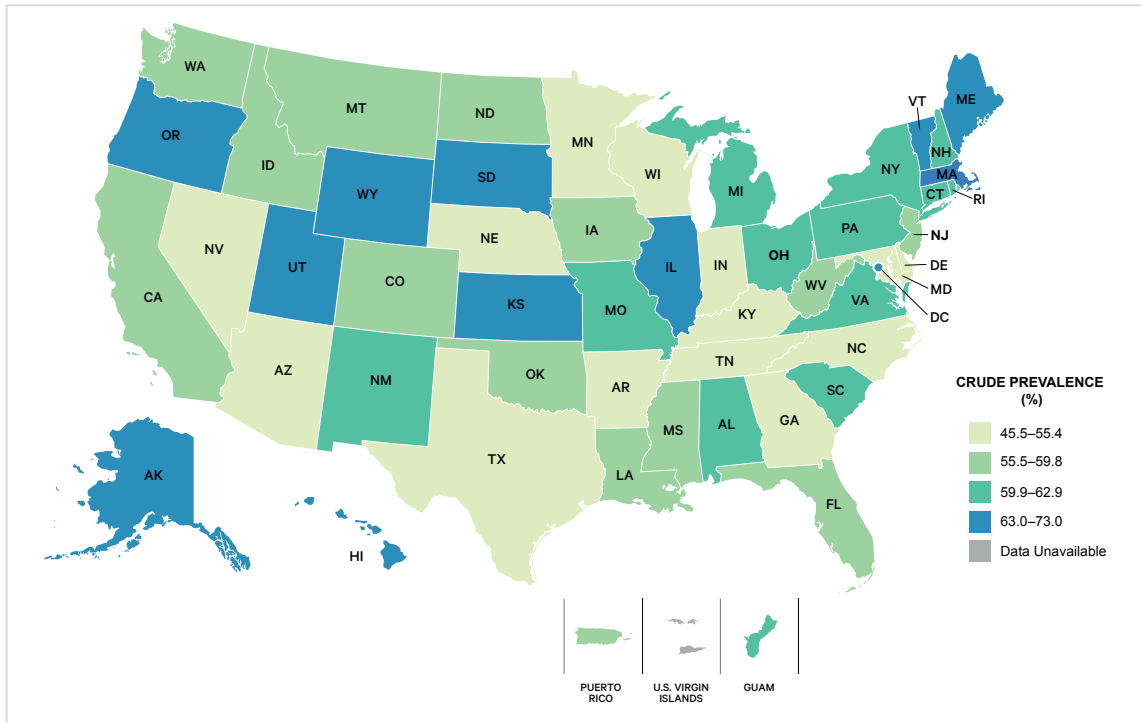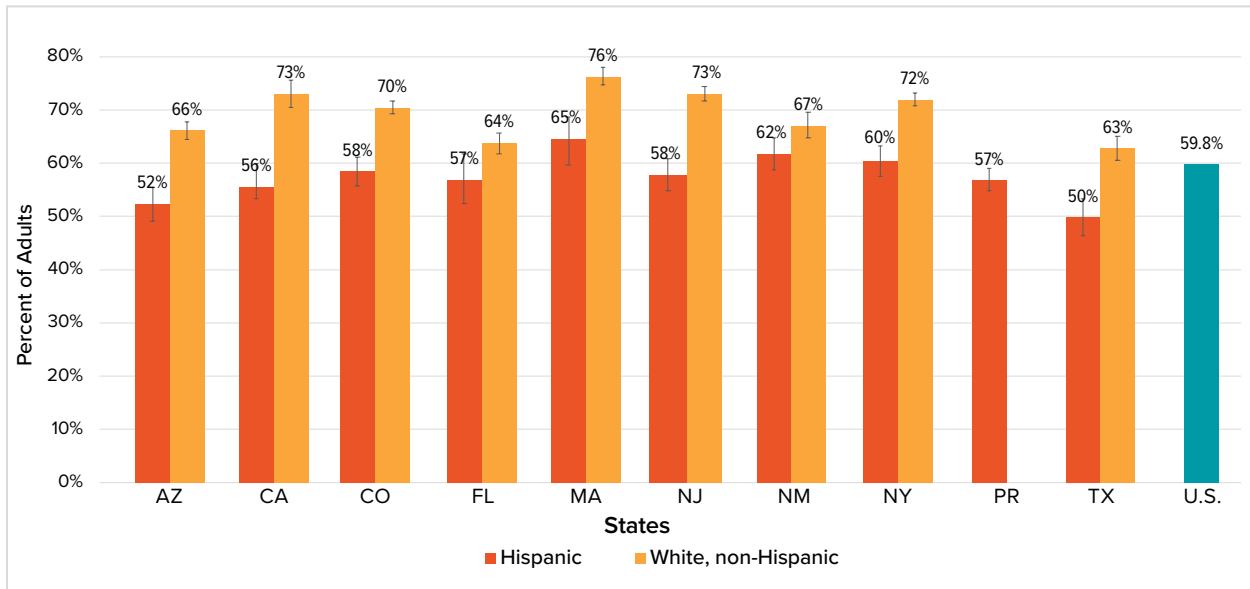United States, BRFSS 2020.**
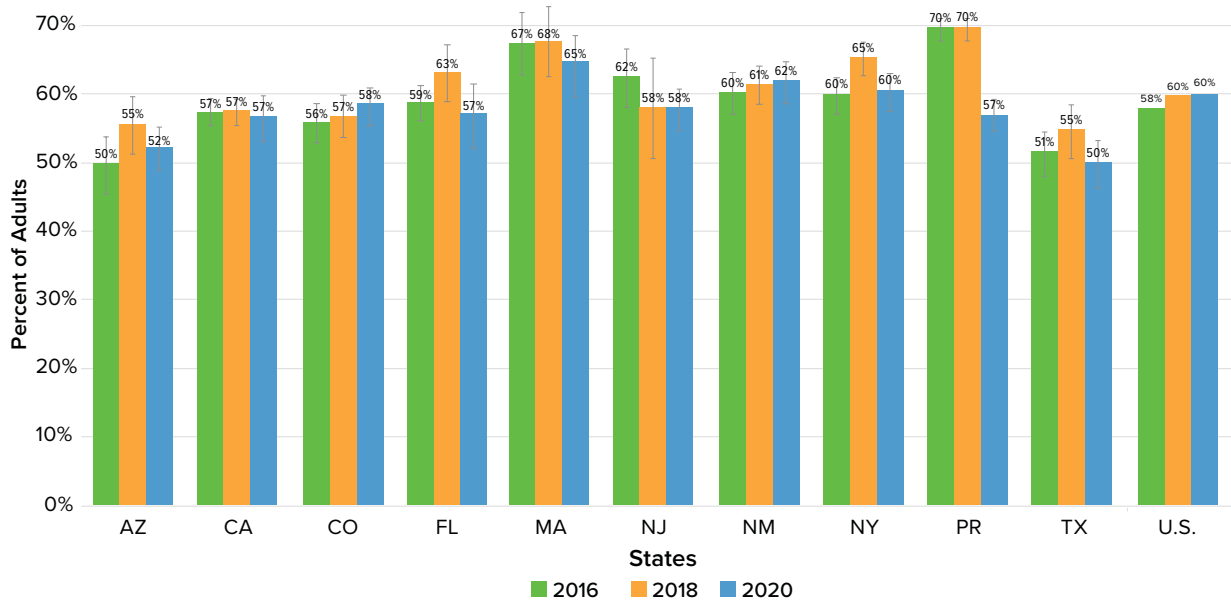
Figure E-4. Dental Visit in the Previous Year by Hispanic Adults in Selected States United States, BRFSS 2020.

CHAPTER 6:
NATIONAL HEALTH INTERVIEW SURVEY (NHIS) RELATED TO DENTAL UTILIZATION

General Background

The Centers for Disease Control and Prevention (CDC) Center for Health Statistics implements the National Health Interview Survey (NHIS). Since 1957, the NHIS has monitored the health of the nation, analyzing a broad range of health topics and collecting data through personal household interviews. Survey results have been instrumental in providing data to track health status, health care access, and progress toward achieving national health objectives.

The NHIS is conducted in a face-to-face interview format and uses geographically clustered sampling techniques to select the sample of dwelling units. Data collection on the NHIS is continuous from January to December each year. The annual sample size can be reduced for budgetary reasons or increased when supplementary funding is available. The target population for this national survey is the civilian population residing within the 50 states and the District of Columbia at the time of the interview. The NHIS universe includes individuals living in homeless shelters, rooming houses, and group homes. Persons excluded from the universe are active-duty military personnel and civilians living on military bases, persons in long-term care institutions, persons in correctional facilities, and U.S. nationals living in foreign countries.

Due to the COVID-19 pandemic, NHIS data collection switched to a telephone-only mode beginning March 19, 2020. Personal visits resumed in all areas in September 2020. In addition, from August–December 2020, a subsample of adult respondents who completed the NHIS in 2019 was contacted by telephone and asked to participate again.

Methods

Beginning in 2019, the sample was expected to yield 30,000 adult and 9,000 child completed interviews; the main response variable was how long it had been since their last dental examination or cleaning. We used the interactive query system available at the Data Resource Center for Child and Adolescent Health (https://www.childhealthdata.org/) and direct analysis of the publicly available dataset to obtain estimates of preventive dental visits for participants aged 2–19, 20–64, and 65 or more years who participated in the 2020 NHIS cycle. In addition, we supplemented with estimates reported by Cha and Cohen (2022). We used historical data from NHIS 1997–2007 to assess trends on dental visits (all types).

Preventive Dental Visits: U.S. 2020

Key Findings

- Around 85% of children aged 2–19 reported an examination or a cleaning visit in 2020. There were no notable differences by race/ethnicity (Figure F-1).

- Close to two-thirds of adults and senior adults reported an examination or a cleaning visit in 2020. Hispanic and non-Hispanic Black adults reported a lower percentage of preventive visits than non-Hispanic Whites and non-Hispanic Asian adults.
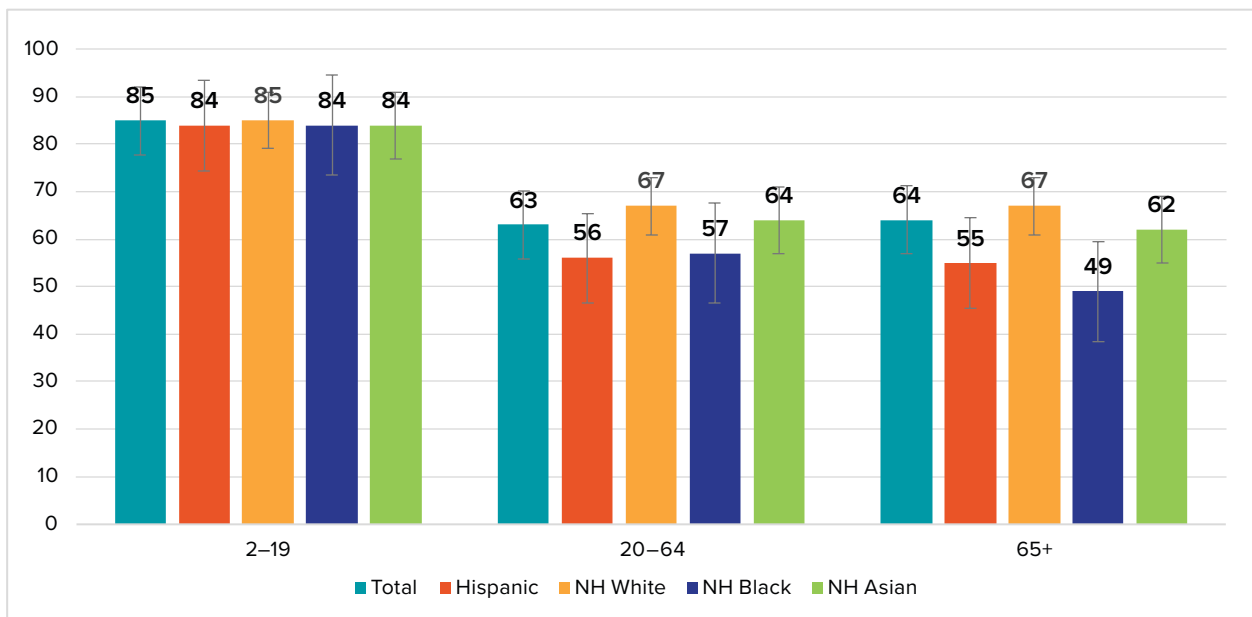
Figure F-1. Examination and Cleaning Visits by Race/Ethnicity and Age Group. United States, NHIS 2020.

Utilization of Dental Services Among Adults Aged 18–64: U.S., 1997, 2010, and 2018

Key Findings

- There was a small increase in the overall utilization of dental services from 2010 to 2018.

- The highest increase was among Hispanics (54% to 66%) from 1997 to 2018 and from 2010 to 2018 among non-Hispanic Black participants (59% to 67%), meaning a reduction in inequities by race/ethnicity from 1997 to 2018 (Figure F-2).
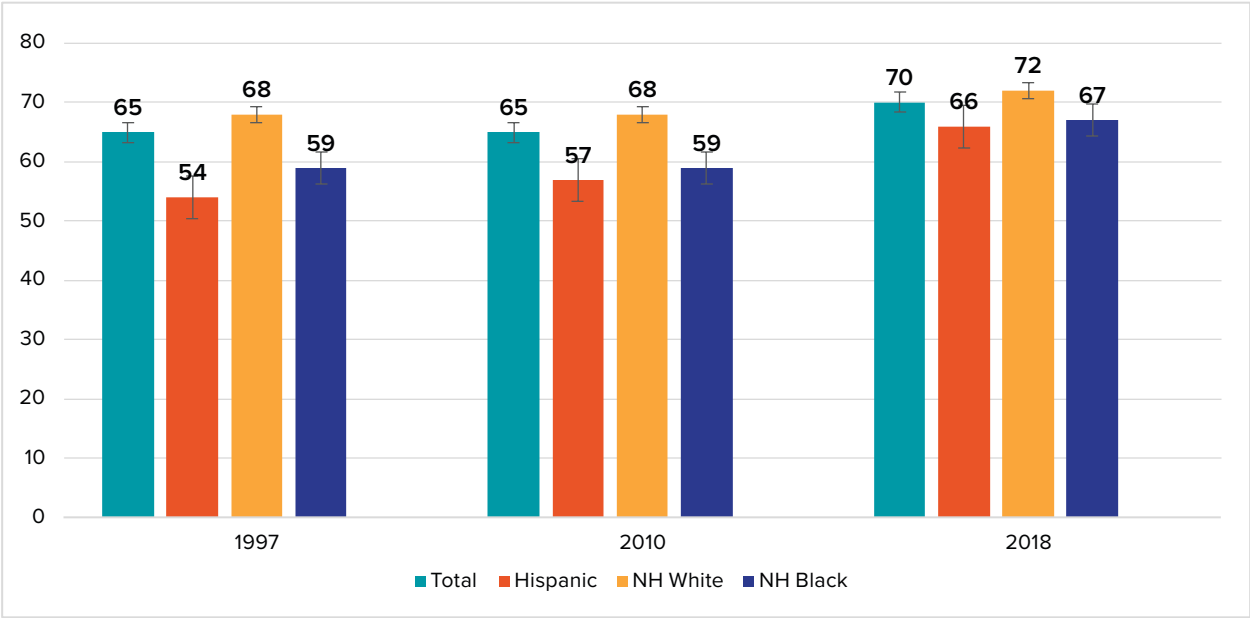
Figure F-2. Trends in Dental Care Utilization Among Adults 18–64. United States, NHIS 1997, 2010, and 2018.

Additional information on trends was derived from the full set of annual data points from 1997 and 2018.

Figure F-3 shows the trends for all participants 2 years and older. Figures F-4 to F-6 show the information for the age groups of 2–17, 18–64, and 65 and over, respectively. We used both the actual data points (connected by straight lines) and the moving average (connected by dotted lines).

- The estimates for all participants were relatively stable until 2009 (Figure F-3) and then increased steadily until 2018. The increase was greater among Hispanic and Black participants than among non-Hispanic White participants. Due to this differential growth in dental utilization, the differences between racial/ethnic groups in 2018 were smaller than in 1997, suggesting a reduction in inequities by race/ethnicity among children and adults aged 2 and older.
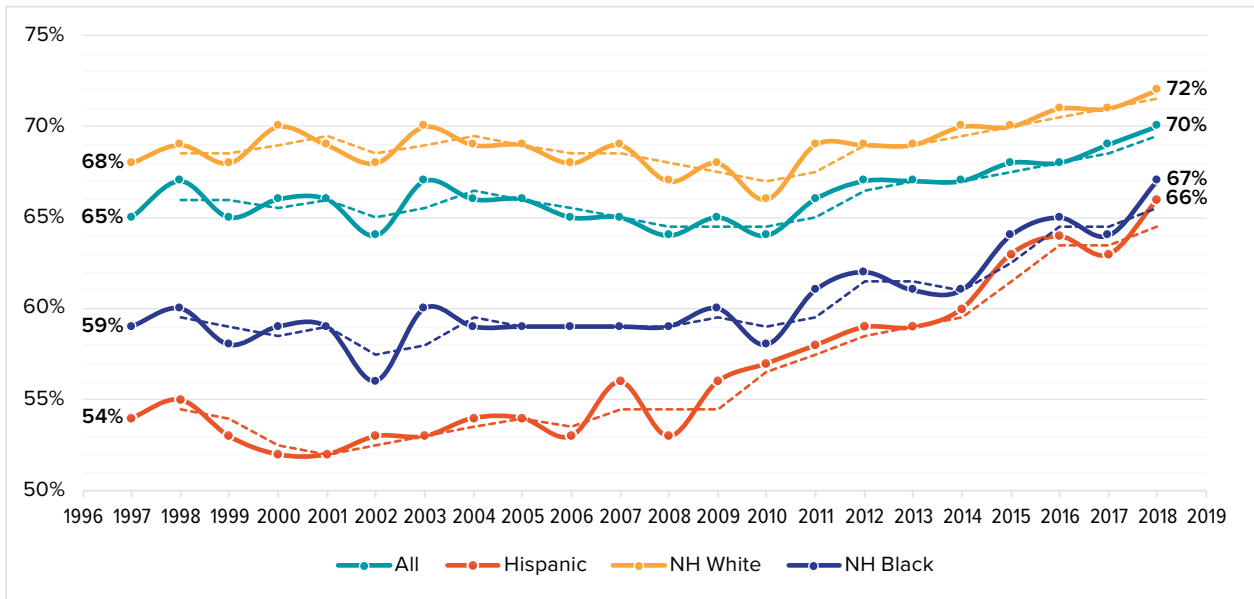
Figure F-3. Annual Change in Percentage and Moving Average of Dental Visits Among Participants Aged 2 Years and Older. United States, NHIS 1997 to 2018.

- There was a steady rise in dental utilization among children and adolescents aged 2–17. In 2018, there were no significant differences in dental utilization by race/ethnicity (Figure F-4).
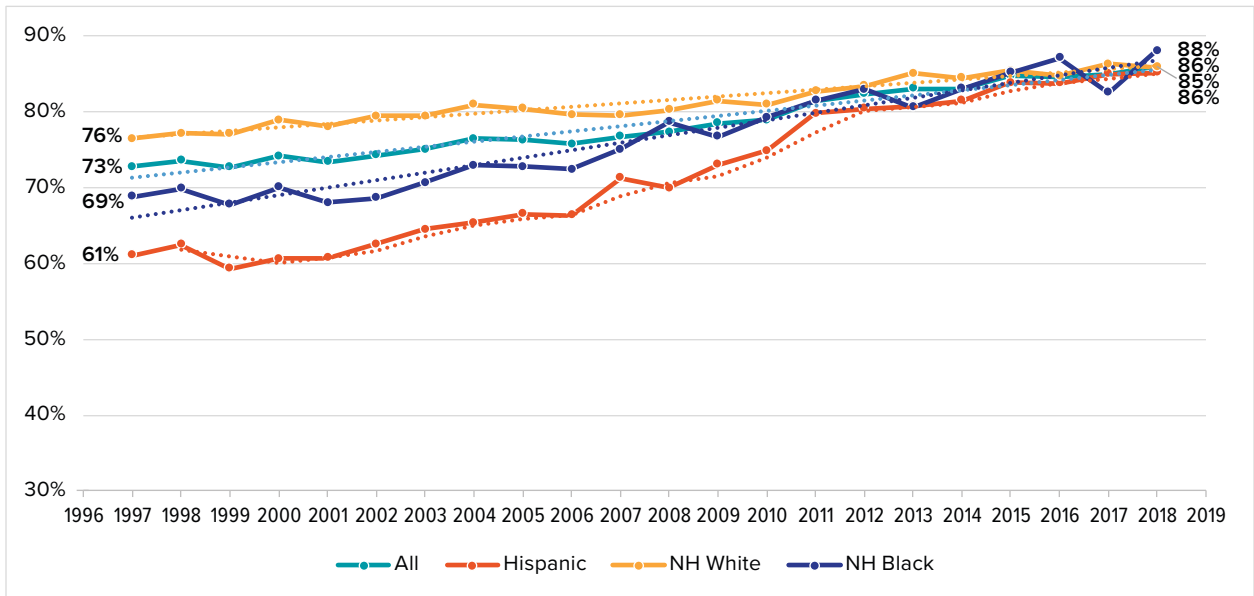
Figure F-4. Annual Change in Percentage and Moving Average of Dental Visits Among Participants Aged 2–17 Years. United States, NHIS 1997 to 2018.

- There were modest increases in the utilization of dental services among adults (Figure F-5) and larger increases among senior adults, especially among non-Hispanic Black participants (Figure F-6).
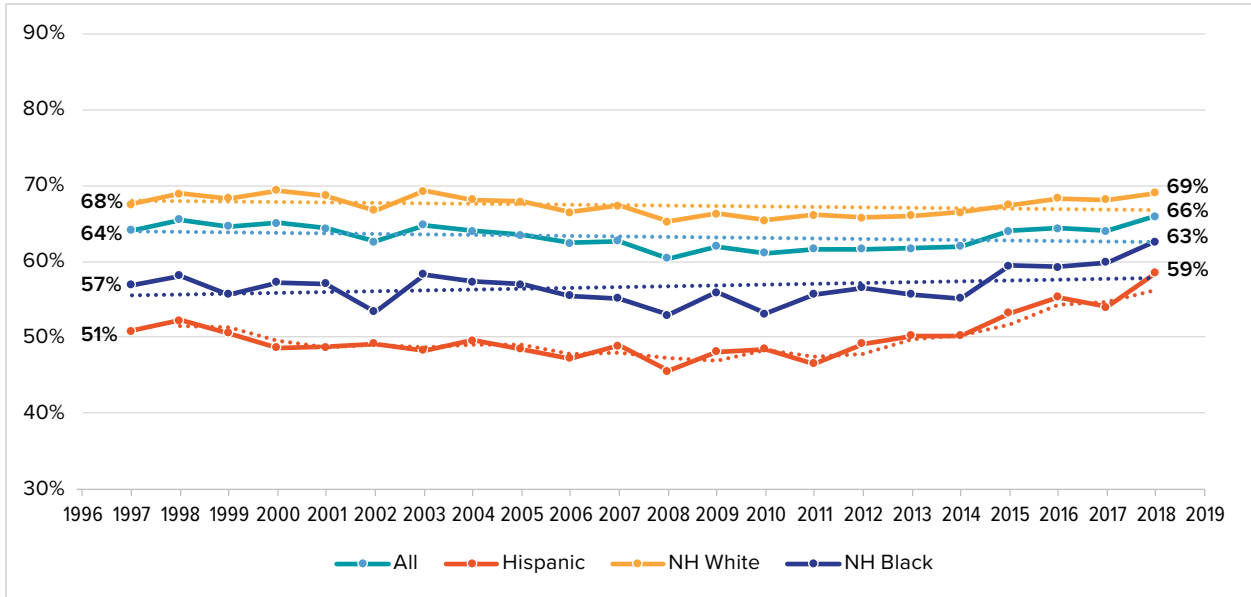
Figure F-5. Annual Change in Percentage and Moving Average of Dental Visits Among Participants Aged 18–64 years. United States, NHIS 1997 to 2018.
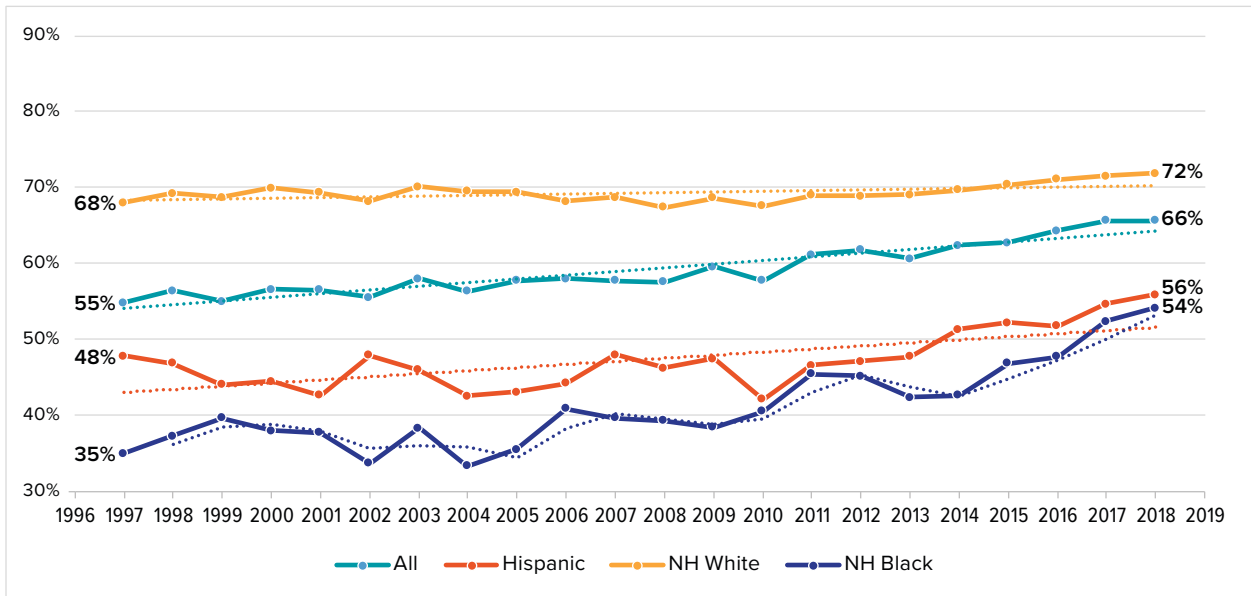
Figure F-6. Annual Change in Percentage and Moving Average of Dental Visits Among Participants Aged 65 years and Older. United States, NHIS 1997 to 2018.

CHAPTER 7:
# YOUTH RISK BEHAVIOR SURVEILLANCE SYSTEM (YRBSS) RELATED TO DENTAL UTILIZATION

YRBSS Background

This analysis is based on results from the Youth Risk Behavior Surveillance System (YRBSS) 2019 survey. YRBSS is a set of national school-based surveys conducted by the CDC at state, territorial, tribal, and local levels. The survey has been used to examine trends in risky behaviors as well as the association between youth behavior and health outcomes. The survey monitors six categories of health-related behaviors among samples of 9th through 12th grade public and private school students. The six behavioral categories include unintended injuries and violence, sexual behavior, tobacco use, alcohol and other drug use, diet, and physical activity. These self-reported surveys are conducted every two years, usually during the spring semester.

YRBSS has included an oral health question since 2015 (Question 86). Previously, in 1999, 2001, and 2003, YRBSS included an oral health question, but the effort was dismissed after three national surveys.

Methods

This secondary data analysis was conducted using the 2019 YRBSS to explore dental care utilization, as well as making comparisons with previous years (2015, 2017) in selected states that have data for those years. Other variables in the dataset, such as consumption of sugar-sweetened beverages (SSB), smoking, tobacco use, vaping, and alcohol consumption were not included in this report.

Outcome: *Saw a dentist for a check-up, exam, teeth cleaning, or other dental work during the 12 months before the survey*

States reporting YRBSS (Figure G-1)

At the time of closing this review, only 39 states and three territories had a complete YRBSS in 2017 and 2019. From the ten states with the largest Hispanic populations, only Colorado did not report YRBSS data.
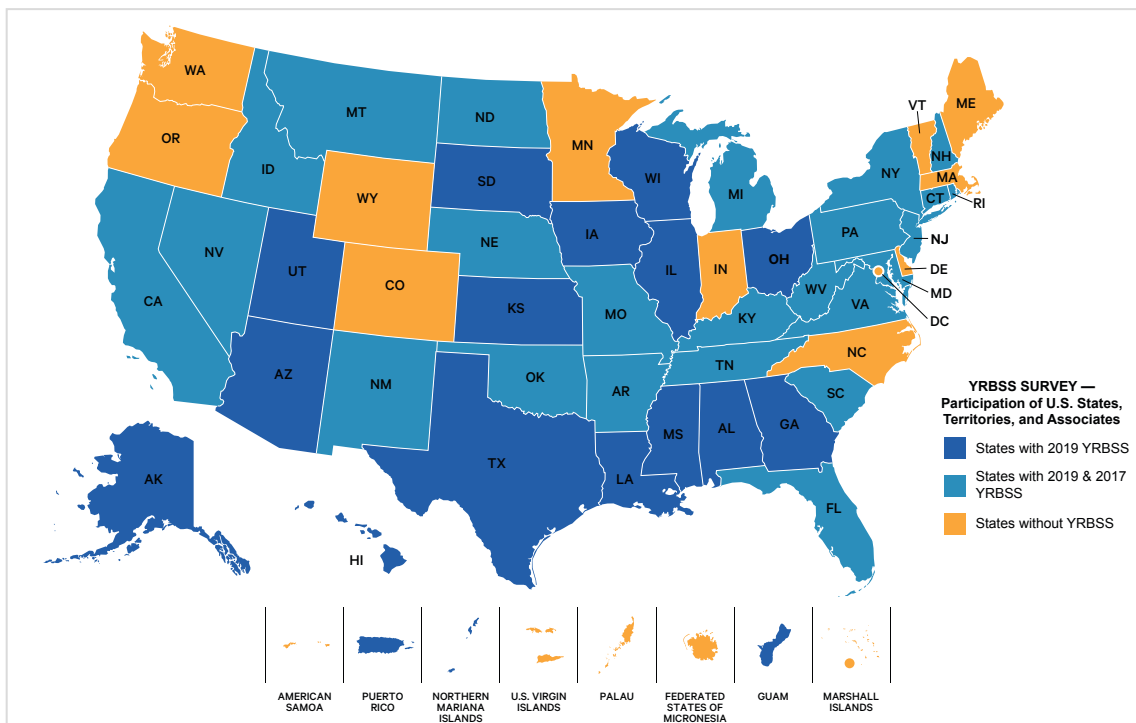
Figure G-1. YRBSS State Participation Status in 2017 and 2019. United States, YRBSS 2017 and 2019.

Standard and Additional Questions (Figure G-2)

The standard High School Questionnaire for YRBSS used in 2015, 2017, and 2019 contained the following question: When was the last time you saw a dentist for a check-up, exam, teeth cleaning, or other dental work? Answer options included "during the past 12 months," "between 12 and 24 months ago," "more than 24 months ago," "never," and "not sure." Additionally, some states have included other questions of interest in oral health, but they only report the standard question required by the CDC. Oregon, Colorado, and Minnesota do not report the YRBSS survey to the CDC but run their own youth-focused survey systems.
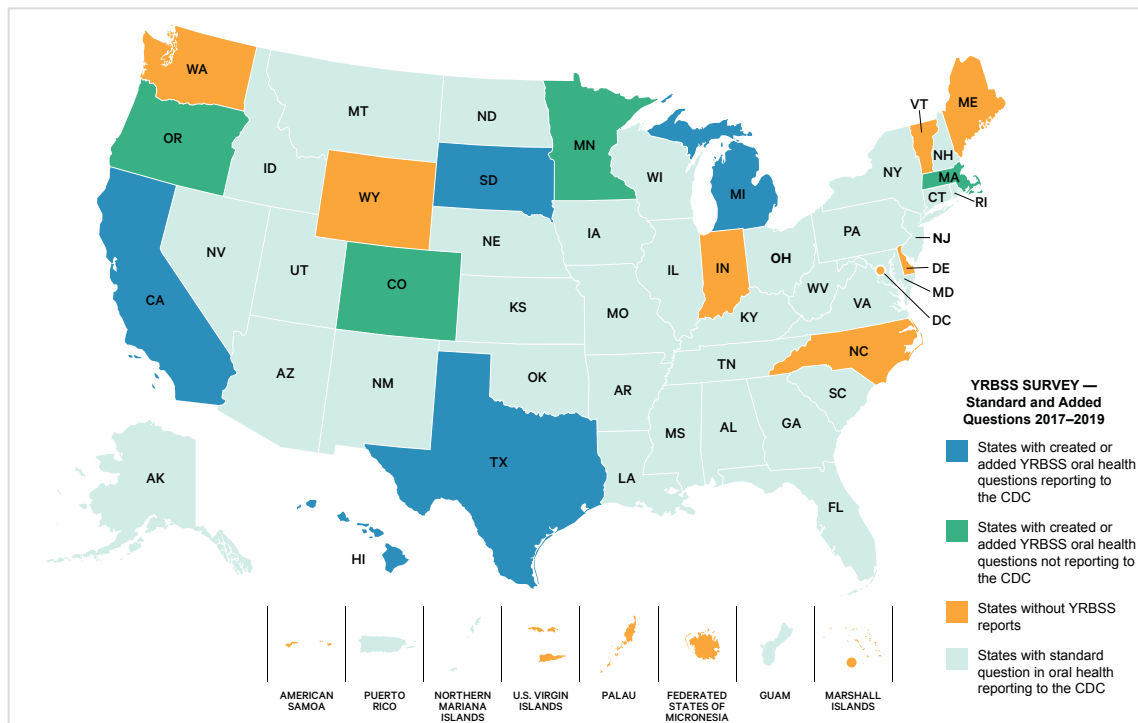
Figure G-2. YRBSS Survey—Standard and Added Questions 2017 and 2019. United States, YRBSS 2017 and 2019.

Reporting by Race and Ethnicity

All states reported estimates by race and ethnicity, but some applied different demographic criteria, excluding or grouping some racial/ethnic groups. In this report, all Hispanic students were included in the Hispanic category regardless of race. All other races were considered as non-Hispanic.

Key Findings

- Around 76% of high school youth reported visiting the dental office for preventive and curative dental treatment (Figure G-3). The prevalence of dental visits increased slightly in grades 9 to 11 and decreased in grade 12.

- A lower proportion of Hispanic and non-Hispanic Black youths had a dental visit in the previous 12 months than non-Hispanic White and Asian participants (Figure G-4).

- The proportion of high school youth reporting visiting the dental office for preventive and curative dental care increased from 2001 to 2019 (Figure G-5). The increase was higher among Hispanic and non-Hispanic Black youth compared with non-Hispanic White youth. As a consequence, the inequities in dental visits among minority youth have recently decreased.

- Among the 10 states with the largest Hispanic populations, Colorado and Puerto Rico did not report YRBSS data. In all states, non-Hispanic White youth reported a higher proportion of dental visits than minority youths (Figure G-6). The proportion of Hispanic youths reporting a dental visit in the previous year ranged from 61% in California to 76% in New Mexico.
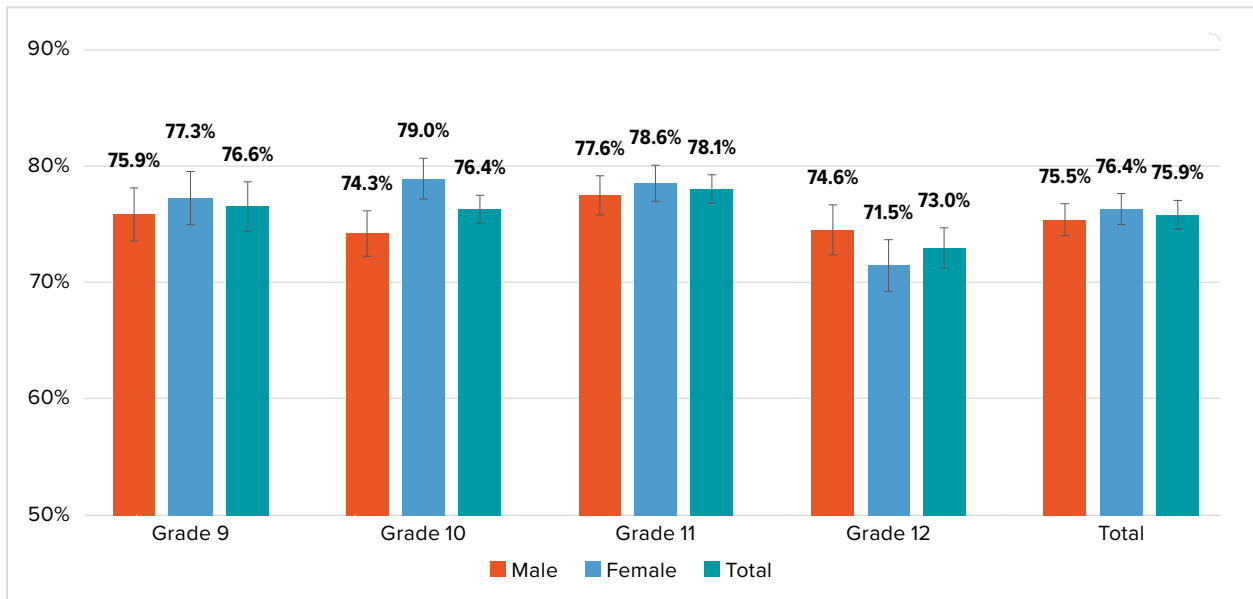
Figure G-3. Proportion of High School Students Reporting a Dental Visit by Grade. United States, YRBSS 2019.
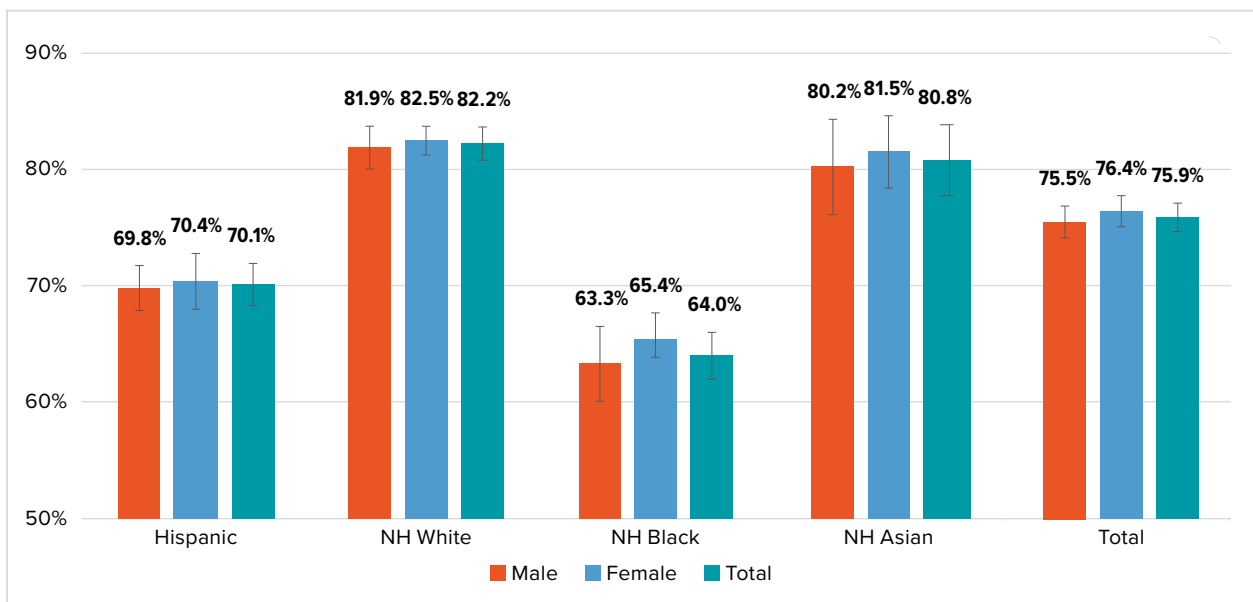
Figure G-4. Proportion of High School Students Reporting a Dental Visit by Race/Ethnicity. United States, YRBSS 2019.
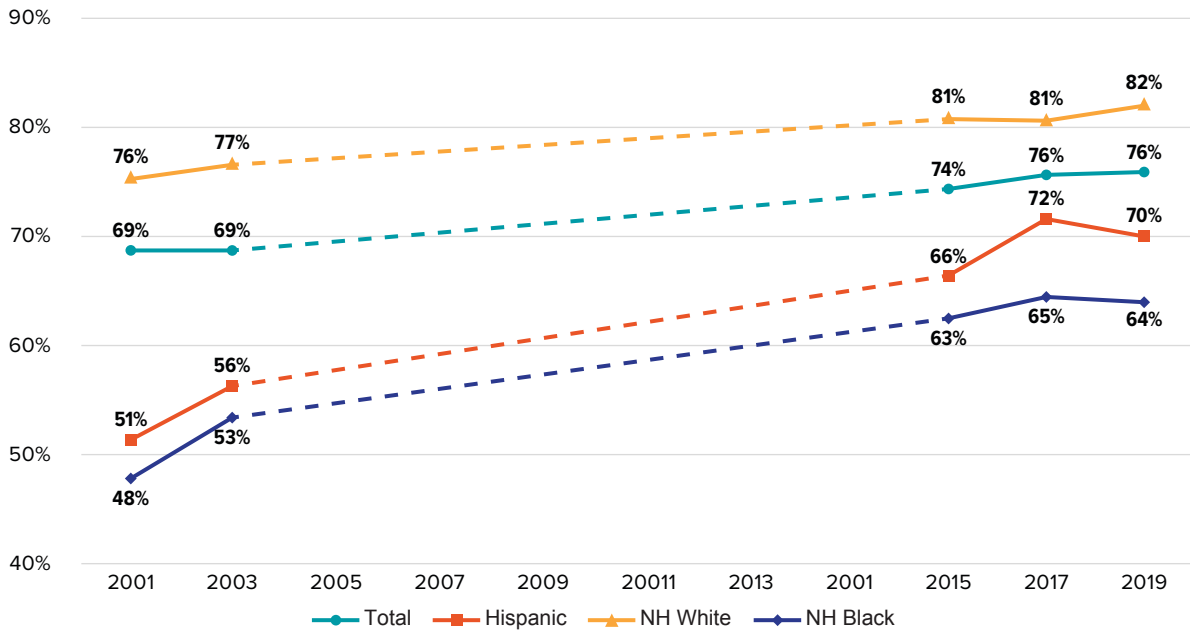
Figure G-5. Proportion of High School Students Who Reported a Dental Visit. United States, YRBSS 2001 to 2019.
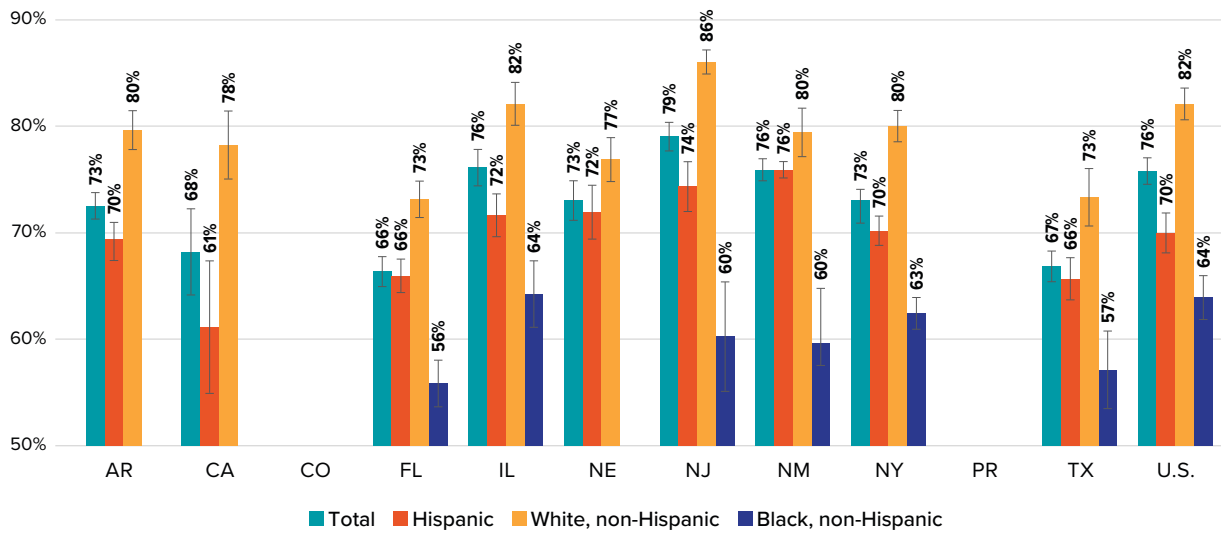
Figure G-6. Proportion of High School Students Who Saw a Dentist in the 10 States with Largest Hispanic Populations, by Race/Ethnicity. United States, YRBSS 2019.

CHAPTER 8:
NATIONAL SURVEY OF CHILDREN'S HEALTH (NSCH) RELATED TO DENTAL UTILIZATION

NSCH Background

In addition to the surveys already discussed, the National Survey of Children's Health (NSCH) is another source of information on dental utilization. The NSCH is funded by the Health Resources and Services Administration (HRSA) and the Maternal and Child Health Bureau (MCHB). The U.S. Census Bureau (Department of Commerce) implements the survey. Data are available for children aged 0–17 at the national and state levels for 2016, 2017, 2018, 2019, and 2020. The objective of the survey is to measure the physical and mental health of a representative sample of children; their access to health care—including dental—; and family, neighborhood, school, and social context. Additional information can be obtained at: https://www.census.gov/programs-surveys/nsch/data/datasets.html.

Methods

Data were collected from randomly selected households by the U.S. Census. The selected households were contacted by mail to identify children under 18. One child was randomly selected from each eligible household. The survey in 2019–2020 oversampled children aged 0–5 years and children with special needs. A total of 72,219 participants were selected, and the overall response rate was 42%. The estimates represent the U.S. population of children less than 18 years old.

We used the interactive query system available at the Data Resource Center for Child and Adolescent Health (https://www.childhealthdata.org/browse/survey) to obtain estimates of dental visits (by all dental providers) and preventive dental visits for children aged 0–17 years who participated in the 2019–2020 NSCH cycles. The downloadable data included the estimates, confidence intervals, sample size, and population estimates after applying the sample weights.

We included two variables related to dental utilization for children aged 0–17 years:

1. Children who received any type of dental care during the past 12 months and from any kind of dental provider
2. Children who had one or more preventive dental care visits during the past 12 months

We requested stratification by age (i.e., 0–5, 6–11, and 12–17), race/ethnicity, and state of residence.

Key Findings

- 80% of parents reported that their children aged 0–17 years had a dental visit in the past 12 months.

- The prevalence of dental visits varied by age: 59% among children aged 1–5, 88% among those aged 6–11, and 85% among those aged 12–17.

- We detected inequities in dental utilization by race/ethnicity: 78% among Hispanics, 83% among non-Hispanic White, and 79% among non-Hispanic Black, but the confidence intervals overlapped.

- Dental utilization by the Hispanic population varied from 59% in West Virginia to 94% in Vermont. Among states with the largest Hispanic populations, dental utilization ranged from 70% in Nevada to 84% in New Jersey.

- In all 10 states with the largest Hispanic populations, Hispanics reported fewer dental visits than other racial/ethnic groups. The percentage of reported visits for these states ranged from 74% in Arizona to 83% in New Jersey.

- The estimates for preventive dental visits were similar to overall dental visits and may indicate that many dental visits reported by parents were preventive.

- Of children with special care needs, 85% had a dental visit; 82% of those visits were for preventive care.

Dental Visit of Any Type

From the 2019–2020 NSCH data, between 74% and 81% of parents reported their children had a dental visit in the previous year, with small differences by race/ethnicity (Figure H-1).
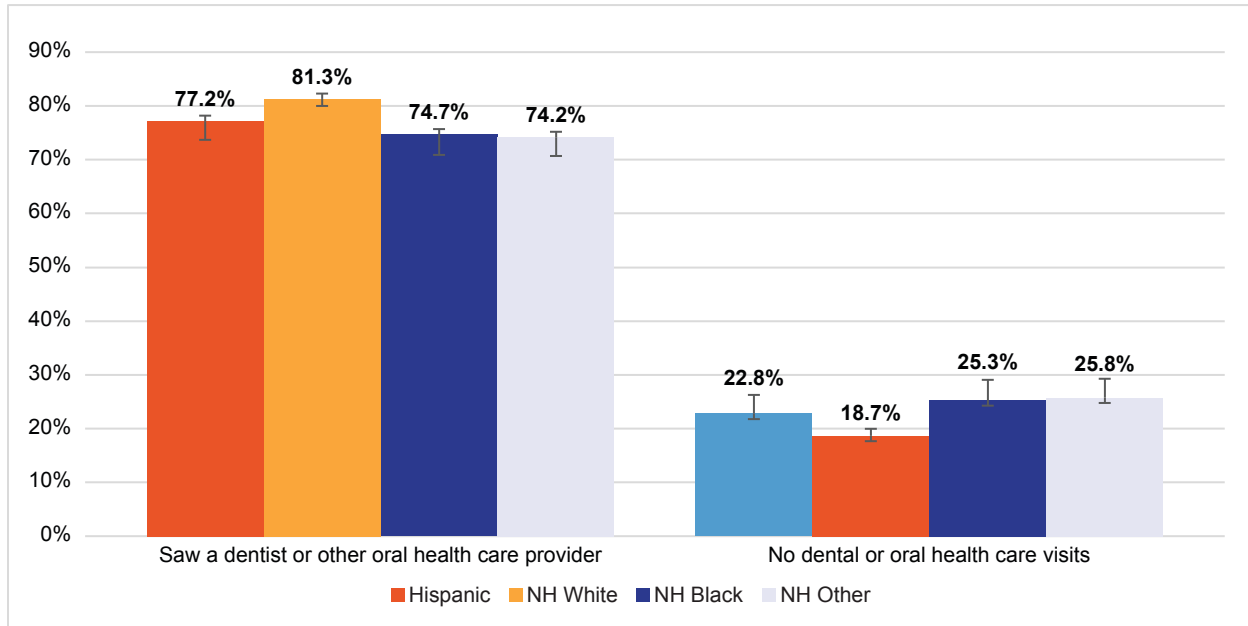
Figure H-1. Children Aged 0–17 Years Receiving Any Type of Dental Care During the Past 12 Months by Race/Ethnicity. United States, NSCH 2019–2020.

Parents of non-Hispanic White children reported higher dental utilization (81%) than other racial/ethnic groups; this difference was as much as seven percentage points. Less than 4% of parents .reported their children had dental visits with oral health providers other than dentists (e.g., dental hygienists or dental therapists).

Figure H-2 displays the same information stratified by age group. While only 58% of children aged one to five years reported a dental visit, the percentage increased to over 85% in the older children. Unfortunately, the data query system does not allow two-level stratification (age and race/ethnicity).
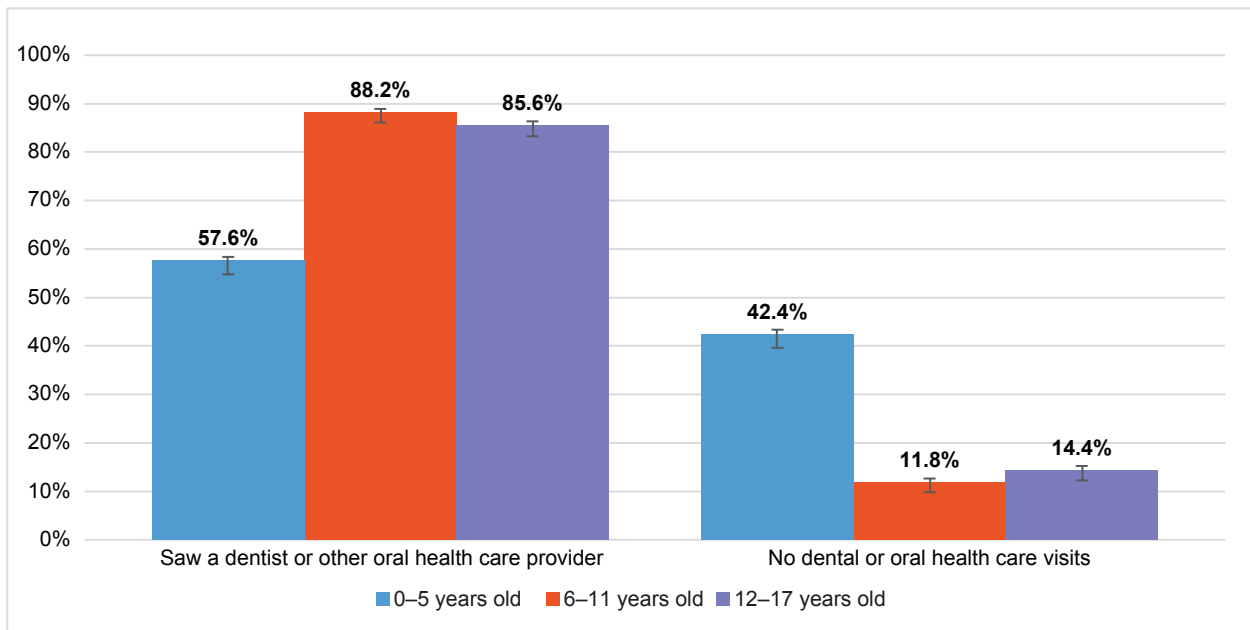
Figure H-2. Children Aged 0–17 Years Receiving Any Type of Dental Care During the Past 12 Months by Age. United States, NSCH 2019–2020.

Preventive Dental Visit

Between 70% and 79% of parents reported their child had a preventive visit (Figure H-3). Parents of non-Hispanic White children reported higher utilization (79%) than other racial/ethnic groups; this difference was as much as nine percentage points.
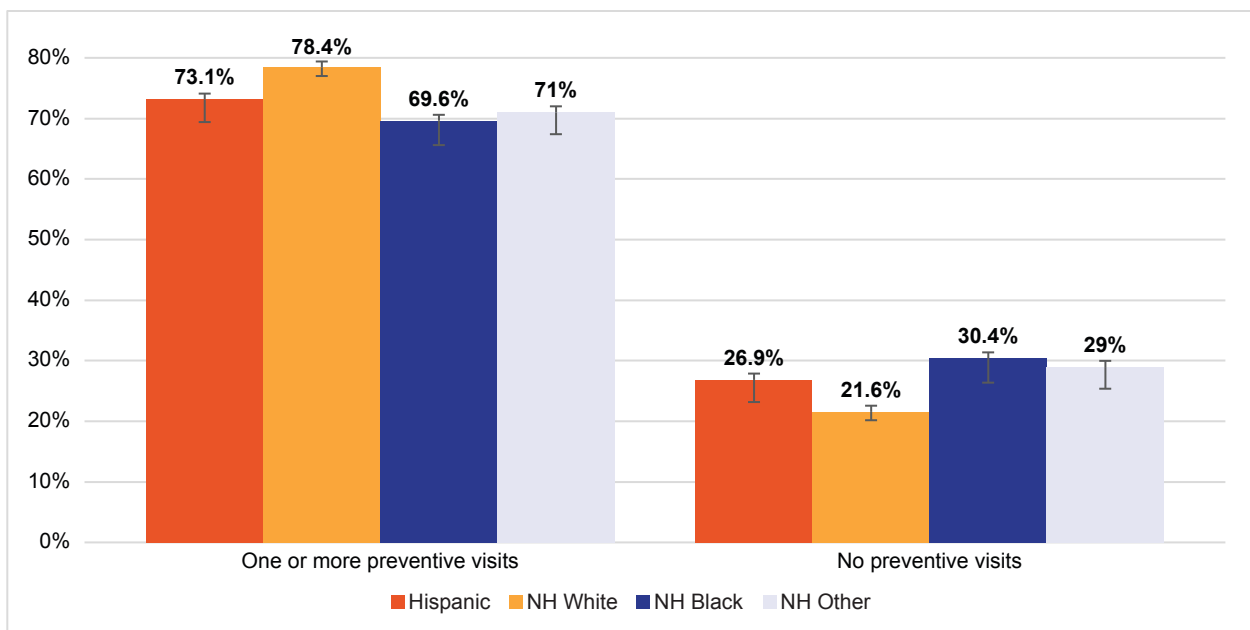
Figure H-3. Children Aged 0–17 Years Receiving One or More Preventive Dental Visits in the Past 12 Months by Race/ Ethnicity. United States, NSCH 2019–2020.

Figure H-4 displays the same information stratified by age group. While only 55% of one-to-five-year-old children reported a dental visit, the percentage increased to over 84% in the older age group.
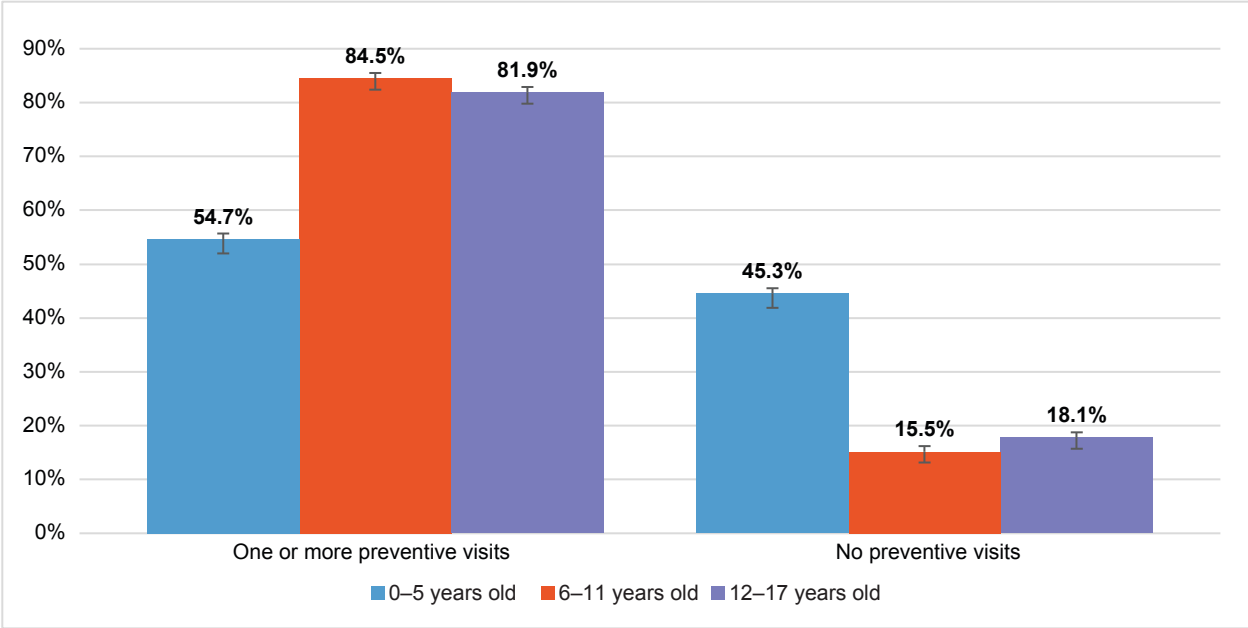
Figure H-4. Children Aged 0–17 Receiving One or More Preventive Dental Visits in the Past 12 Months by Age. United States, NSCH 2019–2020.

Children with Special Needs

Of parents of children with special needs, 79% reported their children had a preventative dental visit compared with 74% of parents of children without special needs (Figure H-5).
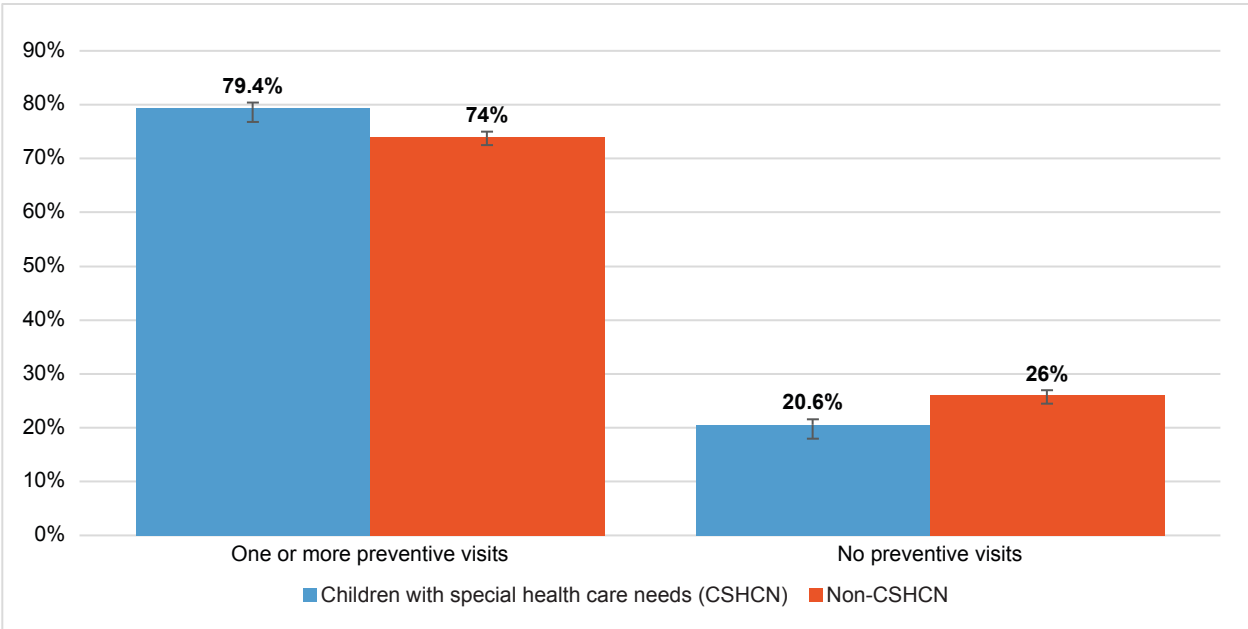
Figure H-5. Children with Special Needs Aged 0–17 Receiving One or More Preventive Dental Visits in the Past 12 Months. United States, NSCH 2019–2020.

There was considerable variation in inequities in dental visits by state. Among Hispanic children, the proportion varied from 48% in West Virginia to 94% in Vermont (Figure H-6).
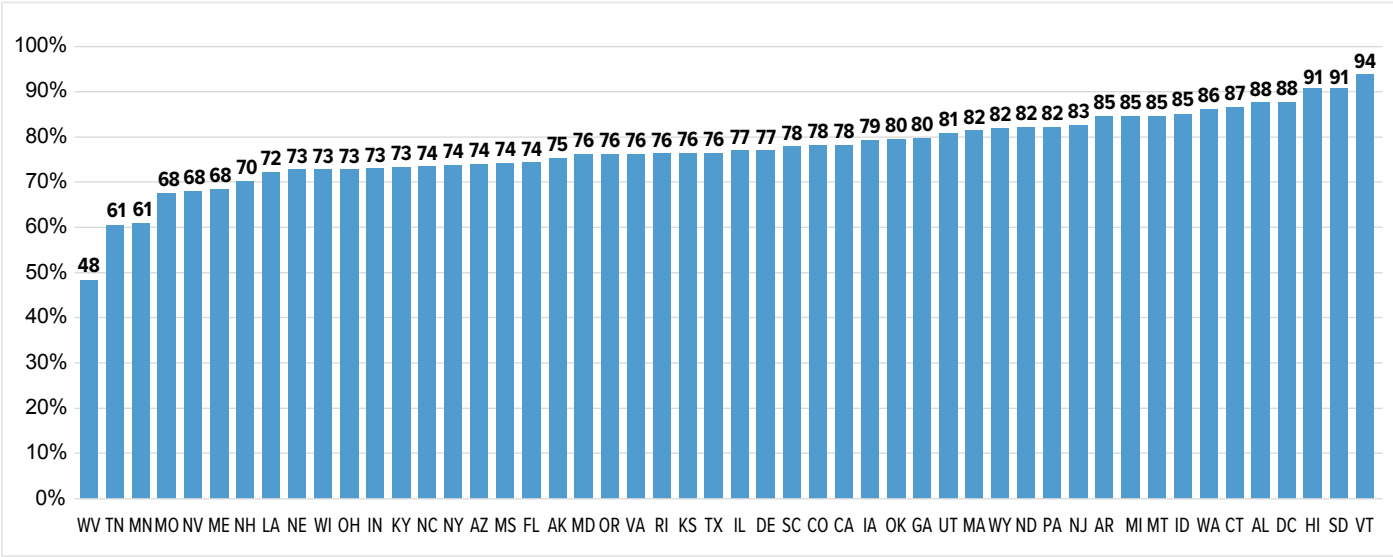
Figure H-6. Percent of Hispanic Children Aged 0–17 Having a Dental Visit in the Previous Year, by State. United States, NSCH 2019–2020.

Among the top five states with the largest Hispanic population, the highest percentages of children having a dental visit were in Illinois (77%), Texas (76%), California (78%), Colorado (78%), and New Jersey (83%).

Figure H-7 provides information for preventive dental visits among Hispanic children by state, showing very little difference in the ordering of the states.
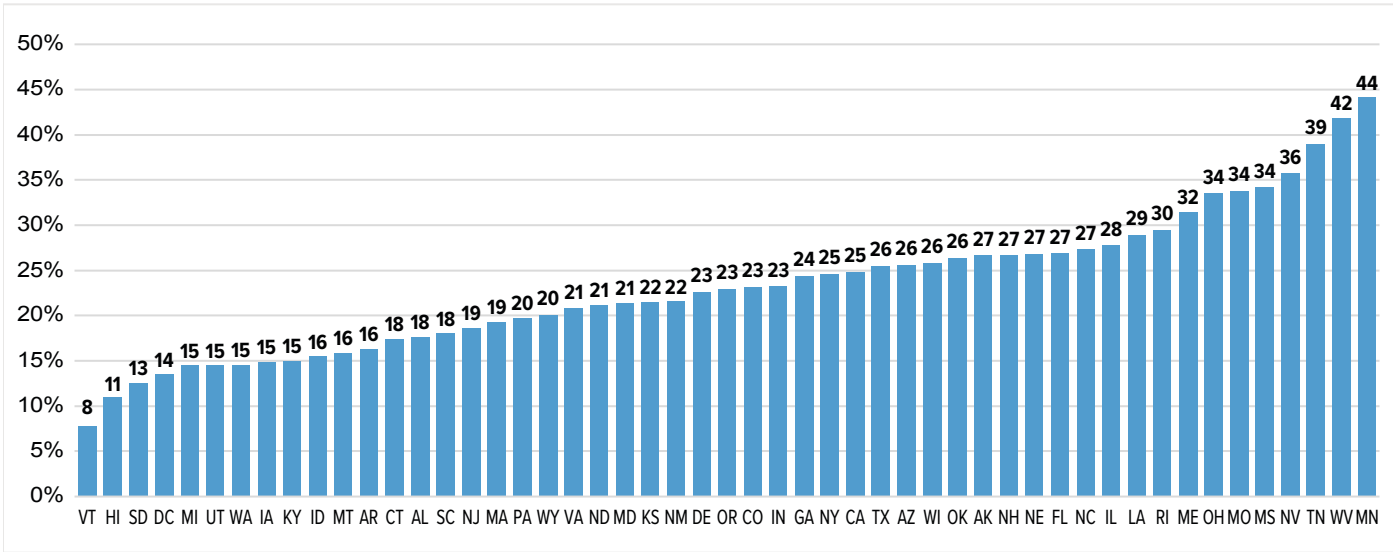
Figure H-7. Percent of Hispanic Children Aged 0–17 Having a Preventive Dental Visit in the Previous Year, by State. United States, NSCH 2019–2020.

Figures H-8 and H-9 provide the race/ethnicity stratification for the prevalence of dental visits and preventive dental visits in the 10 states with the largest Hispanic populations. Differences greater than five percentage points between Hispanic and non-Hispanic White children were observed in Arizona, California, Colorado, and Nevada.
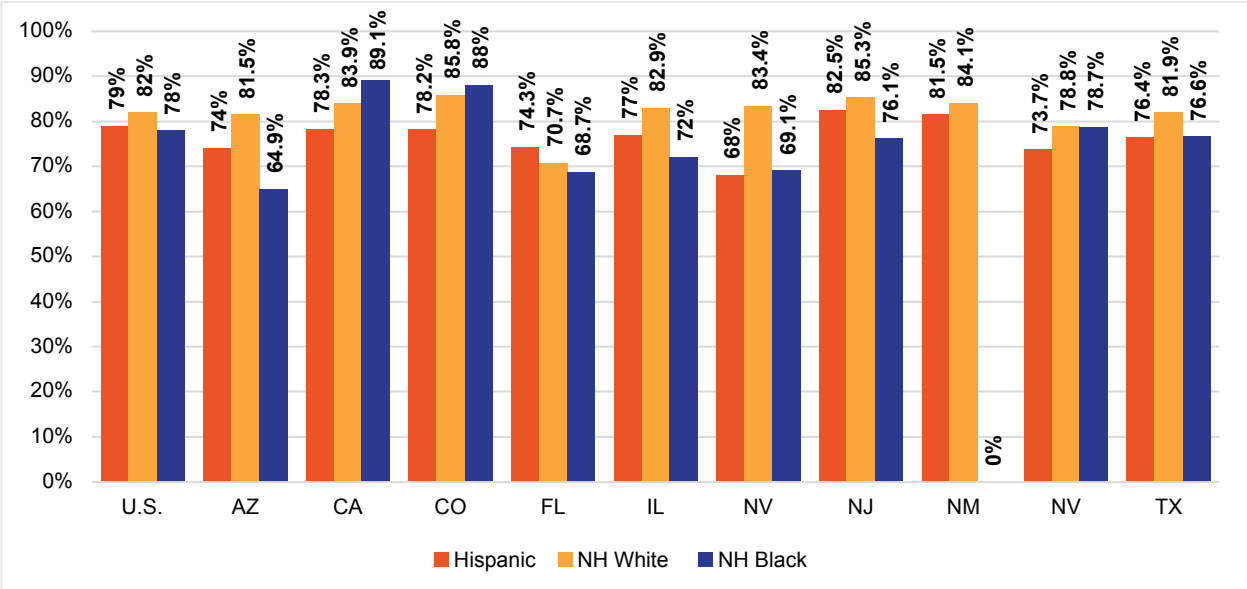
Figure H-8. Children Aged 0–17 With a Dental Visit in the Past Year in the 10 States with Largest Hispanic Populations. United States, NSCH 2019–2020.
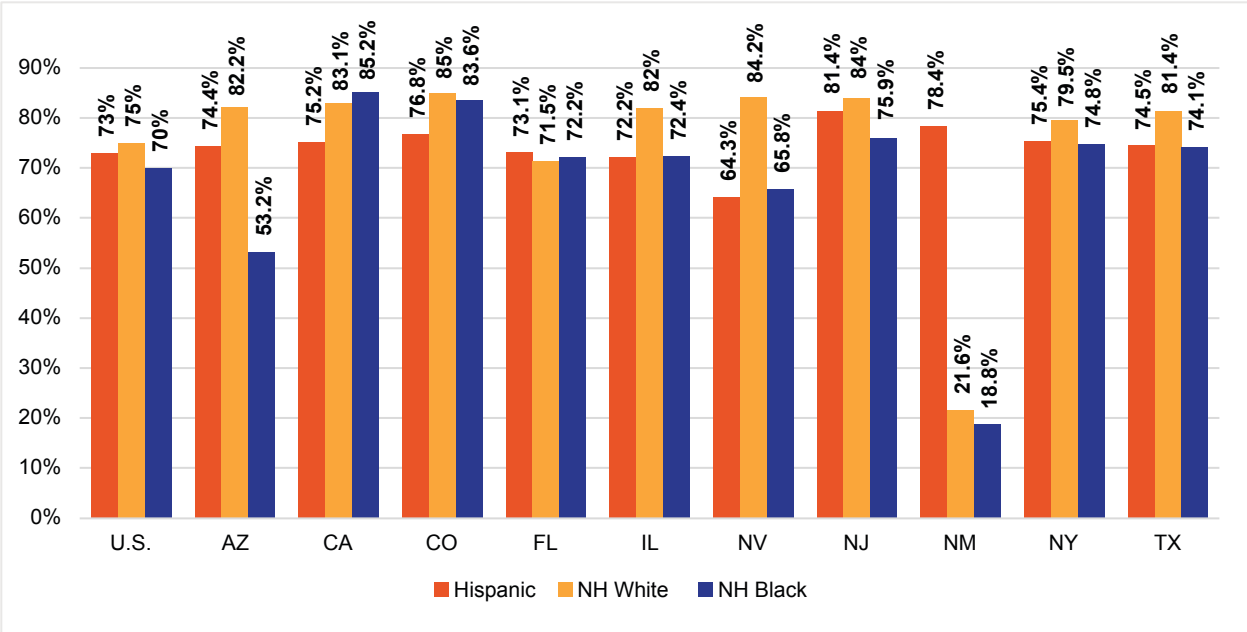
Figure H-9. Children Aged 0–17 With a Preventive Dental Visit in the Past Year in the 10 States with Largest Hispanic Populations. United States, NSCH 2019–2020.

CHAPTER 9:
PREGNANCY RISK ASSESSMENT MONITORING SYSTEM (PRAMS) RELATED TO DENTAL UTILIZATION

PRAMS Background

The Pregnancy Risk Assessment Monitoring System (PRAMS) is a surveillance project of the CDC and state health departments. Developed in 1987, PRAMS collects site-specific, population-based data on maternal attitudes and experiences before and during pregnancy and shortly after birth. PRAMS surveillance currently covers about 81% of all U.S. births.

PRAMS provides data not available from other sources to investigate emerging issues in the field of reproductive health and for state, territory, and local governments to plan and review programs and policies aimed at reducing health problems among mothers and infants. Forty-seven states and DC, New York City, Puerto Rico, and the Great Plains Tribal Chairman's Health Board participate in PRAMS (Shulman, D'Angelo, et al., 2018).

Pregnancy is associated with many physiological and hormonal changes affecting the teeth and oral soft tissues. Furthermore, pregnant women may postpone a dental visit due to fears about adverse effects of dental treatment during pregnancy. The current state of science indicates that pregnant women can safely receive all dental treatment, and there is no reason to postpone dental treatment during pregnancy (New York Department of Health, 2006). Furthermore, delaying dental treatment could complicate ongoing dental treatment plans and lead to poorer oral health outcomes.

Also, dental offices provide a unique opportunity to serve as a primary source of dental health information and behavioral change to improve the oral health of the mother and her children. For a comprehensive review, see the April 2022 issue of the *Journal of the California Dental Association* (https://issuu.com/cdapublications/docs/cda_journal_april_2022).

Methods

PRAMS obtains information via questionnaires administered via telephone and mail. The questionnaire includes a core section in all states and a supplemental set of questions from which states can choose. The current questionnaire corresponds to Phase 8, and it was used from 2016 to 2020.

In the current core questionnaire, question 17 asks, "During your most recent pregnancy, did you have your teeth cleaned by a dentist or dental hygienist?" This question provided data for one of the Title V Performance Measures (U.S. Department of Health and Human Services. *National Performance Measures*. Available at: https://mchb.tvisdata.hrsa.gov/prioritiesandmeasures/nationalperformancemeasures).

Unlike other national data systems, PRAMS does not have an annual report of query systems online. In March 2022, the researchers applied to CDC for access to a Phase 8 working dataset. As of September 2022, we had not received these data. Thus, in July 2022, we contacted the health departments of the ten states with the largest Hispanic populations. We received tabulated data on the preventive dental visit question stratified by race/ethnicity. Not all states included data for all years (2016–2020). Four states reported data from 2015 to 2020 (New York, Illinois, Colorado, and New Jersey). Two states reported data from 2015 to 2019 (Texas and Nevada). California does not participate in PRAMS but has the Maternal and Infant Health Assessment (MIHA) with a similar question for 2019–2020. Since drafting this report, we received the datasets from Nevada and Florida. In the following sections, we describe all the information received from the participating states, regardless of its level of detail and completion.

Key Findings

- Dental cleaning visit rates ranged from 45% to 50% and varied by year.
- The rates of dental visits for Hispanic women ranged from 25% to 55%. In seven of the 10 states with the largest Hispanic populations in the U.S., the utilization of preventive dental services during pregnancy by Hispanic women was lower than by non-Hispanic White and Asian participants.
- There was variation in preventive dental utilization by Hispanic pregnant women by year of data collection, by state, and, in California, by region and county.

Results of PRAMS States Data

PRAMS published a table with the prevalence of selected indicators for all PRAMS sites for the 2016–2019 cycle. Figure I-1 shows the estimates for core Question 17; however, the published table is not stratified by race/ethnicity. Between 45% and 47% of pregnant women reported having a preventive dental visit during their pregnancy. Azofeifa and collaborators reported 61% of pregnant women aged 15–44 had a dental visit using NHANES 1999–2004 (Azofeifa, Yeung, et al., 2014). The focus on preventive visits in PRAMS, compared to all dental visits in NHANES, may explain these differences.
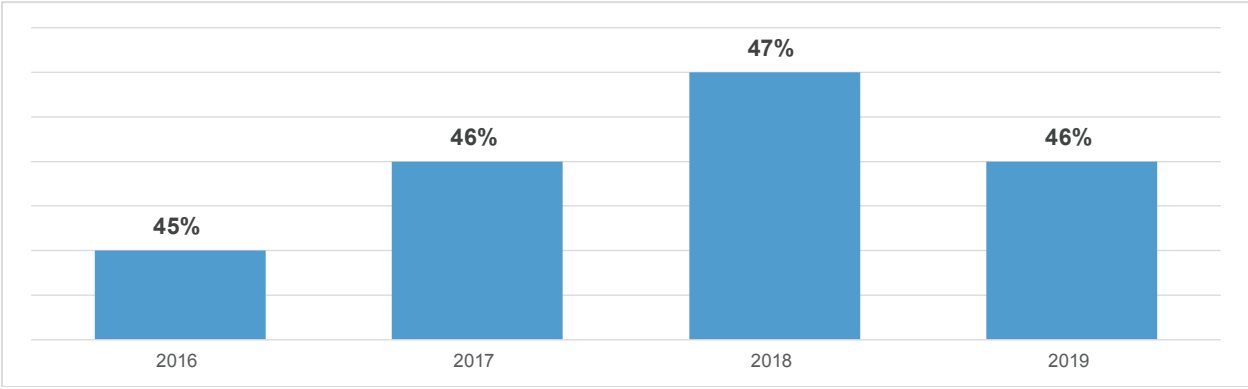
Figure I-1. Frequency of Preventive Dental Visits During Pregnancy. United States, PRAMS Phase 8 2016–2019.

Figure I-2 displays the frequencies of preventive dental visits among Hispanic women across a selected group of states. Texas (33%) and Arizona (25%) had the lowest prevalence of preventive dental visits among Hispanic women, from 25% to 33%, while other states reported prevalence from 35% (New Jersey, 2017) to 55% (New York, 2018). The highest value (55%) in New York was a singular high value and potential outlier. Estimates for Colorado appear to increase from 36% in 2016 to 51% in 2019.
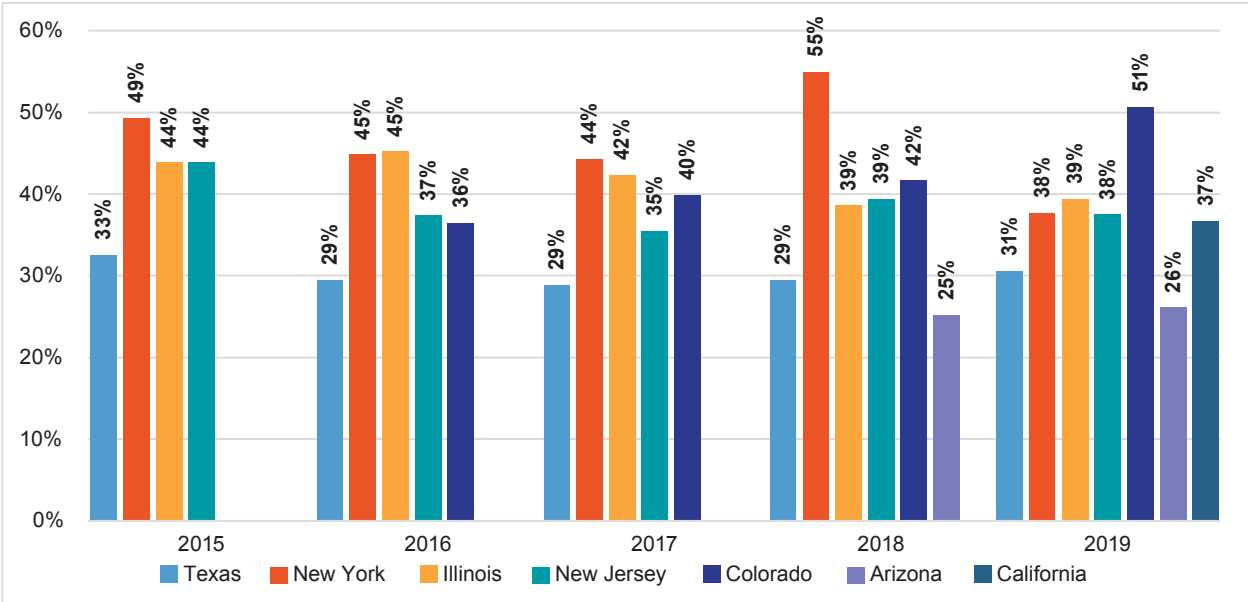
Figure I-2. Proportion of Hispanic Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by State. United States, PRAMS Phase 8 2015–2019.

Figures I-3 to I-7 provide estimates of changes in prevalence of dental cleaning visits by race/ethnicity for individual states. The differences among states are similar to those in the previous figure. For example, Texas and Arizona showed lower utilization of preventive dental visits than the other states, this time across all racial/ethnic groups.

Also, there was variation by year, and the inter-year differences and trends do not follow a particular pattern. This finding suggests the potential bias of using a single year as a representative for the entire Phase. Because of the sampling nature, less populated states and those with less racial/ethnic diversity may be more affected by this bias. For example, Texas showed more consistent estimates by year than Illinois. A recommendation could be to average different years and recalculate the variance. In most states, non-Hispanic White women report a higher proportion of dental cleaning visits.

Figure I-3. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. New York, PRAMS 2015–2019.
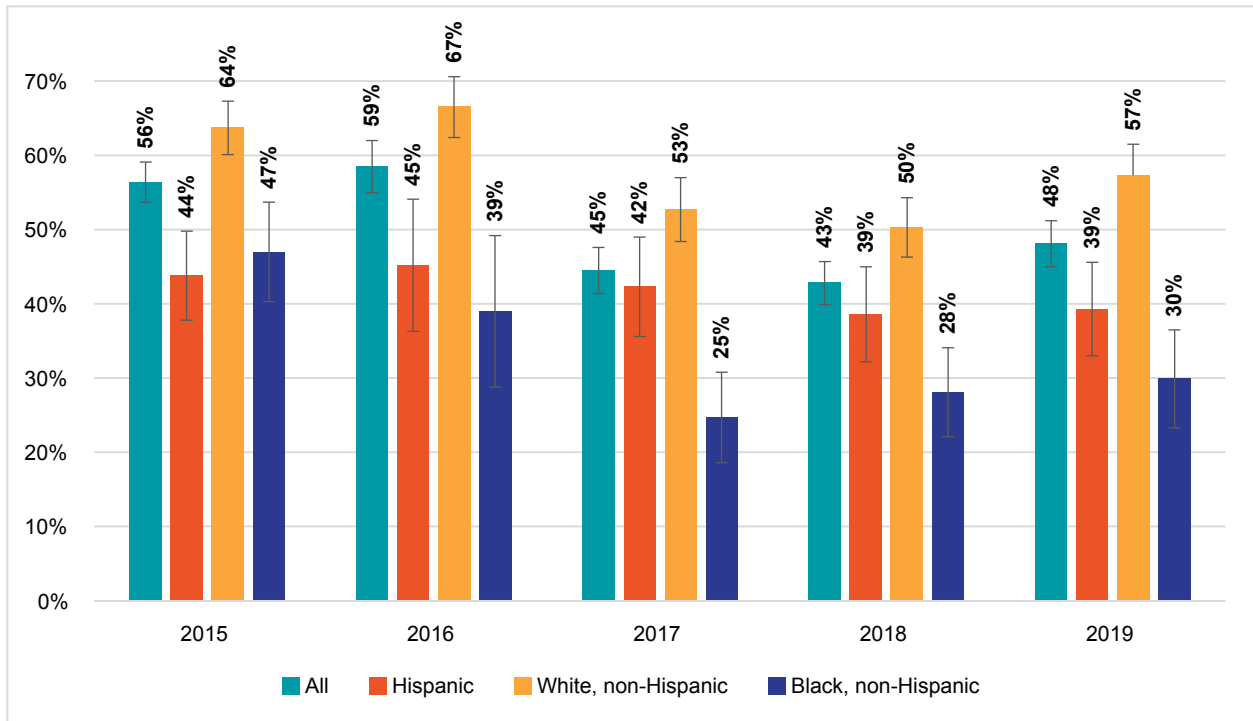
Figure I-4. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. Illinois, PRAMS 2015–2019.
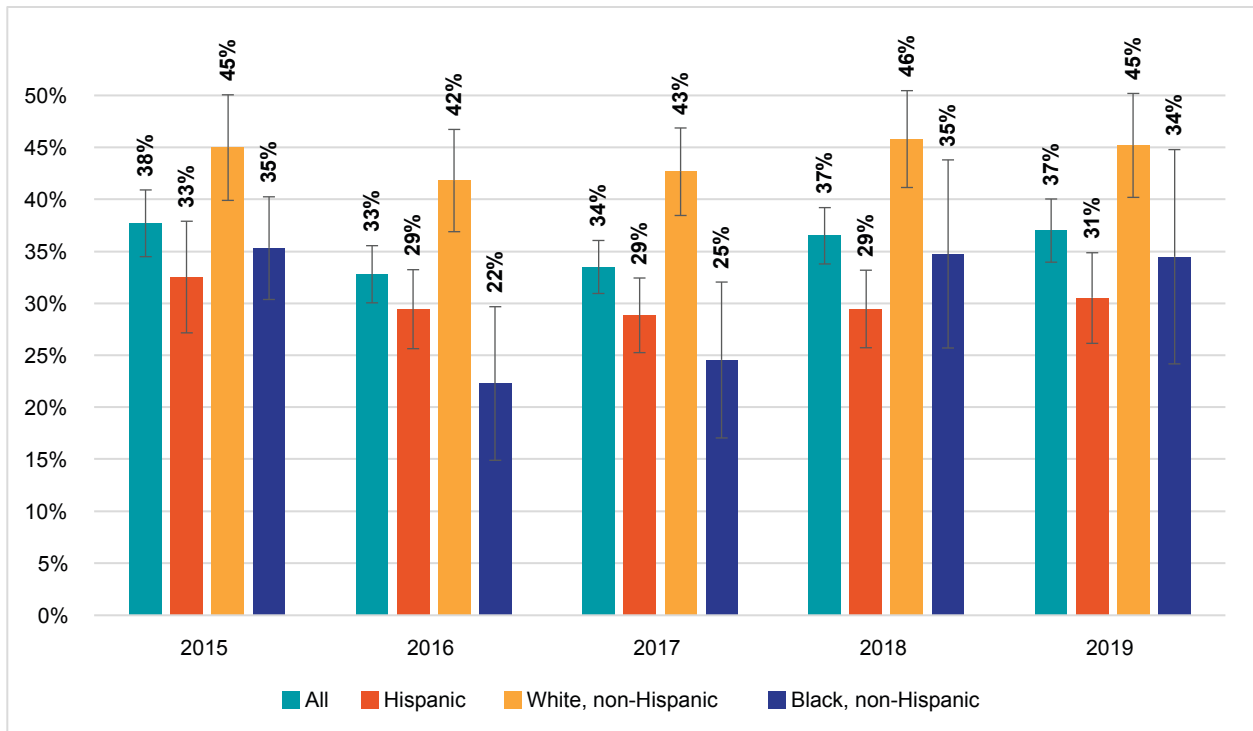
Figure I-5. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. Texas, PRAMS 2015–2019.
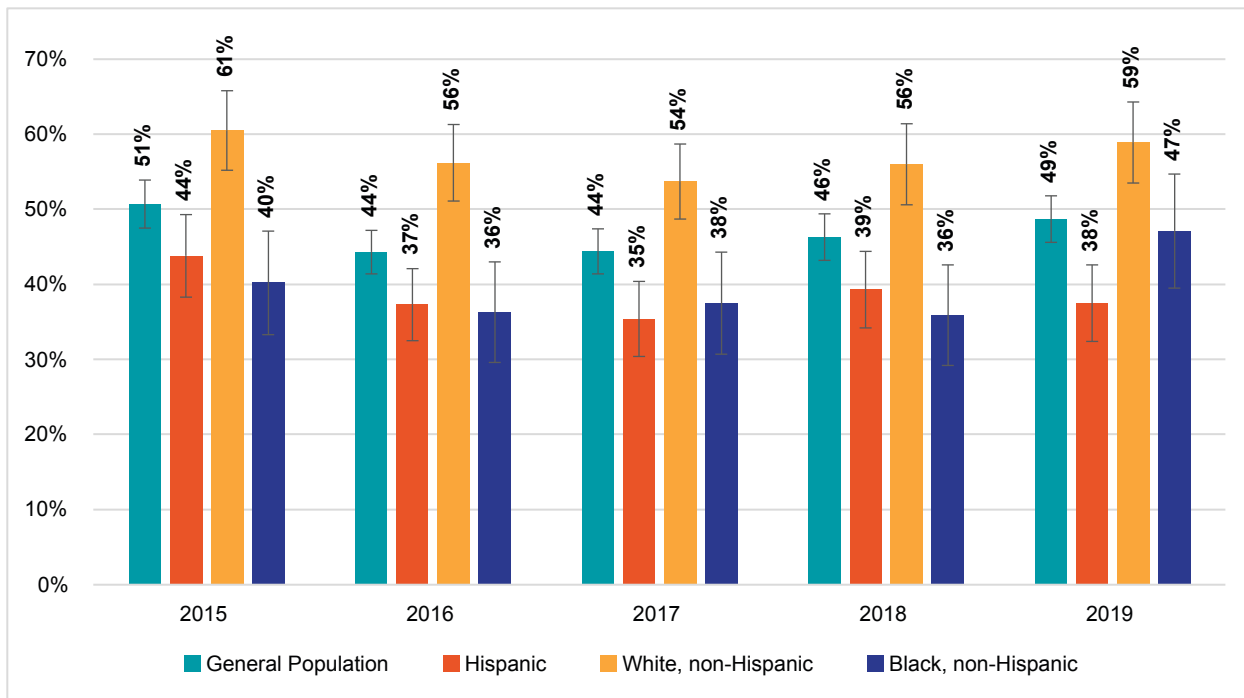
Figure I-6. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. New Jersey, PRAMS 2015–2019.
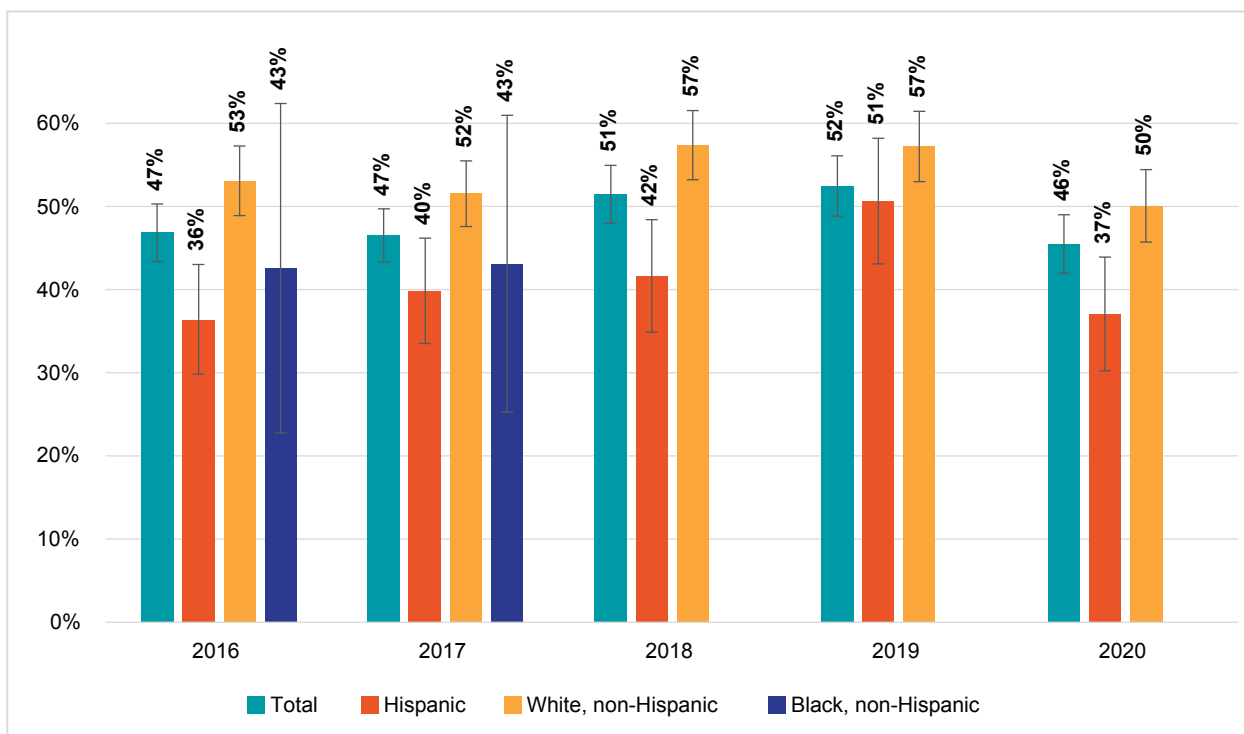
Figure I-7. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. Colorado, PRAMS 2015–2019.

Figure I-8 provides the estimates for Arizona, which include values for American Indian and Asian participants, but the data are limited to 2018, 2019, and 2020 and do not include estimates for all racial/ethnic groups together. Arizona did not report confidence intervals either. Arizona and Texas are states where Hispanic women reported the lowest utilization of preventive dental services during pregnancy. Non-Hispanic White and Asian participants reported the highest level of utilization. A similar pattern, in which non-Hispanic White participants reported higher dental utilization, was observed in other states as well.
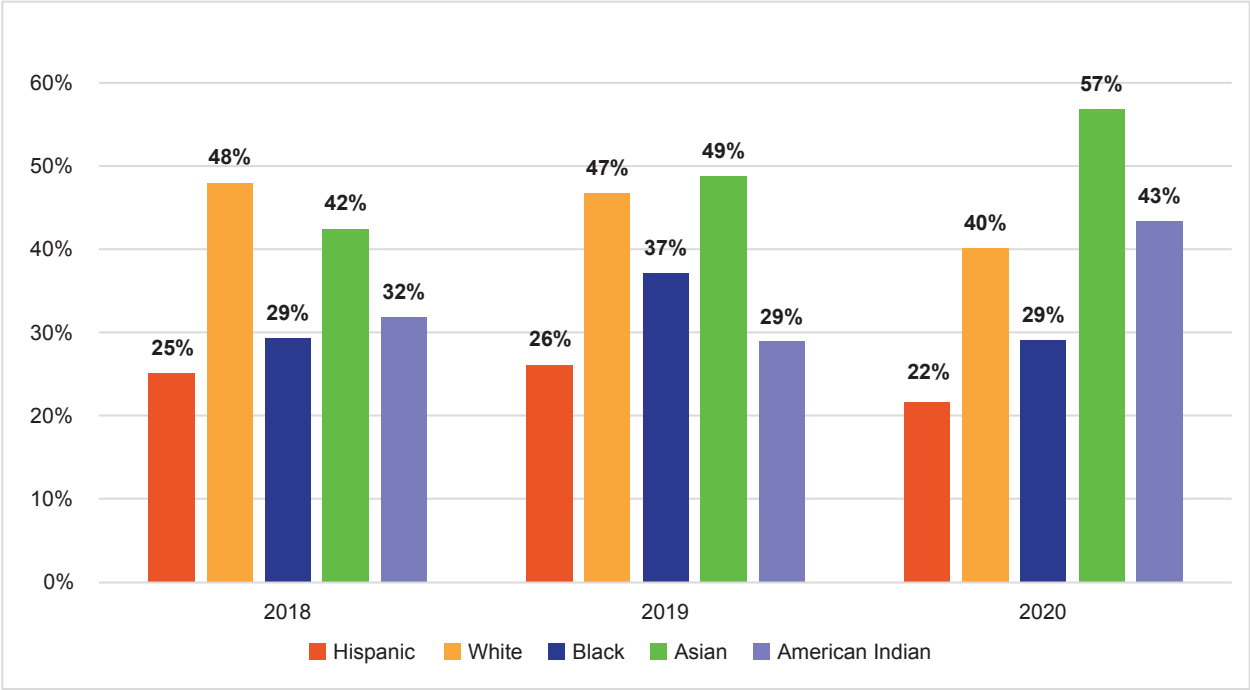
Figure I-8. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. Arizona, PRAMS 2015–2019.

Figure I-9 presents the information from New Mexico with aggregated data from 2018 to 2020. We have included the estimates for dental visits before pregnancy, which were higher, suggesting that some pregnant women may delay dental visits. This finding is consistent across all racial/ethnic groups. In addition, Mexican American women had consistently lower utilization of dental services before and during pregnancy than other racial/ethnic groups.
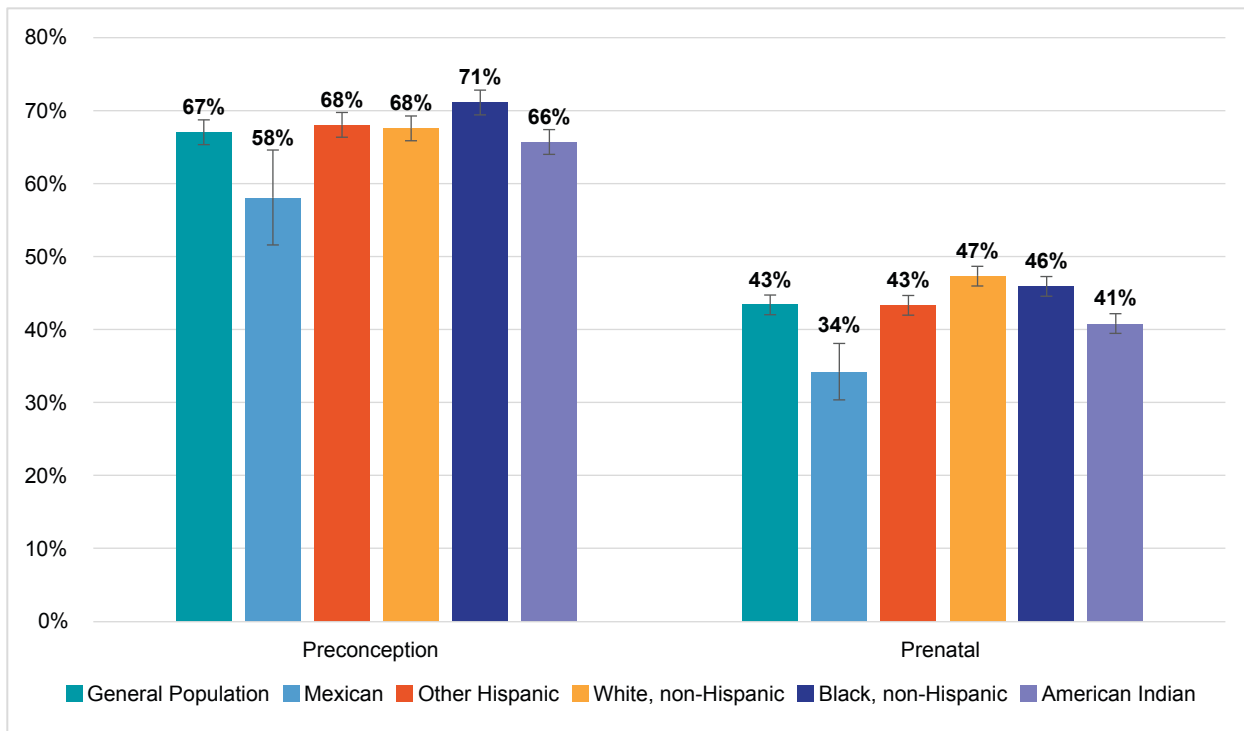
Figure I-9. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. New Mexico, MIHA 2019–2020.

Figures I-10 to I-12 report data from California's Maternal and Infant Health Assessment (MIHA). In California, non-Hispanic White and Asian women reported a higher prevalence of dental cleaning visits during pregnancy (Figure I-10). The inequities were similar to those seen in Arizona, but at a higher degree of dental utilization.
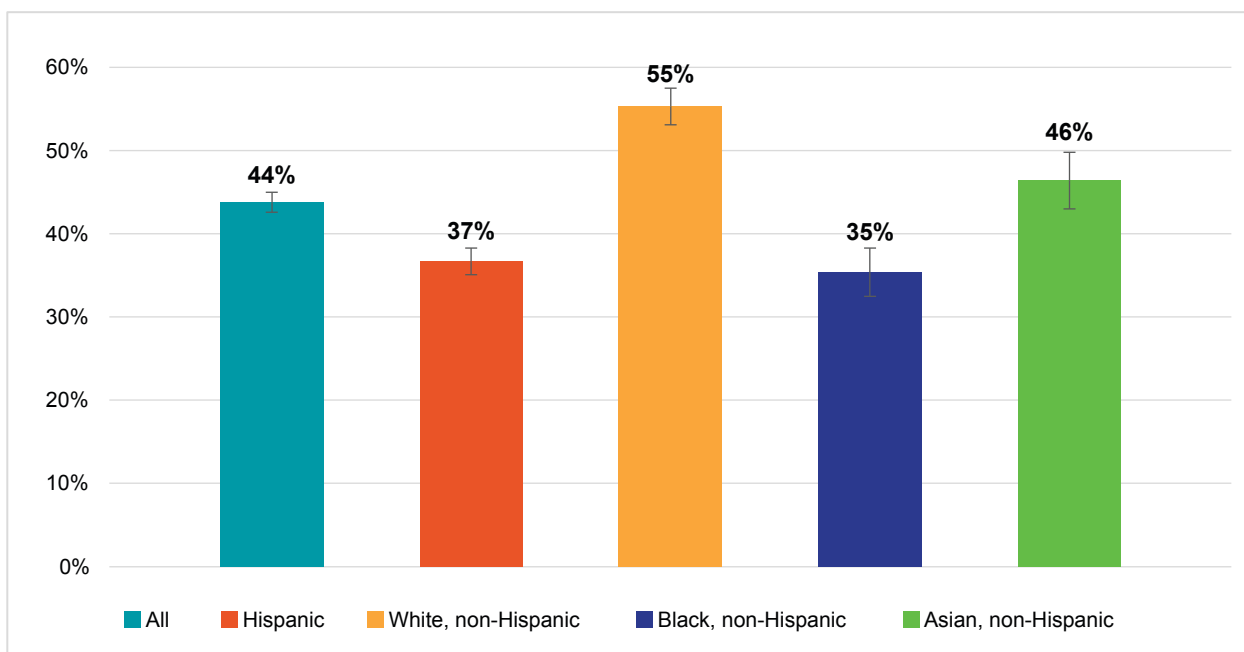
Figure I-10. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity. California, MIHA 2019–2020.

California reported data by county and region. Figure I-11 shows estimates for Hispanic and non-Hispanic women in nine geographical areas in California. Hispanic women had consistently fewer visits than non-Hispanic White women in all but two regions, Central Coast and North Mountain.

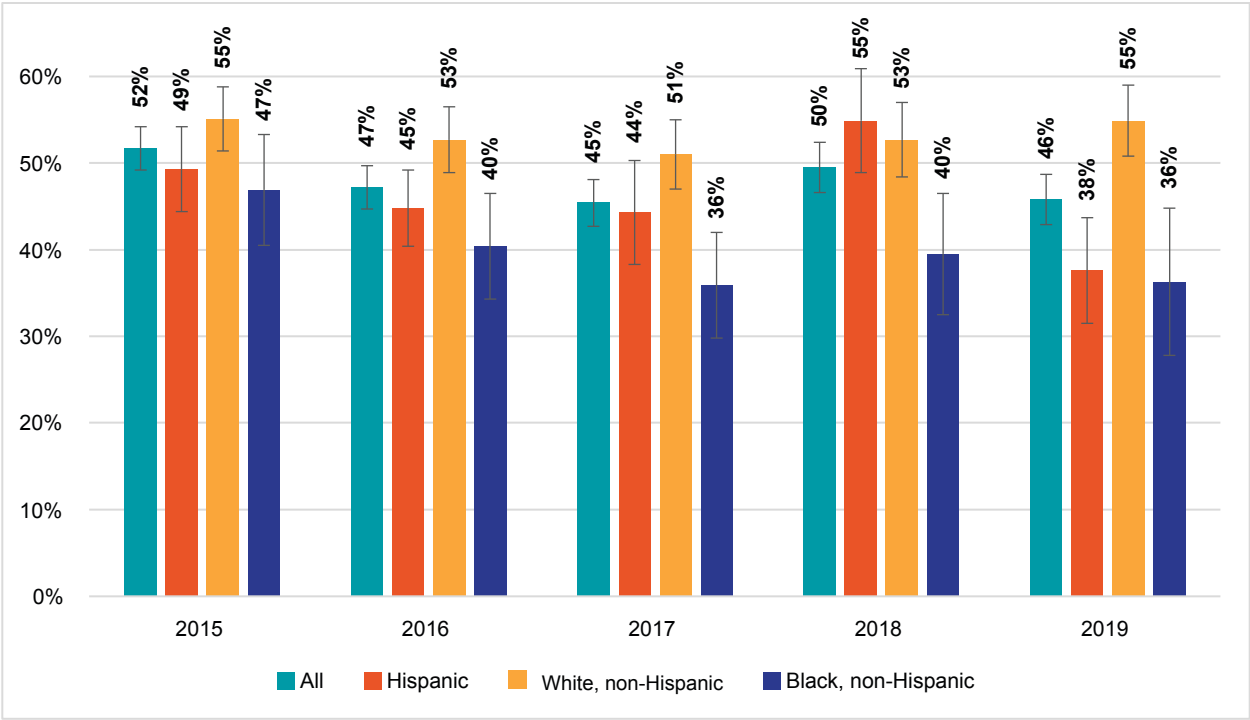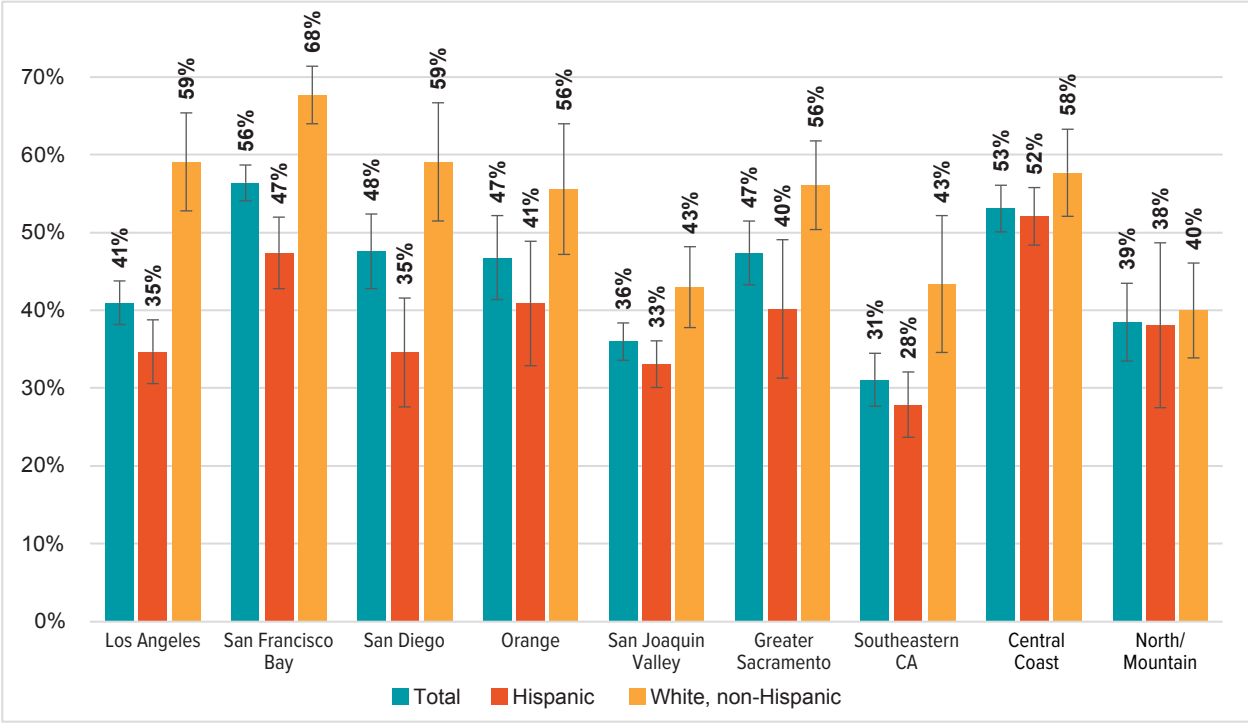**Figure I-11. Proportion of Pregnant Women Reporting a Dental Cleaning Visit During Pregnancy by Race/Ethnicity by Geographical Area. Maternal and Infant Health Assessment (MIHA): California 2019–2020.**

Additionally, we graphed the estimates by county (Figure I-12) to display the wide variation of dental utilization of preventive services by Hispanic women in California, which ranged from the mid to high-twenties to low to mid-fifties. Two counties, Sonoma and Marin, reported 68% and 70% utilization, respectively.
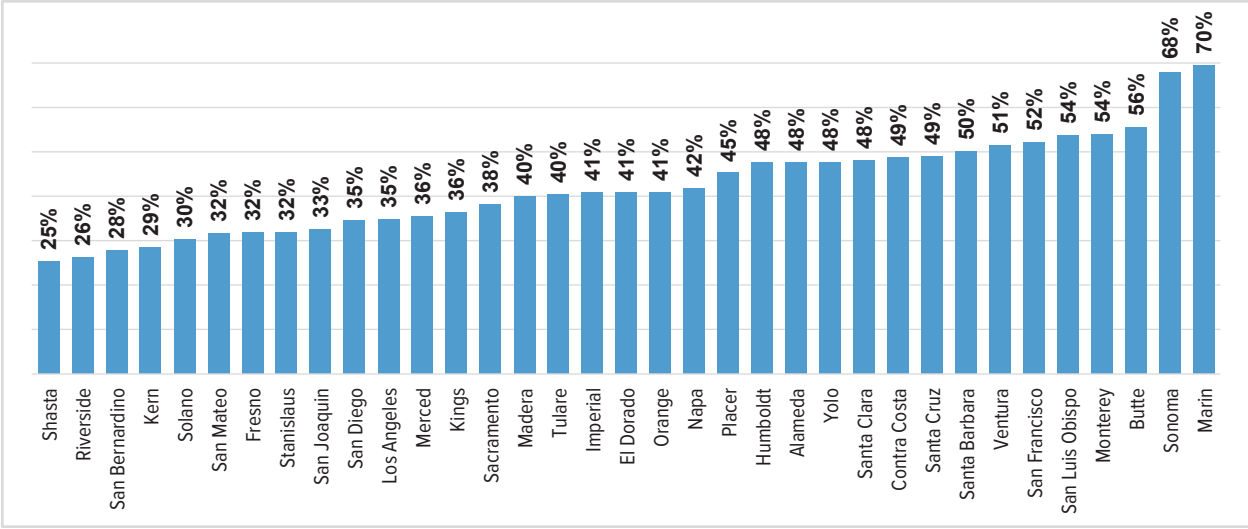
Figure I-12. Preventive Visit During Pregnancy by County. California, MIHA 2019–2020.

The researchers received PRAMS SAS datasets from Florida for 2018, 2019, and 2020. In Florida, PRAMS samples about 1000 participants per year. Thus, we joined the three years to get more precise estimates by race/ethnicity. The researchers used SAS to merge the datasets and obtain the estimates using appropriate weights and sampling variables for stratification and nesting using the SURVEYFREQ procedure. The results displayed in Figure I-13 are based on 3,087 pregnant women who reported race/ethnicity and whether they had a dental cleaning during pregnancy.
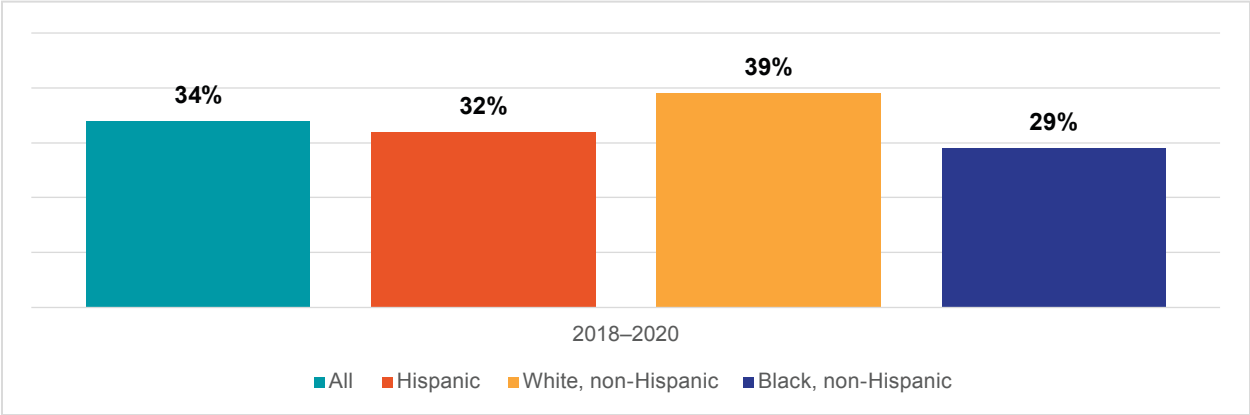
Figure I-13. Prevalence of Dental Cleaning During Pregnancy. Florida, PRAMS 2018–2020.

Thirty-four percent of mothers in Florida reported having a dental cleaning during pregnancy. This estimate is slightly lower than what PRAMS reported for 2012 and 2013 (36% and 38%, respectively). Furthermore, the estimates for Florida were lower than those for other states in this report. Non-Hispanic White women reported the highest prevalence of dental cleaning visits (39%) compared with Hispanic women (32%) and non-Hispanic Black women (29%).

Data Limitations

- There were difficulties in accessing PRAMS data. We have included an expanded description of the process in the methodological section.

- States varied in the scope, extent, and detail of available data. There was no formal process to obtain data for analysis, meaning we needed to contact the local coordinators individually.

- There was no clear definition of a year of data collection. Some states report single years, while others two consecutive years.

Dental Utilization and Dental Services

(Hospital and Emergency Department Visits)

CHAPTER 10:
NATIONAL HOSPITAL AMBULATORY MEDICAL CARE SURVEY (NHAMCS) RELATED TO DENTAL UTILIZATION

NHAMCS Background

This chapter aims to describe and analyze differences between Hispanics and non-Hispanics in use of emergency departments to treat nontraumatic dental conditions, using data derived from the 2019 National Hospital Ambulatory Medical Care Survey (NHAMCS).

Methods

This chapter includes a retrospective analysis of the non-Federal hospital emergency departments, outpatient departments, and ambulatory surgery visits for nontraumatic dental conditions (NTDCs) derived from the 2019 NHAMCS. The NHAMCS is one of the most important annual studies of the utilization and provision of care in hospitals' emergency departments, outpatient departments, and ambulatory surgical locations.

NHAMCS data include patients' demographic characteristics, diagnosis, and therapeutic services used. The data are disseminated through government reports, journal articles, and microdata files. Participation in the NHAMCS is voluntary. NHAMCS is financed by the Centers for Disease Control and Prevention (CDC) and administered by the U.S. Census Bureau. (Centers for Disease Control and Prevention, 2021; U.S. Census Bureau, 2021).

The 2019 NHAMCS file includes patients' demographic information, such as age, sex, race, and ethnicity. The file also includes details of hospital ambulatory care, such as month and day of service, admission and discharge time, discharge status, facility region, patient county, admitting diagnosis, principal diagnosis made by the provider (reported as ICD-10-CM codes), metropolitan statistical areas, principal payer, procedures, and therapeutic services used. The 2019 NHAMCS data is weighted to produce national estimates and include data from 473 nationally representative hospitals, of which 367 are in scope and have eligible emergency departments. The researchers used the case definition of NTDCs recommended by the Association of State and Territorial Dental Directors (ASTDD) in this study (Manz, 2017).

The researchers calculated the frequency of ED visits for NTDCs according to patient characteristics. The researchers calculated crude rates of ED visits for NTDCs among Hispanics and non-Hispanics. The crude rate of ED visits for NTDCs was calculated as the total number of ED visits for NTDCs that occurred in 2019, divided by the estimated U.S. population of Hispanics for July 1 of that year, multiplied by 10,000, and expressed as the annual rate per 10,000 population. We used midyear estimates of the U.S. population developed by the U.S. Census Bureau.

Analysis of the data was conducted using statistical software SPSS version 28.0 (IBM Corp., Armonk, NY). Analysis included descriptive statistics with frequencies, proportions, and means for key variables.

Key Findings

- Approximately 11.4% of the ED visits for NTDCs were for Hispanic individuals and 88.6% for non-Hispanics.

- Overall, female patients had a higher proportion of ED visits for NTDCs than males, both among Hispanics (57.9% vs. 42.1%) and non-Hispanics (62.3% vs. 37.7%).

- The crude rate of ED visits for NTDCs was 34.7 per 10,000 population for Hispanics and 60.8 per 10,000 population for non-Hispanics.

- Adults aged 25 to 34 years old had the highest percentage of ED visits for NTDCs. The percentage of Hispanic adults who had an ED visit for an NTDC (31.3%) was slightly lower than the percentage of non-Hispanic adults (33.5%) with such a visit.

- The geographic regions with the highest proportion of ED visits for NTDCs were the West for Hispanic individuals (52%, 46.2 per 10,000 people) and the South for non-Hispanic individuals (45.8%, 72.6 per 10,000 people).

- The Southern region had the lowest ED visit rate for NTDCs for Hispanics (23.9 per 10,000 population), and the Midwest had the lowest rate for non-Hispanics (43.7 per 10,000 population).

- For primary diagnoses for ED visits for NTDCs, "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) was the most recorded for both Hispanics (43.6%) and non-Hispanics (36.4%).

- "Dental caries, unspecified" (ICD-10-CM code K029) was the second most recorded primary diagnosis for Hispanics at 18.8% and the third most recorded for non-Hispanics at 15.8%. "Periapical abscess without sinus tract" (ICD-10-CM code K047) was the third most recorded for Hispanics at 10.7% and the second most recorded for non-Hispanics at 25.2%.

- The top five primary diagnoses accounted for 83.7% of the ED visits for NTDCs for Hispanics and 83% for non-Hispanics.

- Medicaid was the largest payer for ED visits for NTDCs for both Hispanics (71.1%) and non-Hispanics (40.3%). Private insurance was the second-largest payer for Hispanics at 13.4% and the third-largest for non-Hispanics at 13.6%. Medicare was the fifth-largest payer for both Hispanics (2.2%) and non-Hispanics (10.6%).

- Most of the ED visits for NTDCs were paid by some type of public insurance at 73% for Hispanics and 51% for non-Hispanics.

- The majority of ED visits for NTDCs occurred on weekends for Hispanics at 54% and on weekdays for non-Hispanics at 57%.

- ED visits for NTDCs among Hispanics were most frequent in January (35.5%) and April (24.4%) and most frequent for non-Hispanics in January (14.7%) and July (12.4%).

- In 2019, about 24 Hispanics sought oral health care at hospital emergency departments every hour.

- The average stay of patients who visited EDs for NTDCs was 2 hours and 39 minutes for Hispanics and 2 hours and 22 minutes for non-Hispanics.

- The highest proportion of ED visits for NTDCs occurred in EDs located in metropolitan areas for both Hispanics at 91% and non-Hispanics at 79.5%.

- All Hispanic patients (100%) who visited EDs for NTDCs were treated and released compared with non-Hispanic patients at 96.4%.

- No recorded ED visits for NTDCs resulted in admission into the hospital for Hispanics, and 3.6% of the visits resulted in admission into the hospital for non-Hispanics.

Results

In 2019, overall data from the NHAMCS showed that more than 1.8 million ED visits (weighted estimate) received a primary diagnosis code for NTDC, accounting for 1.2% of the 150 million total ED estimated visits. More females (61.8%) than males (38.2%) had ED visits. The highest proportion of ED visits for NTDCs was among persons aged 25–34 years. Approximately 11.4% of ED visits for NTDCs were for Hispanic individuals. Medicaid was the most common primary source of reimbursement for services rendered at the EDs (71.1%).

The region with the highest proportion of ED visits for NTDCs was the South, with 43.5% of the ED visits. Overall, EDs located in metropolitan areas had the highest proportion of ED visits for NTDCs (80.8%). Most patients who visited EDs for NTDCs were treated and released (96.8%). About 3.2% of the recorded ED visits for NTDCs resulted in admission to the hospital.

The most recorded primary diagnoses were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088, 37.2% of the ED visits), followed by "periapical abscess without sinus tract" (K047; 23.6%), "dental caries, unspecified" (K029; 16.1%), "temporomandibular joint disorders" (M266; 3.4%), and "other forms of stomatitis" (K121; 2.8%). The top five primary diagnoses accounted for 83.1% of the ED visits for NTDCs (Figure J-1).

Figure J-1. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non-Traumatic Dental Conditions. United States, NHAMCS 2019.

Hispanics

Among Hispanics, more females (57.9%) than males (42.1%) had ED visits. Persons aged 25–34 years and 0–5 years accounted for 31.1% and 18.7% of the ED visits for NTDCs, respectively.

Medicaid was the most common primary source of reimbursement with 71.1%, followed by patients with private insurance (13.4%), self-pay (7.5%), and Medicare (2.2%) (Figure J-2). About 73% of the ED visits for NTDCs were paid using some type of public insurance.

Figure J-2. Principal Payer for Emergency Department visits for Non-traumatic Dental Conditions Among Hispanics. United States, NHAMCS 2019.

The West was the geographical region with the highest proportion of ED visits for NTDCs by Hispanics (52%, Figure J-3). About 91% of the ED visits for NTDCs occurred in EDs located in metropolitan areas.

All Hispanic patients who visited EDs for NTDCs were treated and released. No recorded ED visits for NTDCs among Hispanics resulted in admission into the hospital.

Overall, the most commonly recorded primary diagnoses for ED visits for NTDCs among Hispanics were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) reported for 43.6% of the ED visits, followed by "dental caries, unspecified" (K029; 18.8%), "periapical abscess without sinus tract" (K047; 10.7%), "disorders of tooth development and eruption" (K008; 6.2%), and "atrophy of salivary gland" (K110; 4.4%) (Figure J-4). The top five primary diagnoses accounted for 83.7% of the ED visits for NTDCs.

Figure J-3. Geographic Regions[2] for Emergency Department Visits for Non-Traumatic Dental Conditions Among Hispanics. United States, NHAMCS 2019.

Figure J-4. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non- Traumatic Dental Conditions Among Hispanics. United States, NHAMCS 2019.

2 **Northeast:** Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. **Midwest:** Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. **South:** Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. **West:** Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

The crude rate of ED visits for NTDCs among Hispanics was 34.7 per 10,000 population. However, rates varied widely by geographical region, from a low of 23.9 per 10,000 population in the South region to a high of 46.2 per 10,000 in EDs located in the West region.

Figure J-5. Emergency Department Visits for Non-Traumatic Dental Conditions Among Hispanics by Month. United States, NHAMCS 2019.

Figure J-6. Emergency Department Visits for Non-Traumatic Dental Conditions Among Hispanics by Day of Week. United States, NHAMCS 2019.

The ED visits for NTDCs among Hispanics were more frequent in January (35.5%) and April (24.4%) (Figure J-5). About 28% of ED visits for NTDCs made by Hispanic patients occurred on weekends (Figure J-6). The times most Hispanic patients arrived at the EDs for NTDCs were between 10:00 p.m. and 11:00 p.m. In 2019, about 24 Hispanics sought oral health care at hospital emergency departments every hour. The average stay among Hispanic patients who visited EDs for NTDCs was 159 minutes compared with 142 among non-Hispanics.

Non-Hispanics

Among non-Hispanics, there were more than 1.6 million (weighted estimate) emergency department visits (ED) for NTDCs. More females (62.3%) than males (37.7%) had ED visits for NTDCs. Persons aged 25–34 accounted for 33.5% of those ED visits.

For non-Hispanics, Medicaid was the most common primary source of reimbursement for services rendered at the EDs for NTDCs with 40.3%, followed by self-pay (15.4%), patients who did not respond or unknown insurance coverage (13.7%), private insurance (13.6%), and Medicare (10.6%). About 51% of the ED visits for NTDCs were expected to be paid by public funds (Figure J-7).

EDs located in the South region had the highest proportion of ED visits for NTDCs among non-Hispanics with 45.8%, followed by West (22.3%), Midwest (16.9%), and Northeast (15.1%) (Figure J-8).

The overall highest proportion of ED visits for NTDCs among non-Hispanics occurred in EDs located in metropolitan areas (79.5%).

Most non-Hispanic patients who visited EDs for NTDCs were treated and released (96.4%). About 3.6% of the recorded ED visits for NTDCs resulted in admission to the hospital.

Figure J-7. Principal Payer for Emergency Department Visits for Non-Traumatic Dental Conditions among Non-Hispanics. United States, NHAMCS 2019.
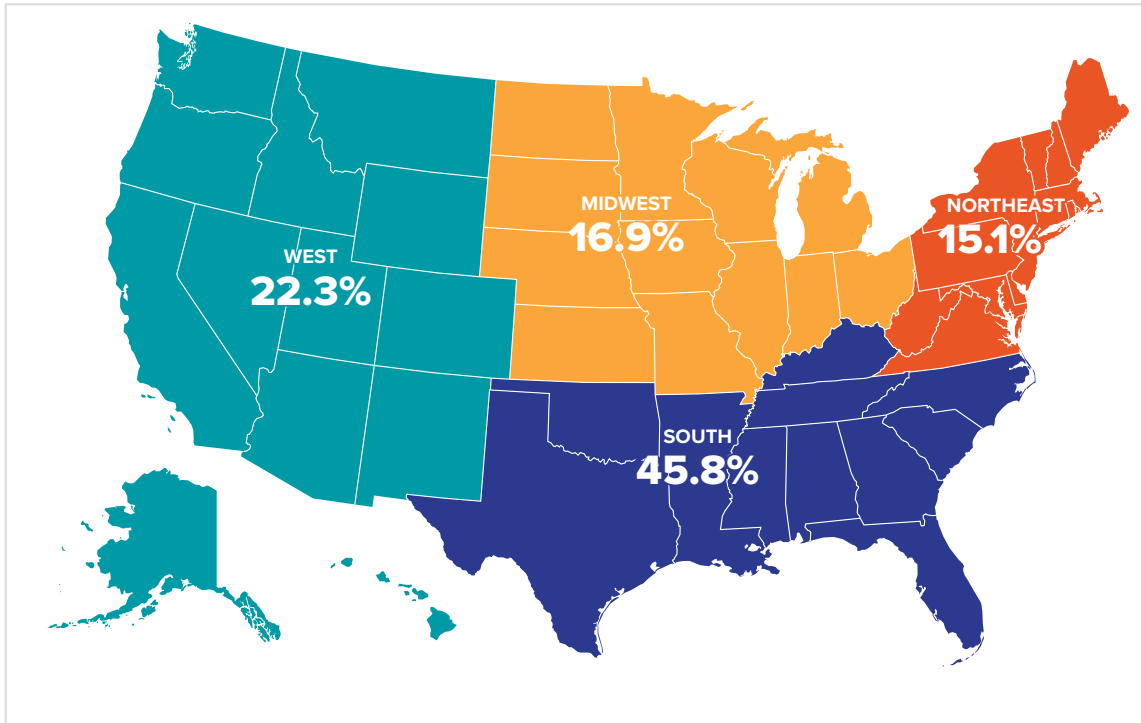
Figure J-8. Geographic Regions[3] for Emergency Department Visits for Non-Traumatic Dental Conditions Among Non-Hispanics. United States, NHAMCS 2019.
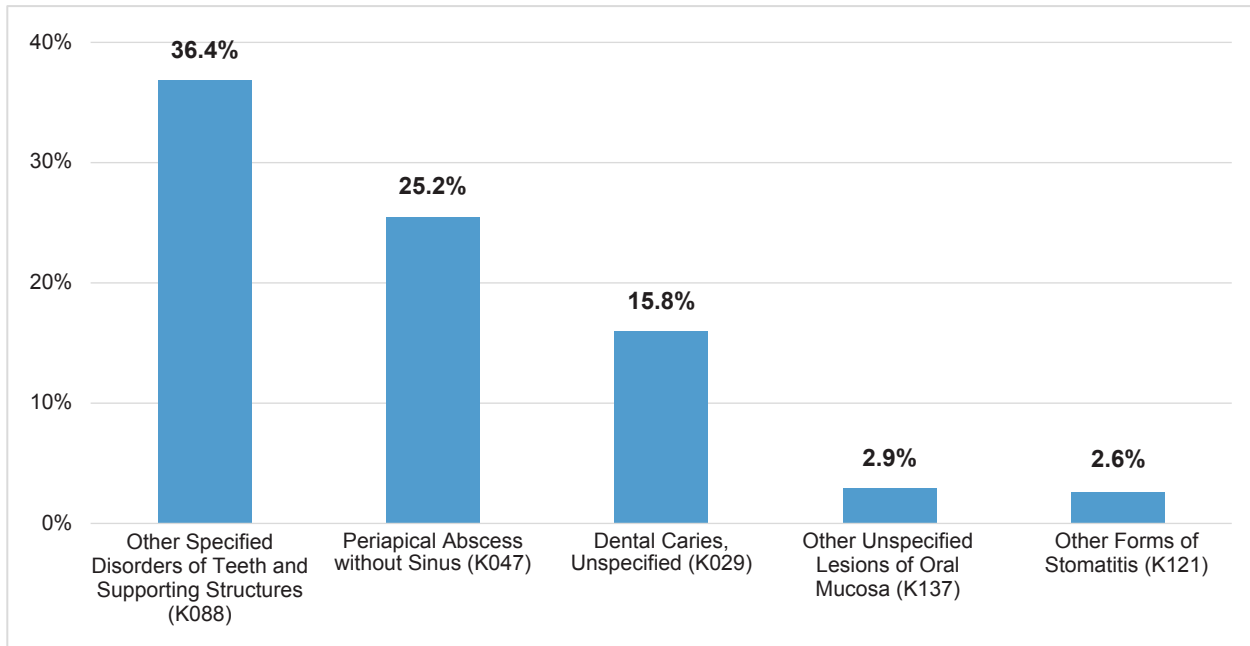
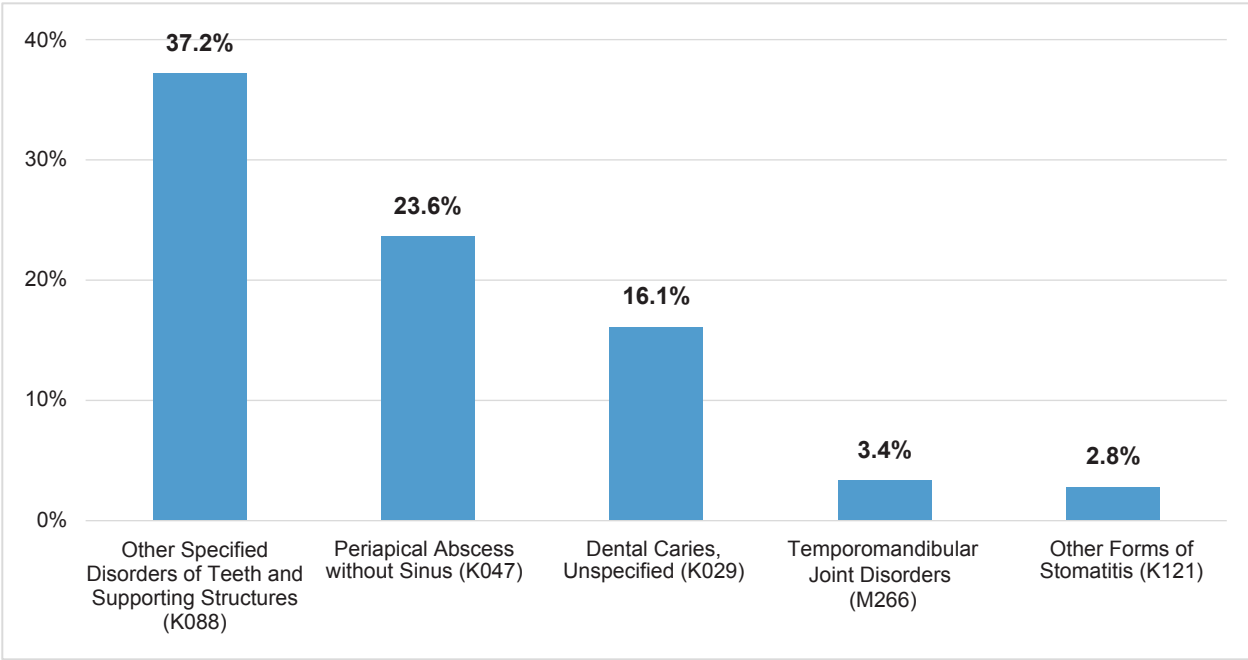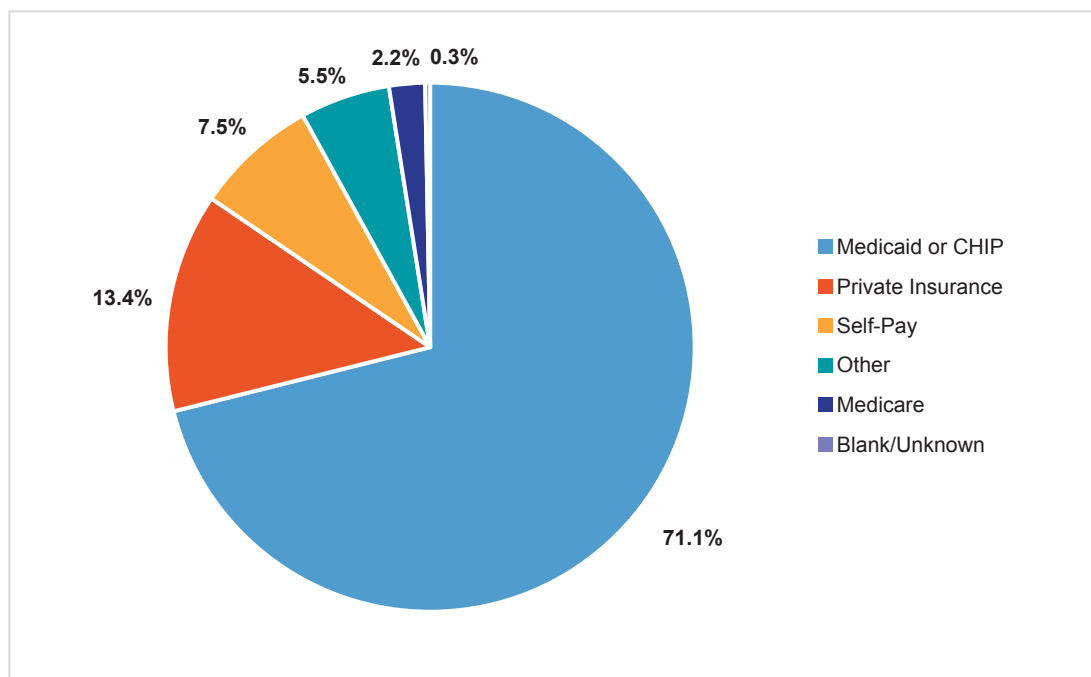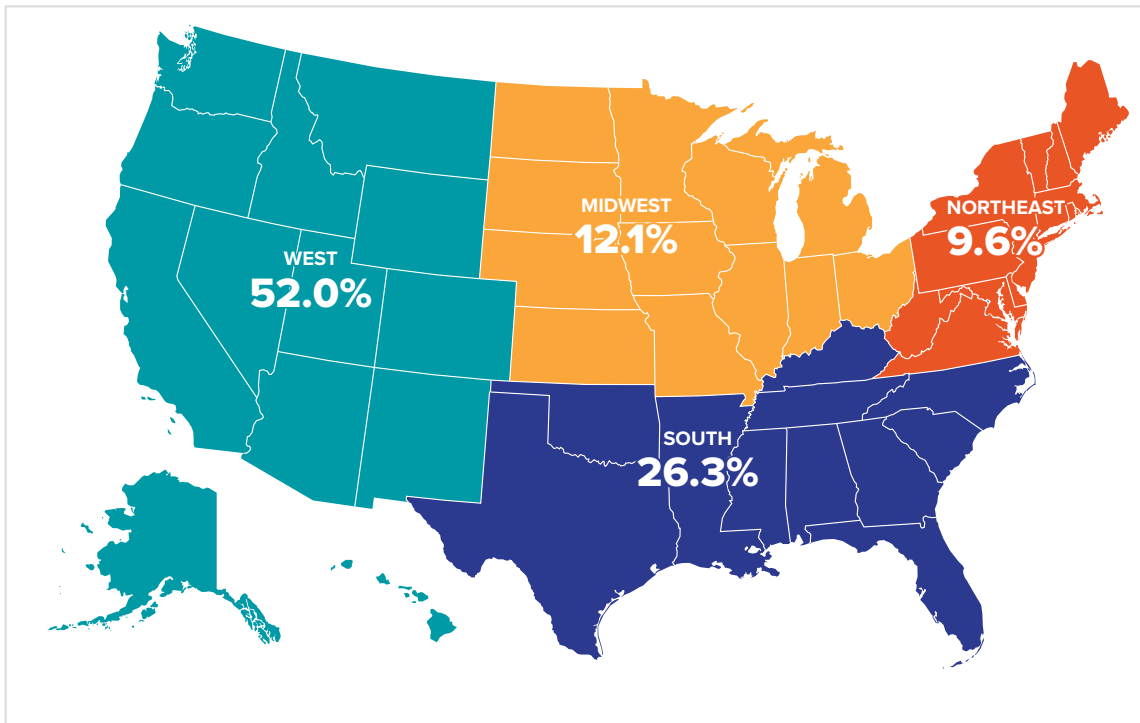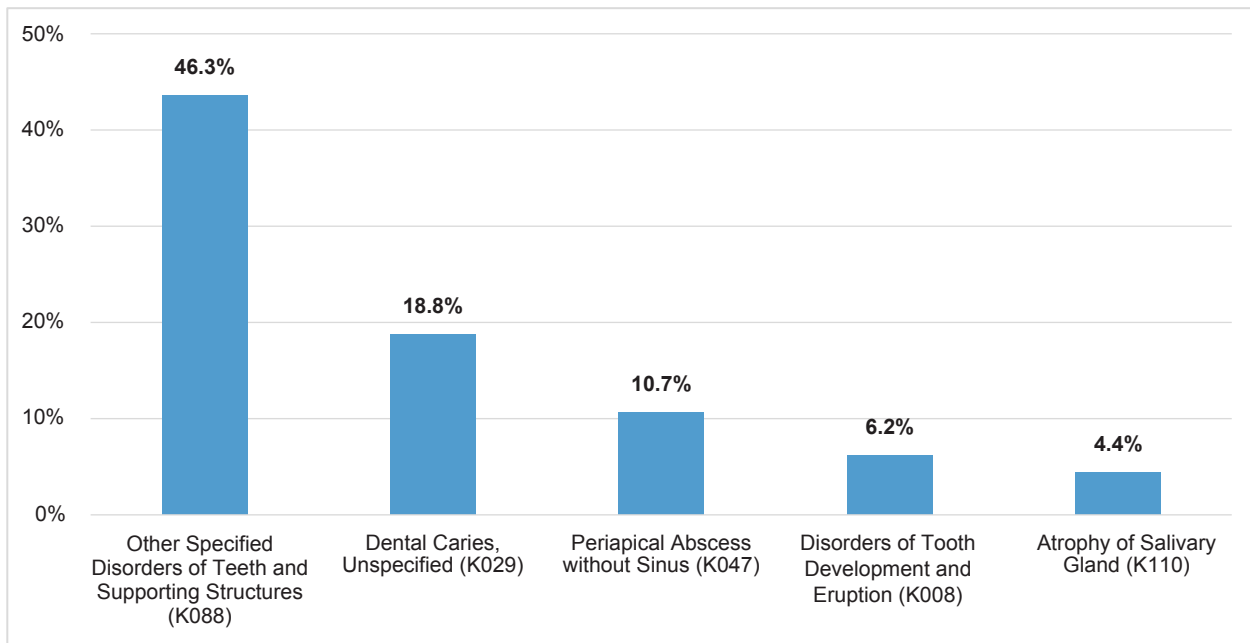**Figure J-9. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non- Traumatic Dental Conditions Among Non-Hispanics. United States, NHAMCS 2019.**

3 **Northeast:** Connecticut, Maine, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania, Rhode Island, and Vermont. **Midwest:** Illinois, Indiana, Iowa, Kansas, Michigan, Minnesota, Missouri, Nebraska, North Dakota, Ohio, South Dakota, and Wisconsin. **South:** Alabama, Arkansas, Delaware, District of Columbia, Florida, Georgia, Kentucky, Louisiana, Maryland, Mississippi, North Carolina, Oklahoma, South Carolina, Tennessee, Texas, Virginia, and West Virginia. **West:** Alaska, Arizona, California, Colorado, Hawaii, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

The most commonly recorded primary diagnoses for ED visits for NTDCs among non-Hispanics in 2019 were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) reported for 36.4% of the ED visits, followed by "periapical abscess without sinus tract" (K047; 25.2%), "dental caries, unspecified" (K029; 15.8%), "other and unspecified lesions of oral mucosa" (K137; 2.9%), and "other forms of stomatitis" (K121; 2.6%). The top five primary diagnoses accounted for 83% of the ED visits for NTDCs (Figure J- 9).

The crude rate of ED visits for NTDCs among non-Hispanics was 60.8 ED visits per 10,000 population. However, rates varied widely by geographical region, from a low of 43.7 per 10,000 population in the Midwest region to a high of 72.6 per 10,000 population in EDs located in the Southern region. The ED visits for NTDCs among non-Hispanics were more frequent in January (14.7%) and July (12.4%) (Figure J-10). About 68% of ED visits for NTDCs occurred on weekdays (Figure J-11).
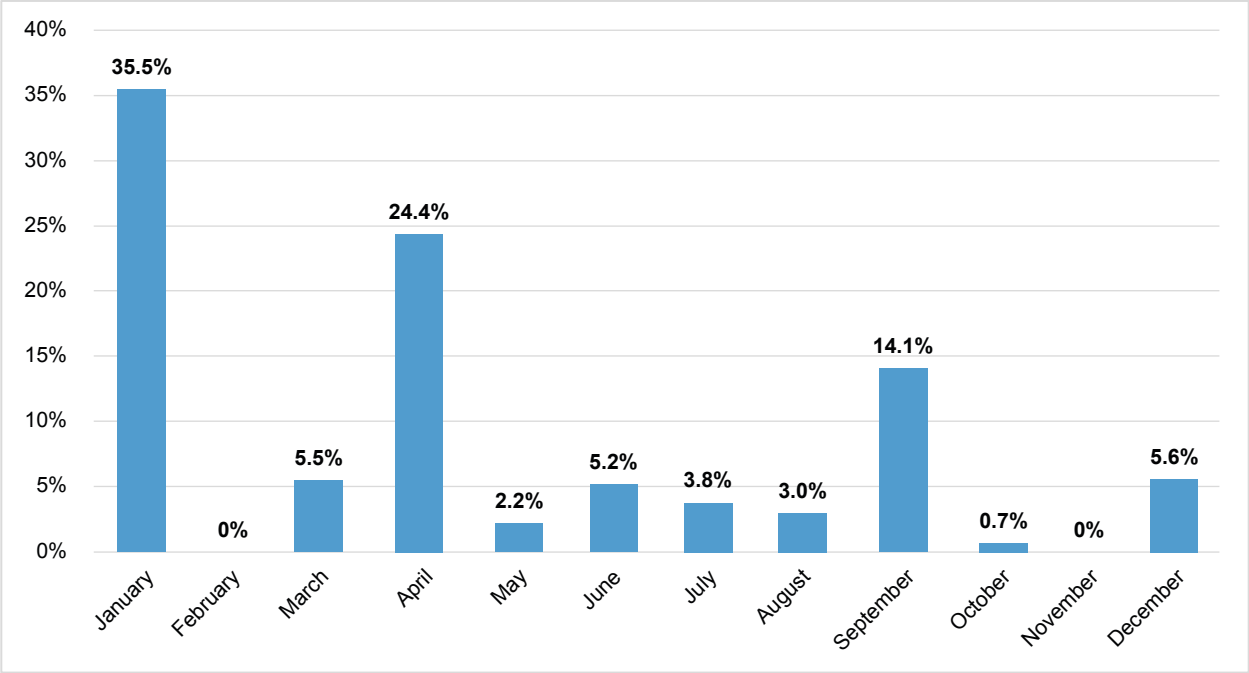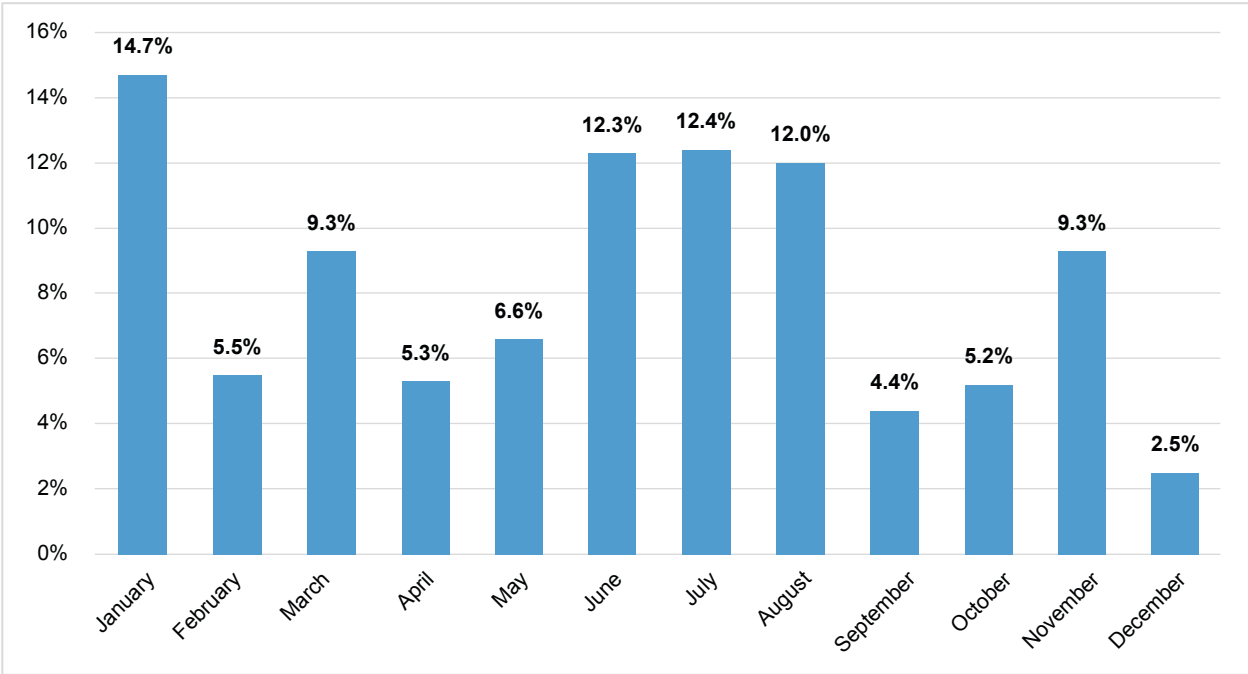

Figure J-10. Emergency Department Visits for Non-Traumatic Dental Conditions Among Non-Hispanics by Month. United States, NHAMCS 2019.

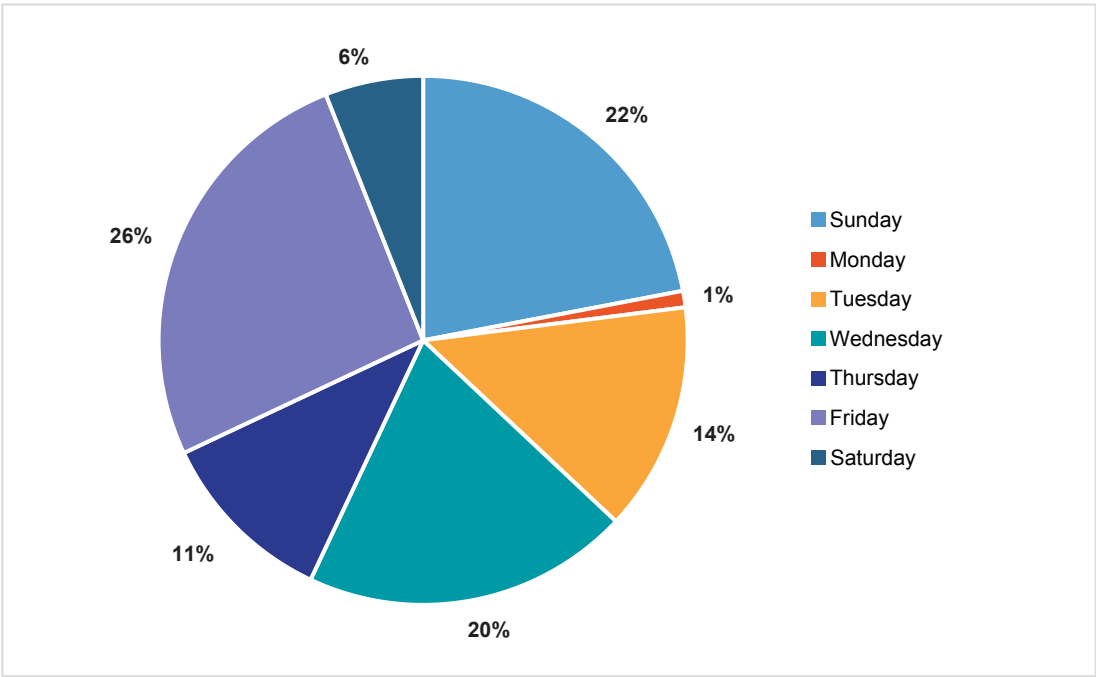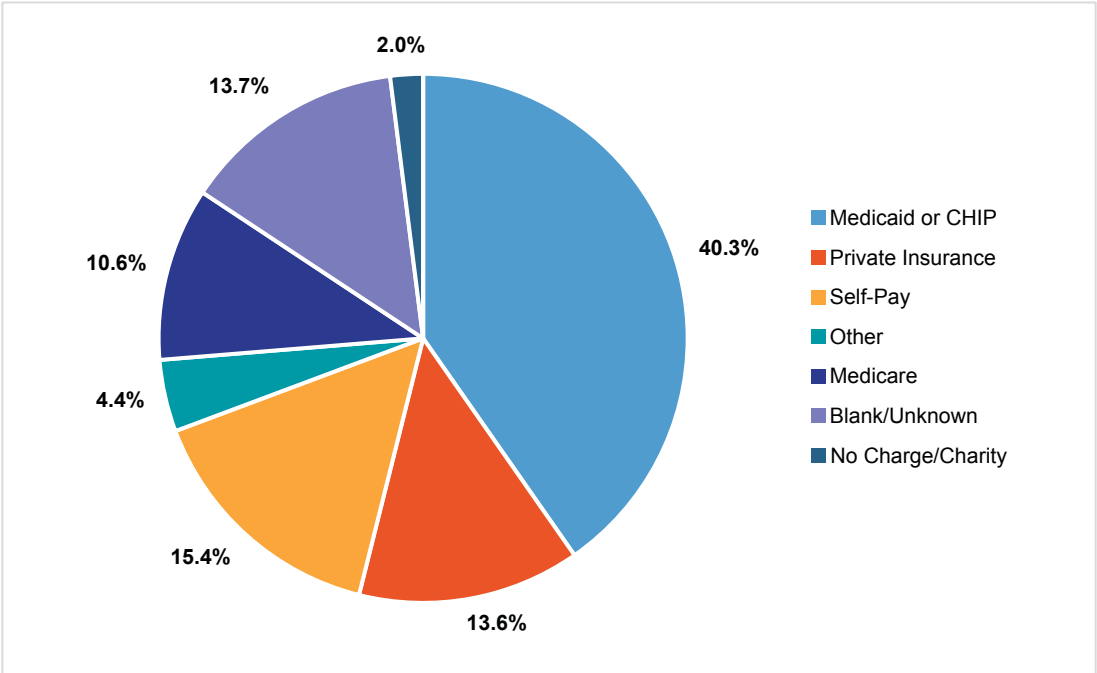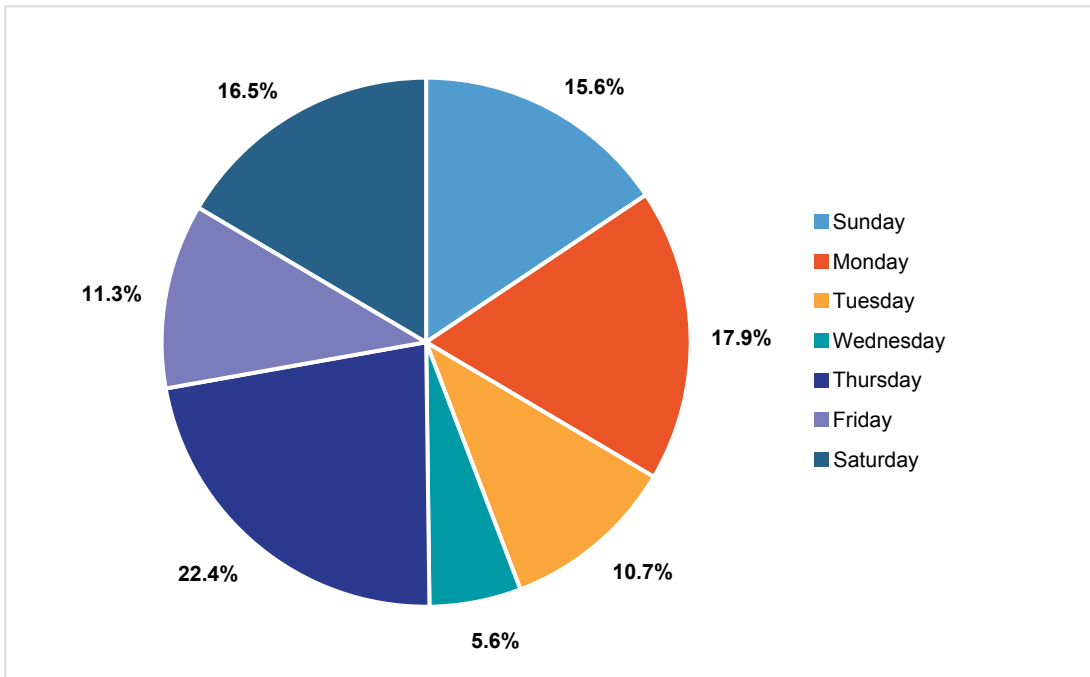**Figure J-11. Emergency Department Visits for Non-Traumatic Dental Conditions Among Non-Hispanics by Day of Week. United States, NHAMCS 2019.**

CHAPTER 11:
NATIONWIDE EMERGENCY DEPARTMENT SAMPLE (NEDS) RELATED TO DENTAL UTILIZATION

NEDS Background

This chapter describes differences between Hispanics and non-Hispanics in emergency department use to treat non-traumatic dental conditions using data derived from the 2019 Nationwide Emergency Department Sample (NEDS).

Methods

This chapter is a retrospective analysis of the non-Federal hospital emergency departments, outpatient departments, and ambulatory surgery visits for non-traumatic dental conditions (NTDCs) derived from the 2019 Nationwide Emergency Department Sample (NEDS). The NEDS is the largest database with information about the utilization and provision of visits to hospital emergency departments. NEDS data are used to support health care policy and research at the national, state, and community level.

NEDS is part of the databases developed by the Healthcare Cost and Utilization Project (HCUP), a federal-state-industry partnership financed by the Agency of Healthcare Research and Quality (AHRQ). NEDS is constructed using the State Emergency Department Databases (SEDD) and the State Inpatient Databases (SID) from 40 states and the District of Columbia: Alaska, Arkansas, Arizona, California, Colorado, Connecticut, Florida, Georgia, Hawaii, Iowa, Illinois, Indiana, Kansas, Kentucky, Massachusetts, Maryland, Maine, Michigan, Minnesota, Missouri, Mississippi, Montana, North Carolina, North Dakota, Nebraska, New Hampshire, New Jersey, Nevada, New York, Ohio, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Texas, Utah, Vermont,

Wisconsin, and Wyoming. These states account for 84.9% of the U.S. population and 83.9% of all ED visits in the U.S. Participation is voluntary. Emergency department visits from federal and long-term care hospitals are not part of NEDS (Healthcare Cost and Utilization Project, 2021).

The 2019 NEDS file includes patients' demographic information, such as age, sex, race, and ethnicity, as well as information related to month, day, payer type, zip code-based urbanicity and income quartile, diagnosis, procedures, treatments, injury codes, hospital region, hospital characteristics, inpatient care if admitted to the same hospital, discharge status, and total charges. The 2019 NEDS data is weighted to produce national estimates and include data from 989 hospital-owned emergency departments in the U.S. Unweighted, it contains data from over 33 million ED visits. Weighted, it estimates roughly 143 million ED visits (Healthcare Cost and Utilization Project, 2021).

The authors used the case definition of NTDCs recommended by the Association of State and Territorial Dental Directors (ASTDD) in this study (Manz, 2017).

We calculated the frequency of ED visits both for NTDCs overall and according to patient characteristics, including age, sex, Hispanic origin, principal payer, discharge status, primary diagnosis made by the provider (reported as ICD-10-CM codes), location of the patient residency, median household income for patient's zip code, and total charges from a wide range of component services. We calculated crude rates of ED visits for NTDCs as the total number of ED visits for NTDCs that occurred in 2019, divided by the estimated U.S. Hispanic population for July 1 of that year, multiplied by 10,000, and expressed as the annual rate per 10,000 population. For this study, we used midyear estimates of U.S. population developed by the U.S. Census Bureau.

Analysis of the data was conducted using statistical software SPSS version 28.0 (IBM Corp., Armonk, NY). Analysis included descriptive statistics with frequencies, proportions, and means for key variables.

Key Findings

- Approximately 13% of the ED visits for NTDCs were for Hispanic individuals, 85% for non-Hispanics.

- Overall, female patients had higher proportion of ED visits for NTDCs than males among both Hispanics (52% vs. 48%) and non-Hispanics (53% vs. 47%).

- The crude rate of ED visits for NTDCs was 37.3 per 10,000 population for Hispanics and 59.5 ED visits per 10,000 population for non-Hispanics.

- The number of ED visits for NTDCs for adults aged 25 to 34 years was higher compared with the other age groups: 26% for Hispanics and 32% for non-Hispanics in this age range.

- The most recorded primary diagnoses for ED visits for NTDCs was "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) for both Hispanics (28%) and non-Hispanics (29%).

- Medicaid was the largest payer for ED visits for NTDCs for both Hispanics (47%) and non-Hispanics (38%). Self-pay was the second-largest payer for Hispanics at 25% and non-Hispanics at 27%.

- Most of the ED visits for NTDCs were paid by public funds at 55% for Hispanics and 49% for non-Hispanics.

- The majority of visits occurred Monday through Friday for Hispanics and non-Hispanics at 69%.

- The ED visits for NTDCs were most frequent in July for Hispanics (7.8%) and non-Hispanics (7.7%).

- Hispanics and non-Hispanics in the lowest income quartile ($1–$45,999) had the highest proportion of ED visits for NTDCs with 40.5% and 41.2%, respectively. Hispanics and non-Hispanics in the highest-income quartile ($79,000 or more) had the lowest proportion of ED visits for NTDCs with 11% and 10.7%, respectively.

- Thirty-nine percent of the ED visits for NTDCs were for Hispanic patients residing in large central metropolitan counties and 24% of the ED visits for NTDCs were for non-Hispanic patients residing in medium metropolitan counties. About 3% of ED visits for NTDCs among Hispanics and 8% among non-Hispanics were for patients not residing in metropolitan or medium metropolitan areas.

- About 2% of ED visits for NTDCs for all patients (Hispanic and non-Hispanics) resulted in a hospital admission, while approximately 98% of patients were treated and released.

- Hispanics had a higher mean charge ($2,253) and median charge ($1,373) for an ED visit for an NTDC compared to non-Hispanics (mean: $1,627, median: $1,077).

Results

In 2019, overall data from the NEDS showed that more than 1.8 million ED visits (weighted estimate) received a primary diagnosis code for NTDC, accounting for 1.3% of the 143 million total ED estimated visits. More females (52.6%) than males (47.4%) had ED visits for NTDCs. The highest proportion of ED visits for NTDCs was among persons aged 25–34 years with 31%.

Approximately 13% of those ED visits for NTDCs were for Hispanic individuals, 85% for non-Hispanics, and 2% did not have race/ethnicity reported. Medicaid was the most common primary source of reimbursement for services rendered at the EDs (39%), followed by self-pay (26%), private insurance (20%), and Medicare (11%). Approximately, 50% of all ED visits for NTDCs were paid for using some type of publicly funded insurance.

Patients located in medium metropolitan areas had the highest proportion of ED visits for NTDCs (26%). Most patients who visited EDs for NTDCs were treated and released (97.7%). About 2% of the recorded ED visits for NTDCs resulted in admission to the hospital.

The most recorded primary diagnoses were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) reported for 28.4% of the ED visits, followed by "periapical abscess without sinus tract" (K047; 27.3%), "dental caries, unspecified" (K029; 16.5%), "jaw pain" (R6884; 2.7%), and "cellulitis and abscess of mouth" (K122; 2.3%). (Figure K-1). The top five primary diagnoses accounted for 77.2% of the ED visits for NTDCs.

Figure K-1. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non-Traumatic Dental Conditions. United States, NEDS 2019.

In 2019, the mean charge for an ED visit for NTDCs was $1,862, the median charge was $1,100, and the total charge for all ED visits for NTDCs was over $3 billion.

Hispanics

Among Hispanics, more females (52%) than males (48%) had ED visits for NTDCs. Persons aged 25–34 years and 35–44 years accounted for 26% and 18% of the ED visits for NTDCs, respectively.

Medicaid was the most common primary source of reimbursement with 47%, followed by self-pay (25%), patients with private insurance (17%), and Medicare (8%) (Figure K-2). About 55% of the ED visits for NTDCs were paid for using some type of publicly funded insurance.

Figure K-2. Principal Payer for Emergency Department Visits for Non-Traumatic Dental Conditions among Hispanics. United States, NEDS 2019.

ED visits for NTDCs among Hispanics varied by patient's location and income level. About 39% of the ED visits for NTDCs were for Hispanic patients residing in large central metropolitan counties, followed by Hispanic patients residing in medium metropolitan counties (28%), large fringe metropolitan counties (18%), small metropolitan counties (7%), micropolitan counties (5%), and no metropolitan or micropolitan (3%).

Hispanics in the lowest income quartile ($1–$45,999) had the highest proportion of ED visits for NTDCs with 40.5%, followed by Hispanics with a median household income of $46,000–$58,999 (27.2%), median household income of $59,000–$78,999 (20%), and median household income of $79,000 or more (11%).

About 98% of ED visits for NTDCs among Hispanic patients were treated and released. Only 2% of the recorded ED visits for NTDCs among Hispanics resulted in admission into the hospital.

Figure K-3. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non-Traumatic Dental Conditions Among Hispanics. United States, NEDS 2019.

The most commonly recorded primary diagnoses for ED visits for NTDCs among Hispanics in 2019 were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) reported for 28% of the ED visits, followed by "periapical abscess without sinus tract" (K047; 22.3%), "dental caries, unspecified" (K029; 14%), "other forms of stomatitis" (K121; 3.2%), and "jaw pain" (R6884; 2.8%). The top five primary diagnoses accounted for 70.3% of the ED visits for NTDCs (Figure K-3). The crude rate of ED visits for NTDCs among Hispanics was 37.3 per 10,000 population.

In 2019, the mean charge for an ED visit for NTDCs among Hispanics was $2,253, the median charge was $1,373, and the total charge for all ED visits for NTDCs was over $550 million.

The mean and median charges for "other specified disorders of teeth and supporting structures" (K088) were $1,652 and $1,228, followed by "Periapical Abscess without Sinus" (K047) with $2,622 and $1,505; "Dental Caries, Unspecified" (K029) with $1,731 and $1,232.50; "Other Forms of Stomatitis" (K121) with $1,755 and $1,280; "Jaw Pain" (R6884) with $3,780 and $2,055; and "Cellulitis and Abscess of Mouth" (K122) with $4,345 and $2,445.

The ED visits for NTDCs among Hispanics were more frequent in July, having an increase of 7.8% compared to the other months of the year. Sixty-nine percent of ED visits for NTDCs among Hispanics occurred from Monday through Friday, while 31% occurred during the weekend.

Non-Hispanics

There were more than 1.5 million (weighted estimate) emergency department (ED) visits for NTDCs among non-Hispanics. More females (53%) than males (47%) had ED visits for NTDCs. Persons aged 25–34 years and 35-44 years accounted for 32% and 21% of the ED visits for NTDCs. Regarding the percent distribution of ED visits for NTDCs by the payer type, Medicaid was the most common primary source of reimbursement with 38%, followed by self-pay (27%), patients with private insurance (21%), and Medicare (11%). About 49% of the ED visits for NTDCs were expected to be paid by public funds (Figure K-4).
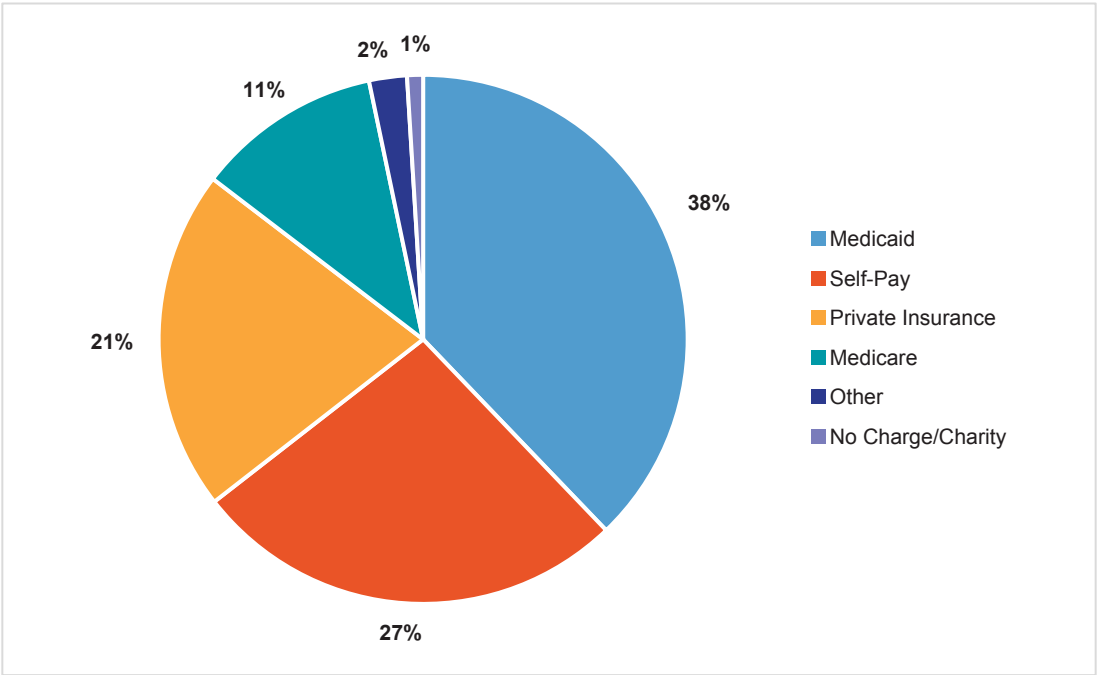
Figure K-4. Principal Payer for Emergency Department Visits for Non-Traumatic Dental Conditions among Non-Hispanics. United States, NEDS 2019.

ED visits for NTDCs among non-Hispanics also varied by patients' location and income level. About 24% of the ED visits for NTDCs were for non-Hispanic patients residing in medium metropolitan counties, followed by non-Hispanic patients residing in large metropolitan counties (23%), large fringe metropolitan counties (20%), micropolitan counties (13%), small metropolitan counties (11%), and neither metropolitan nor micropolitan (8%).

Non-Hispanics in the lowest-income quartile ($1–$45,999) had the highest proportion of ED visits for NTDCs with 41%, followed by non-Hispanics with a median household income of $46,000–$58,999 (28%), median household income of $59,000–$78,999 (19%), and median household income of $79,000 or more (11%).

Similar to Hispanics, about 98% of ED visits for NTDCs among non-Hispanic patients were treated and released. Only 2% of the recorded ED visits for NTDCs among non-Hispanics resulted in admission to the hospital.

The most commonly recorded primary diagnoses for ED visits for NTDCs among non-Hispanics in 2019 were: "other specified disorders of teeth and supporting structures" (ICD-10-CM code K088) reported for 28.9% of the ED visits, followed by "periapical abscess without sinus tract" (K047; 28.1%), "dental caries, unspecified" (K029; 17%), "jaw pain" (R6884; 2.6%), and "cellulitis and abscess of mouth" (K122; 2.3%) (Figure K-5). The top five primary diagnoses accounted for 79% of the ED visits for NTDCs.
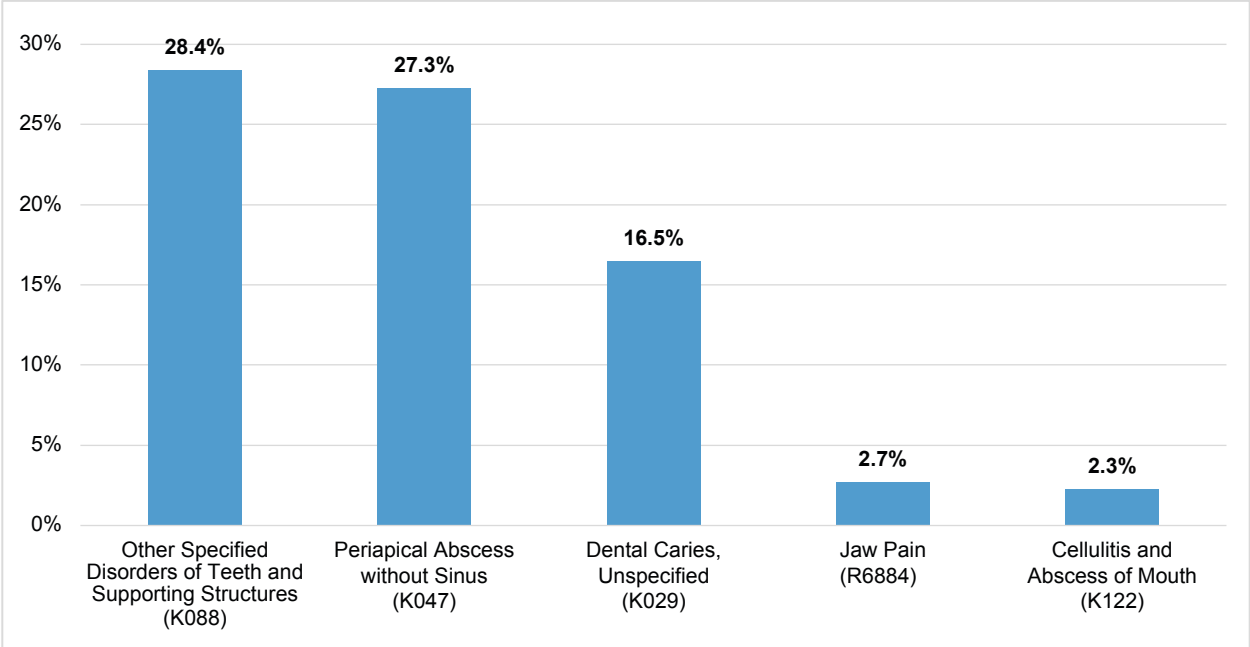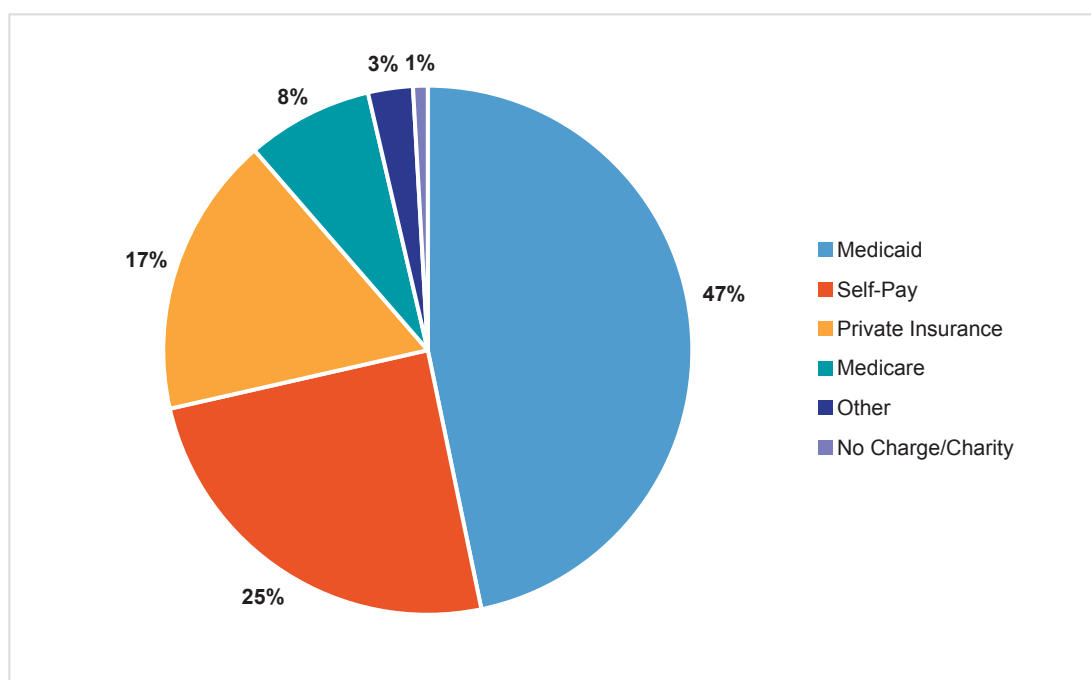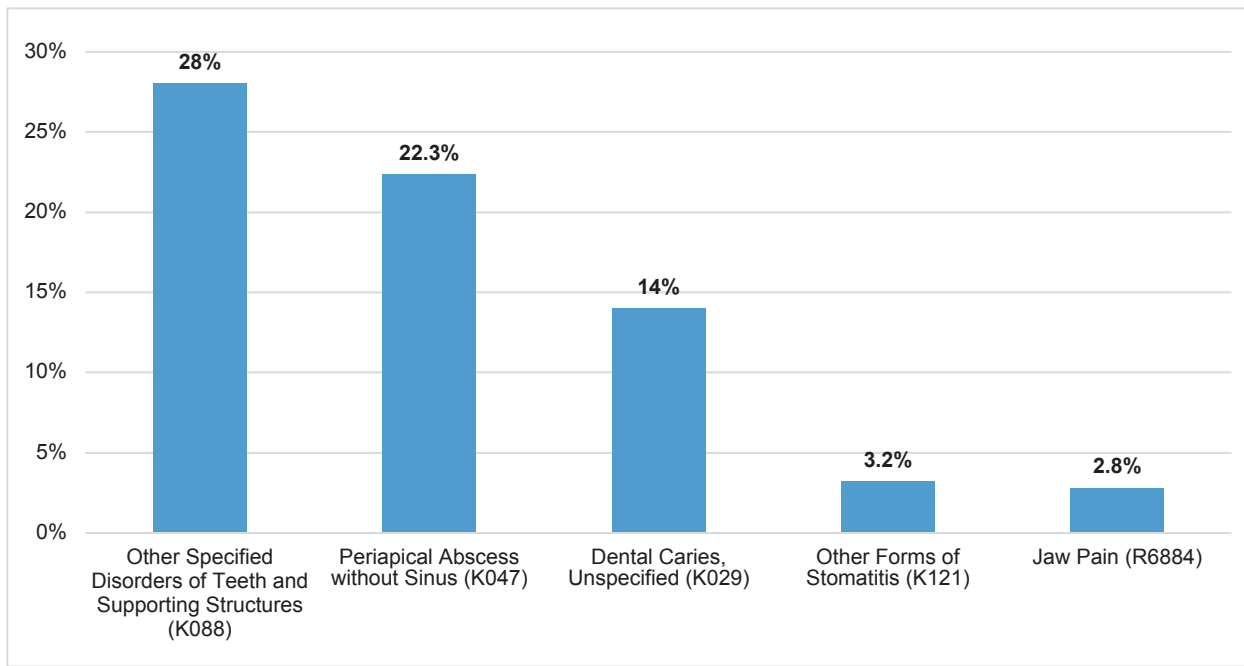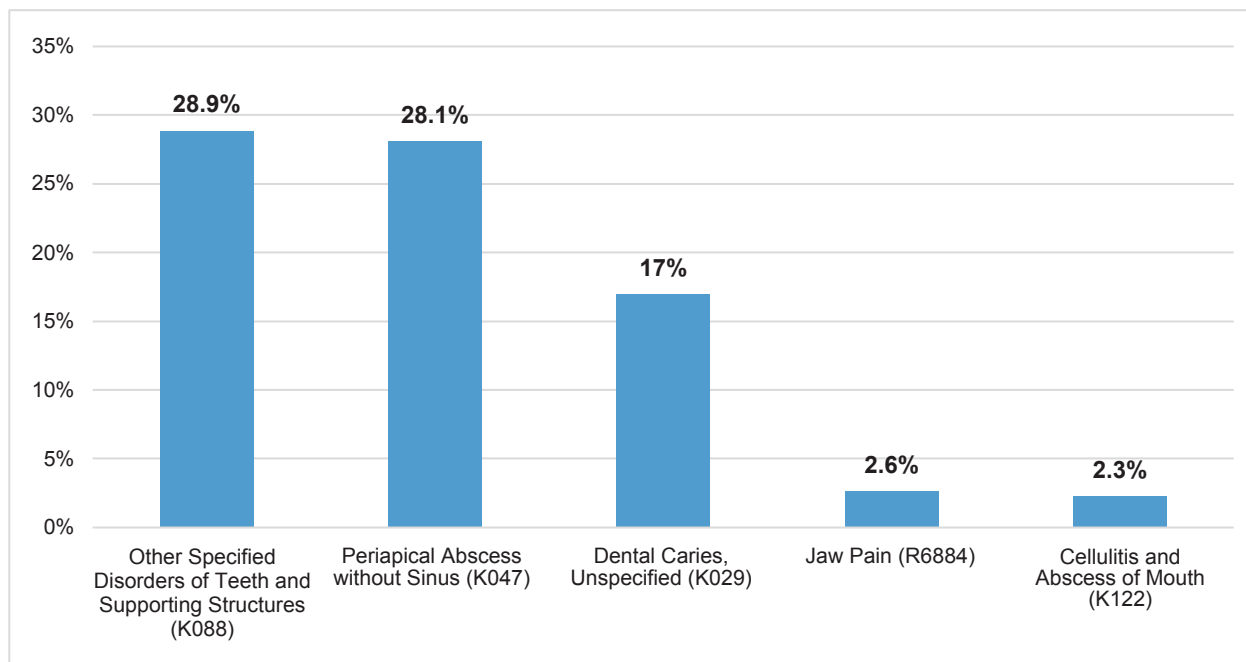

Figure K-5. The Five Most Frequent Primary Diagnoses for Emergency Department Visits for Non-Traumatic Dental Conditions among Non-Hispanics. United States, NEDS 2019.

The crude rate of ED visits for NTDCs among non-Hispanics was 59.5 ED visits per 10,000 population.

In 2019, the mean charge for an ED visit for NTDCs among non-Hispanics was $1,627, the median charge was $1,077, and the total charge was approximately $2.5 billion. The mean and median charges varied by the most recorded primary diagnoses.

The mean and median charges for "other specified disorders of teeth and supporting structures" (K088) were $1,289 and $969, followed by "periapical abscess without sinus" (K047) with $1,984 and $1,136; "Dental Caries, Unspecified" (K029) with $1,462 and $1,021; "Other Forms of Stomatitis" (K121) with $1,742 and $1,065; "Jaw Pain" (R6884) with $3,220 and $1,725; and "Cellulitis and Abscess of Mouth" (K122) with $3,922 and $2,200. The ED visits for NTDCs among non-Hispanics were more frequent in May, July, and August, having an increase of 7.7% compared to the other months of the year. About 69% of ED visits for NTDCs occurred Monday through Friday, and 31% occurred during the weekend (data not shown).

Results

The use of the emergency departments to treat NTDCs in the U.S. continues to be a challenge for the U.S. health care system. Emergency departments are becoming an essential point of care for NTDCs, particularly for publicly insured or uninsured Hispanic people. It is of concern that large proportions of ED visits for NTDCs are due to potentially preventable and manageable diseases.

Substantial resources are spent in treating NTDCs in hospital settings. If the high numbers of ED visits for NTDCs continues, this will contribute to an increasing burden on the U.S. health care system. A more efficient and effective use of public funds to achieve better oral health outcomes than reliance on emergency departments for managing dental conditions is highly recommended. Further studies are needed to understand the mechanisms for reducing emergency department use among Hispanics, when optimal oral health care is provided in a dental office or clinic.

Table 1. Nationwide Emergency Department Sample (NEDS) and National Hospital Ambulatory Medical Care Survey (NHAMCS) Comparison, U.S., 2019.

Characteristic	NEDS	NHAMCS
Year	2019	2019
Supported by	AHRQ	CDC
Number of Variables	>100	879
Number of States	41	50
Number of Hospitals	970	473
ED Visits		
Weighted	143 million	150 million
Unweighted	33 million	19,400
NTDC-Related ED Visits		
Weighted	1.8 million	1.8 million
Unweighted	426,000	223
Percentage from all ED Visits	1.3%	1.2%
Hispanics		
Hispanics NTDC-Related Visits (Weighted)	224,000	209,000
Percentage	13%	11.4%
Non-Hispanics		
Non-Hispanics NTDC-Related Visits (Weighted)	1.5 million	1.6 million
Percentage	87%	88.6%

Table 2. NTDC-Related Visits to Emergency Departments Based on Weighted Number of Visits Among Hispanics: Nationwide Emergency Department Sample (NEDS) and National Hospital Ambulatory Medical Care Survey (NHAMCS), U.S., 2019.

Category	NEDS		NHAMCS	
	Weighted Frequency (n)	Weighted Proportion (%)	Weighted Frequency (n)	Weighted Proportion (%)
ED Visit				
NTDC-Related Visit	224,398	13	209,635	11.4
Sex				
Female	116,813	52	121,296	57.9
Male	107,580	48	88,339	42.1
Age Group (years)				
0<5	17,825	8	39,189	18.7
5–14	23,159	10	31,512	15
15–24	34,342	15	21,436	10.2
25–34	57,911	26	65,299	31.1
35–44	39,494	18	17,891	8.5
45–54	25,509	11	24,755	11.8
55–64	15,590	7	0	0
65–74	6,938	3	9,553	4.6
75–84	2,614	1	0	0
≥85	985	0	0	0
Payer Type				
Medicaid	103,014	47	149,155	71.1
Self-Pay	56,468	25	15,755	7.5
Private Insurance	38,690	17	28,004	13.4
Medicare	17,450	8	4,575	2.2
Other	6,244	3	11,574	5.5
No Charge/Charity	2,097	1	0	0
Location of the Patient Residence				
Large Central Metropolitan	87,473	39	N/A	N/A
Large Fringe Metropolitan	43,026	18	N/A	N/A
Medium Metropolitan	59,847	28	N/A	N/A
Small Metropolitan	14,575	7	N/A	N/A
Micropolitan	11,422	5	N/A	N/A
Not Metropolitan or Micropolitan	6,958	3	N/A	N/A
Missing/Invalid	1,097	1	N/A	N/A

Category	NEDS		NHAMCS	
	Weighted Frequency (n)	Weighted Proportion (%)	Weighted Frequency (n)	Weighted Proportion (%)
Discharge Status				
Treated and Released	218,883	97.6	N/A	N/A
Admitted to the Same Hospital	4,408	2.0	N/A	N/A
Transferred to Another Short-Term Hospital	1,009	0.4	N/A	N/A
Died in the ED	0	0.0	N/A	N/A
Not Admitted to the Same Hospital	98	0.0	N/A	N/A
Median Household Income Patient's ZIP Code				
$1–$45,999	90,909	40.5	N/A	N/A
$46,000–$58,999	61,014	27.2	N/A	N/A
$59,000–$78,999	44,812	20.0	N/A	N/A
$79,000 or more	24,593	11.0	N/A	N/A
Missing/Invalid/Inconsistent	3,070	1.4	N/A	N/A
Region				
West	N/A	N/A	109,093	52
South	N/A	N/A	55,045	26.3
Midwest	N/A	N/A	25,443	12.1
Northeast	N/A	N/A	20,054	9.6
Metropolitan Statistical Area Status				
MSA	N/A	N/A	191,674	91.4
Non-MSA	N/A	N/A	17,961	8.6
Hospital Admission				
Not Admitted to Hospital	N/A	N/A	209,635	100
Admitted to Hospital	N/A	N/A	0	0
Most Recorded Primary Diagnoses				
Other Specified Disorders of Teeth (K088)	62,809	28.0	91,387	43.6
Dental Caries, Unspecified (K029)	31,393	14.0	39,471	18.8
Periapical Abscess Without Sinus (K047)	50,097	22.3	22,491	10.7

SECTION 4
Oral Health Workforce

CHAPTER 12:
ORAL HEALTH WORKFORCE: CURRENT TRENDS

Impact of Diversity in Health/Dental Workforce

The need to diversify the health care workforce and promote cultural competence in the U.S. health care system stems from recognizing the growing disparities in health outcomes and access to care, particularly for underrepresented minorities and those who live below the federal poverty level. It has also stemmed from the recognition of the impact that social determinants of health have in those disparities and the provision of care.

Enrollment in dental and allied education programs is at an all-time high. Racial and ethnic diversity within these professions is increasing modestly, and more than half of the most recent dental graduates have been women. Nevertheless, underrepresentation continues to be a concern for some racial/ethnic groups within the oral health profession (Oral Health in America, 2020).

An important research gap includes the collection of data regarding provider performance when it comes to race/ethnicity and its linkage to improving health outcomes in the population they serve.

In this section of the report, we start addressing the issue of workforce in two parallel approaches: a comprehensive review of the literature on the topic and collecting secondary data from existing sources.

Regarding the review of the literature, the investigators identified the following issues on diverse workforces (a complete summary will be included in the final report of the project, along with the information obtained from the secondary data analysis):

1. Cultural competence of dental providers.

2. Effect of integration of primary care on diversity of workforce.

3. Practice patterns of graduating dentists from racial/ethnic minorities: how practices can be improved and the current state of existing available evidence.

4. Comparisons with other health care providers in terms of cultural competence.

5. Current policies supporting a diverse workforce from selection to training, and how these policies could be improved.

6. Research gaps regarding diversity of the U.S. oral health workforce

Oral Health Workforce Secondary Data Analysis Background

The dental workforce refers to the number, distribution, and characteristics of dentists, dental auxiliaries, and other support staff involved in the provision of oral health care.

Most data sources that were reviewed to assess diversity in the dental workforce use variations of the U.S. Census Bureau guidelines in accordance with the 1997 Standards for Maintaining, Collecting, and Presenting Federal Data on Race and Ethnicity directed by the U.S. Office of Management and Budget (OMB). The 1997 OMB Standards require two minimum ethnicity categories ("Hispanic or Latino" and "Not Hispanic or Latino") and five minimum race categories ("White," "Black or African American," "American Indian or Alaska Native," "Asian," and "Native Hawaiian and Other Pacific Islander"). A sixth category, "Some Other Race," is also used with OMB's approval. The 1997 OMB Standards allow respondents to report more than one race.

The 2020 U.S. Census reported that the percentage of people that self-reported as Hispanic or Latino was 18.7% of the total U.S. population, making this the largest minority in the U.S.

The Bureau of Workforce from the Health Resources and Services Administration (HRSA) monitors the sex, race, and ethnic composition of all health occupations in the U.S. Their most recent report, in 2017, included data collected from the 2011–2015 period from their American Community Survey. One of the key findings from this report was that all minority groups except Asians were underrepresented in Health Diagnosis and Treating occupations. We have received confirmation from HRSA that this is the most recent data.

In order to assess the current situation regarding the oral health workforce, we reviewed the following data sources:

1. U.S. Bureau of Labor Statistics website from the Current Population Survey, last updated in January 2022.

2. ADEA Annual Snapshot reports, which summarize the demographic makeup of oral health students from academic institutions of all 50 states and Puerto Rico. These data include entering/graduating dental, dental hygiene, and dental assistant students.

3. We sent a survey to state boards of dentistry requesting information on the racial/ethnic makeup of licensed dental professionals in their jurisdiction. As of December 2022, we had not yet received complete data from all 50 states and Puerto Rico.

Methods

We followed the U.S. Census Bureau Guidance on the Presentation and Comparison of Race and Hispanic Origin Data. This has been used in previous sections in this report. This classification merges ethnicity (Hispanic or not) with race. Therefore, a self-identified Hispanic or Latino (from any racial group) is classified separately from White, Black, or Asian races and/or ethnicities. The latter are classified as non-Hispanic Whites, non-Hispanic Blacks, and non-Hispanic Asians.

Regarding the workforce data from the U.S. Bureau of Labor Statistics, and effective with January 2020 data, occupations reflect the introduction of the 2018 Census occupational classification system, derived from the 2018 Standard Occupational Classification (SOC). Data for 2020 are not strictly comparable with earlier years. Dashes indicate no data or data that do not meet publication criteria (values not shown where base is less than 50,000).

The investigators transferred the website data and developed the final set of tables and data to develop graphs. In this section, we include key findings supported by charts. In reporting findings, and when appropriate, we rounded up the numbers in the charts and text. Missing information in the tables and graphs corresponds to non-reported or censored data. In some instances, estimates for race groups (White, Black or African American, and Asian) do not sum to totals because data may not be present for all races. Persons whose ethnicity is identified as Hispanic or Latino may be of any race.

Workforce Distribution of Oral Health and Other Health Care Providers by Race/Ethnicity and Gender Reported in Percentages

Key Findings

- By 2021, approximately 6% of dentists, 10.7% of dental hygienists, 30.4% of dental assistants, and 19.8% of dental laboratory technicians identified themselves as Hispanic, which contrasts with approximately 19% of Hispanic population in the U.S. (Figure L-1).

- The 6% for dentists in 2021 matches the 6% reported by HRSA in 2017.

- A similar trend of underrepresentation is observed among other Hispanic health care professionals (e.g., physicians, nurses, and pharmacists) (Figure L-2).

- Regarding gender, females continue to be underrepresented as dentists (Figure L-3). This is not the case for hygienists or dental assistants, where the majority are female.
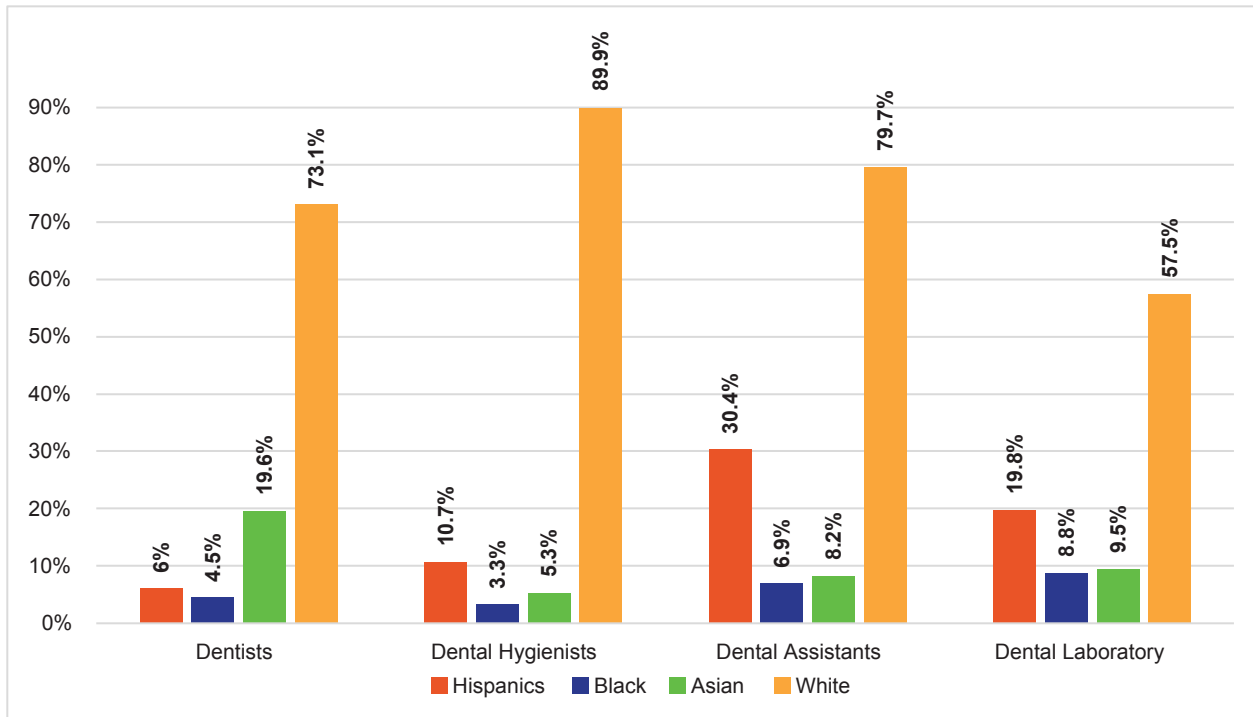
Figure L-1. Percent of Total Dental Professionals by Race/Ethnicity Employed in 2021 — Last Update Jan 2022. U.S. Bureau of Labor Statistics 2020.
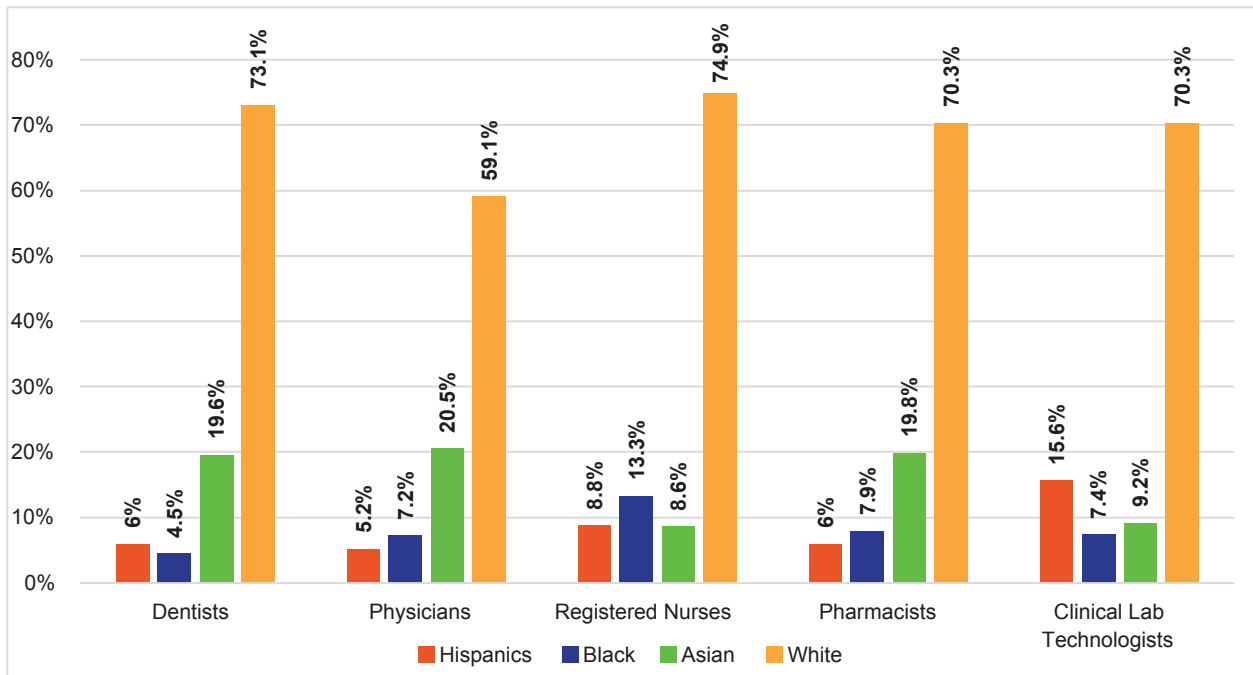
Figure L-2. Percent of Health Care Providers by Race/Ethnicity Employed in 2021 — Last Update Jan 2022. U.S. Bureau of Labor Statistics 2020.
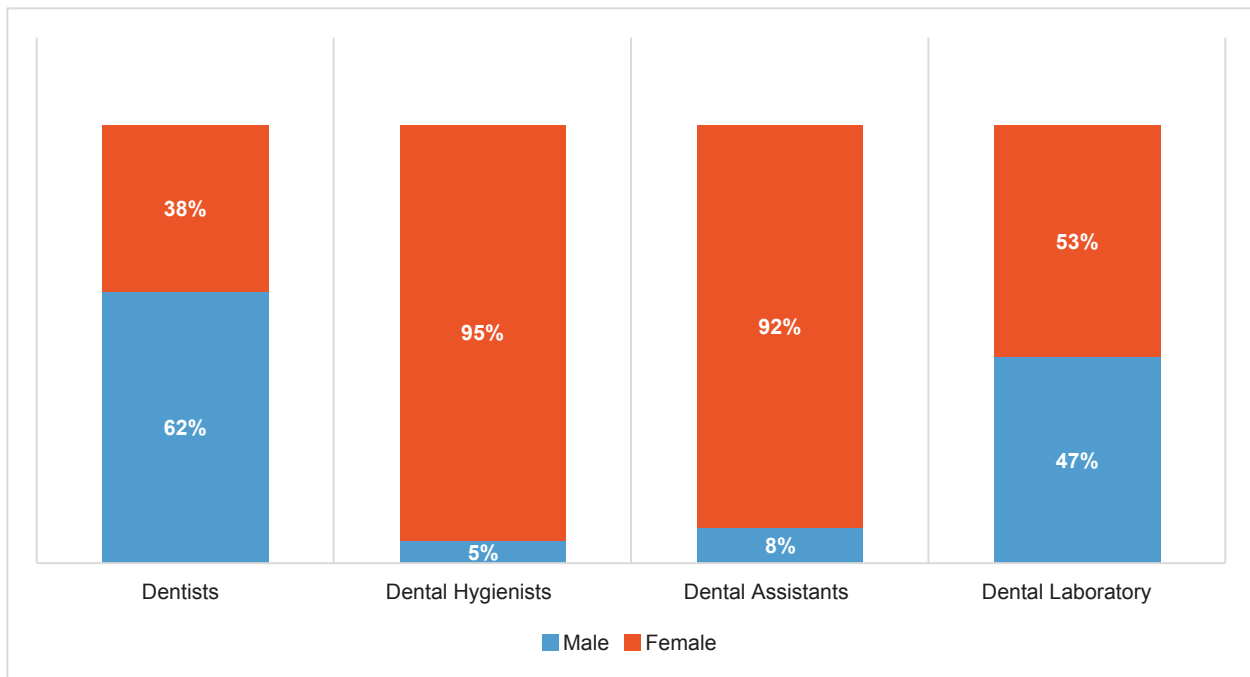
**Figure L-3. Percent of Total Dental Professionals by Gender Employed in 2021
— Last Update Jan 2022. U.S. Bureau of Labor Statistics 2020.**

Analysis of First Year Enrollees in Dental Schools, by Race/Ethnicity and Sex, 2010–2020

Key Findings

- Hispanic enrollees in dental schools increased from 7.2% in 2010 to 10% in 2020 (Figure L-4).

- Other minorities, such as American Indians or Native Americans, have not increased enrollment over the last decade.

- Hispanics in dental hygiene schools were 18.34% of the total enrollment in 2020–2021 (Figure L-5).

- The total enrollment in allied dental programs decreased 9.3% in all races/ethnicities between 2017–2021, showing a downward trend in minority access to dental education (Figure L-6).
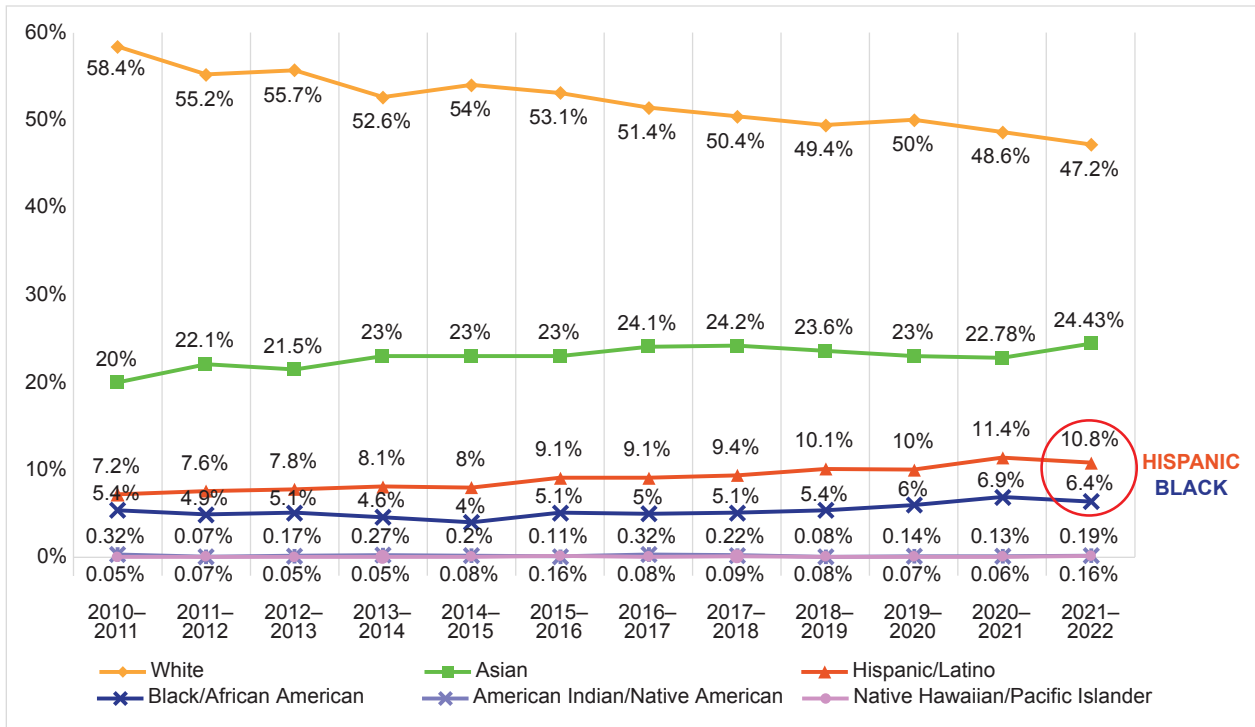
Figure L-4. Dental School Enrollees by Race/Ethnicity.
ADEA Snapshot of Dental Education Reports 2010—2020.

	Hispanic / Latino (any race)	White	Black or African American	American Indian / Alaska Native	Asian	Native Hawaiian / Other Pacific Islander	Two or more races (not Hispanic)	Unknown	Nonresident Alien
Total	18.34	61.05	5.83	0.69	8.32	0.68	2.63	2.05	0.36
Female	17.66	62.82	5.4	0.7	7.84	0.65	2.59	2.02	0.28
Male	29.05	32.17	13.4	0.55	16.53	1.23	3.01	2.34	1.67
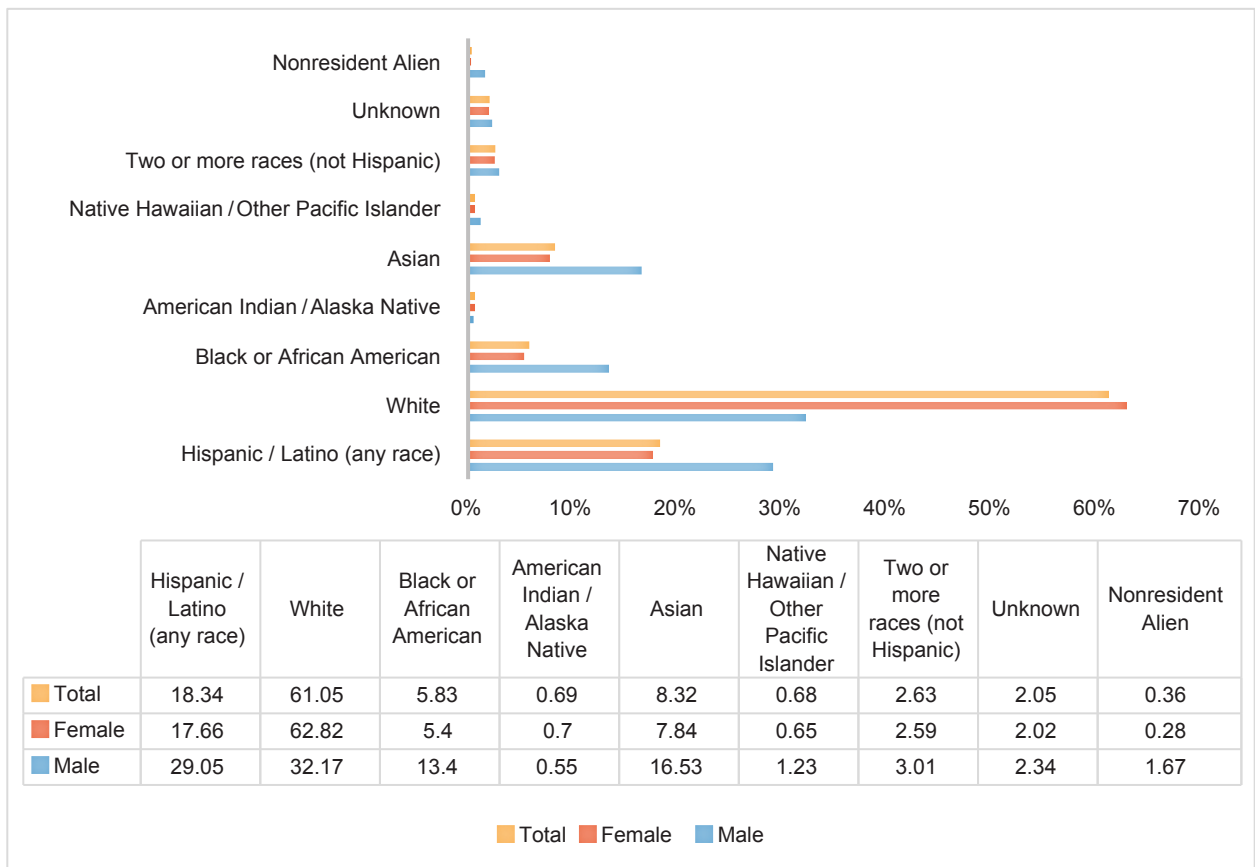
Figure L-5. U.S. Total Enrollment in Accredited Dental Hygiene Programs by Race/Ethnicity and Gender, 2020—21.
American Dental Association Health Policy Institute 2020—2021.
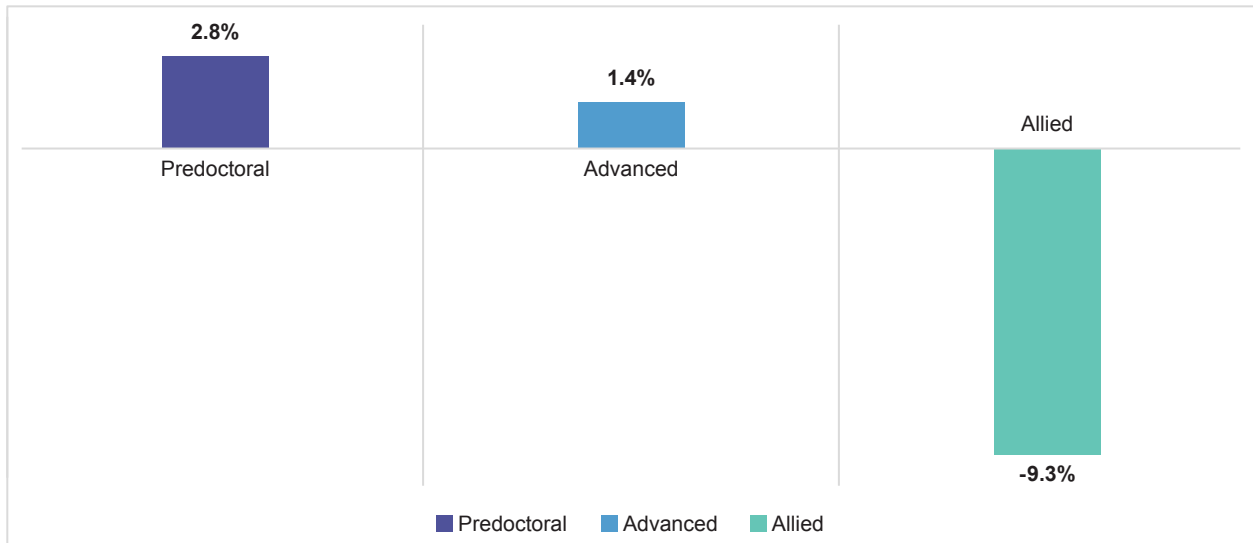
Figure L-6. U.S. Percent Change in First Year Enrollment by Dental Education Program, 2017–2021

Key Findings (Figures L-7 and L-8)

- Hispanics represent 8.5% of the full-time faculty (N = 437) and 5.2% of the part-time faculty (N = 273) in U.S. dental schools (Figure L-7).

- Hispanics represent 8.5% (N = 409) of the total faculty of accredited dental hygiene programs (N=4848), where 6.9% of male faculty members are Hispanic and 8.7% of female faculty members are Hispanic (Figure L-8).
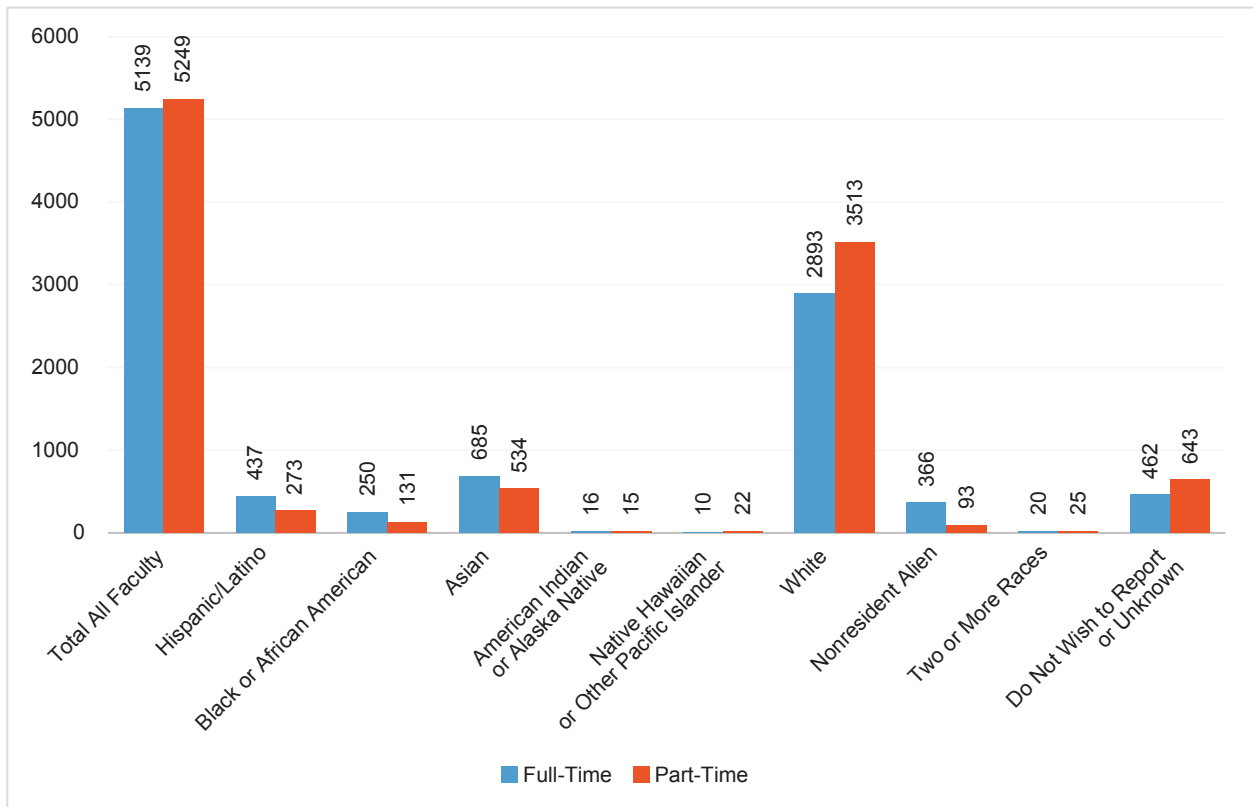
Figure L-7. Number of Full-Time and Part-Time Dental School Faculty by Gender and Race/Ethnicity, 2018–19 Academic Year. American Dental Education Association, Survey of Dental School Faculty, 2018–19
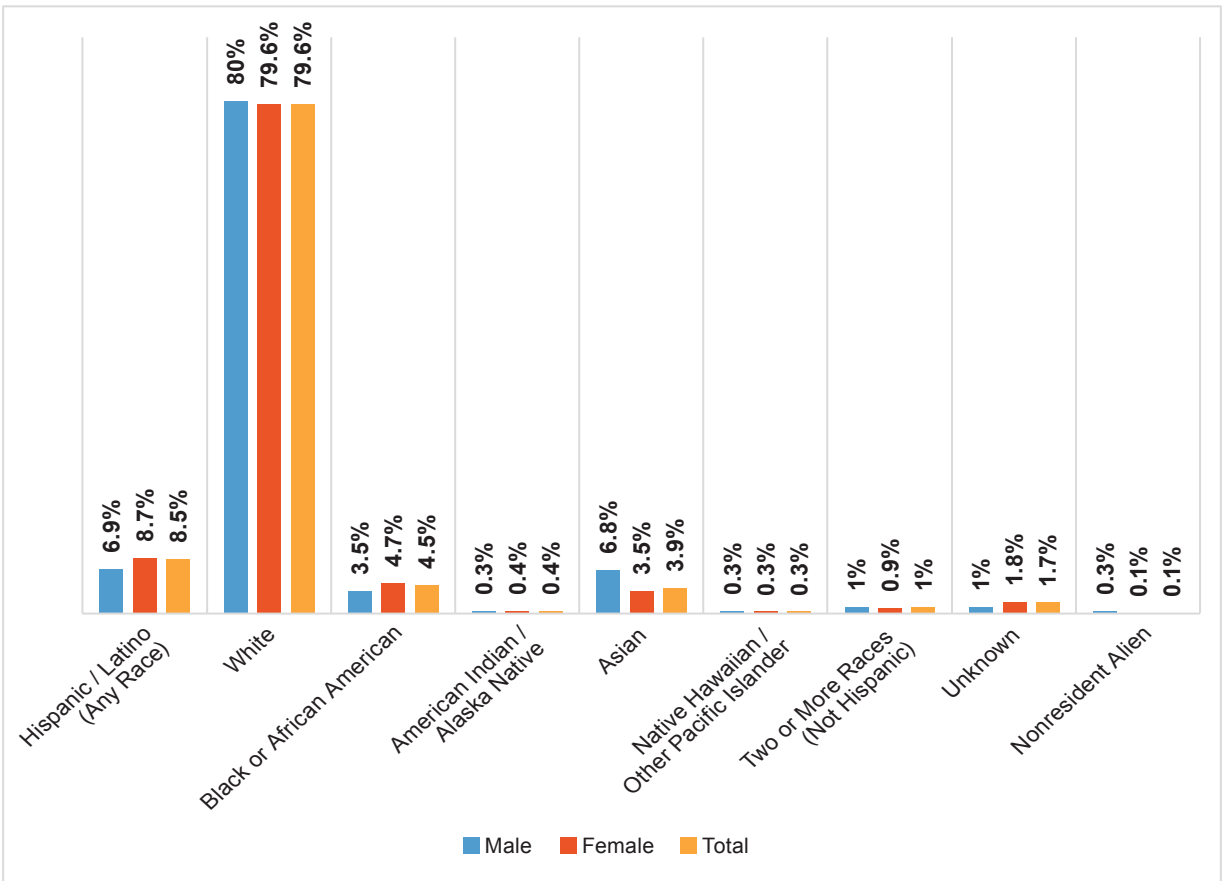
Figure L-8. Number of Faculty of Accredited Dental Hygiene Programs by Race/Ethnicity, 2020–2021 Academic Year.
American Dental Association Health Policy Institute (ADA HPI) Survey of Dental Hygiene Education Programs, 2020–2021.

Graduates From Dental and Dental Hygiene Schools by Sex, Race, and Ethnicity, Academic Year 2020–2021

Key Findings (Figures L-9, L-10, and L-11)

- In 2020–2021, dental schools graduated more African American, Asian, and Hispanic females than males (Figure L-9).

- Hispanic female graduates from U.S. dental schools represented 60% of the total Hispanic graduates for the 2020–2021 academic year. In contrast, White female graduates represented 45% of graduates compared to their male counterparts for the same period (Figure L-9).

- The graduation rate from dental schools for Hispanics was between 8.1% in 2017 to 9.4% in 2021 (Figure L-10).

- Hispanics were 17% of dental hygiene graduates in 2020 (Figure L-11).
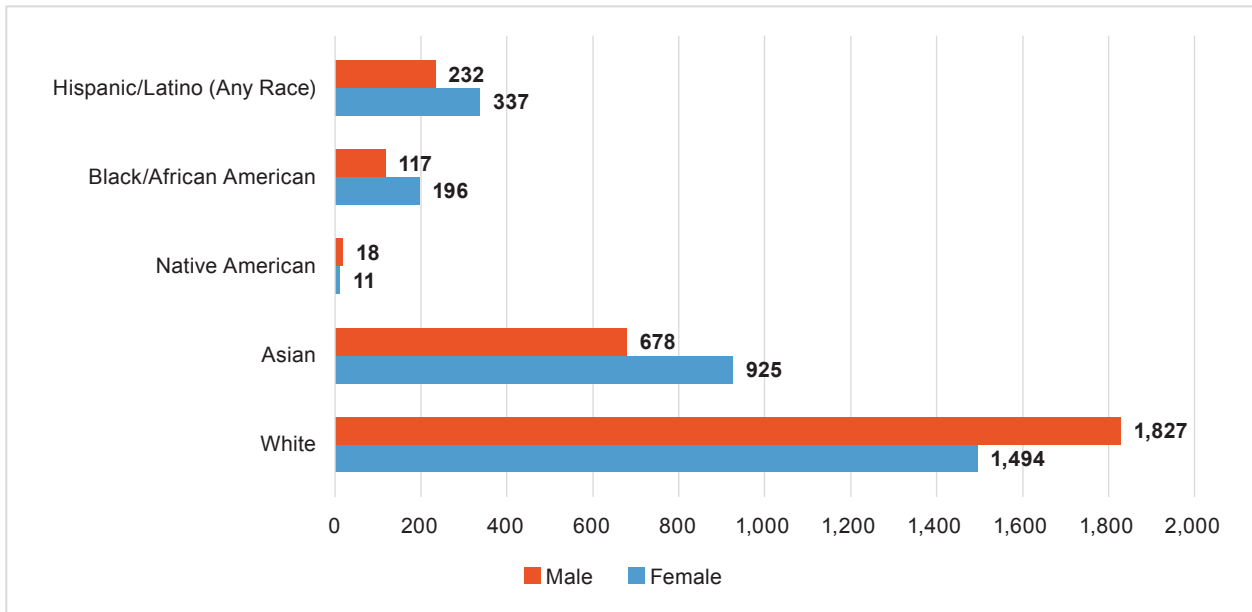
Figure L-9. Number of U.S. Dental School Graduates by Gender and Race/Ethnicity. American Dental Association Health Policy Institute (ADA HPI) and the Commission on Dental Accreditation (CODA), 2020–2021.
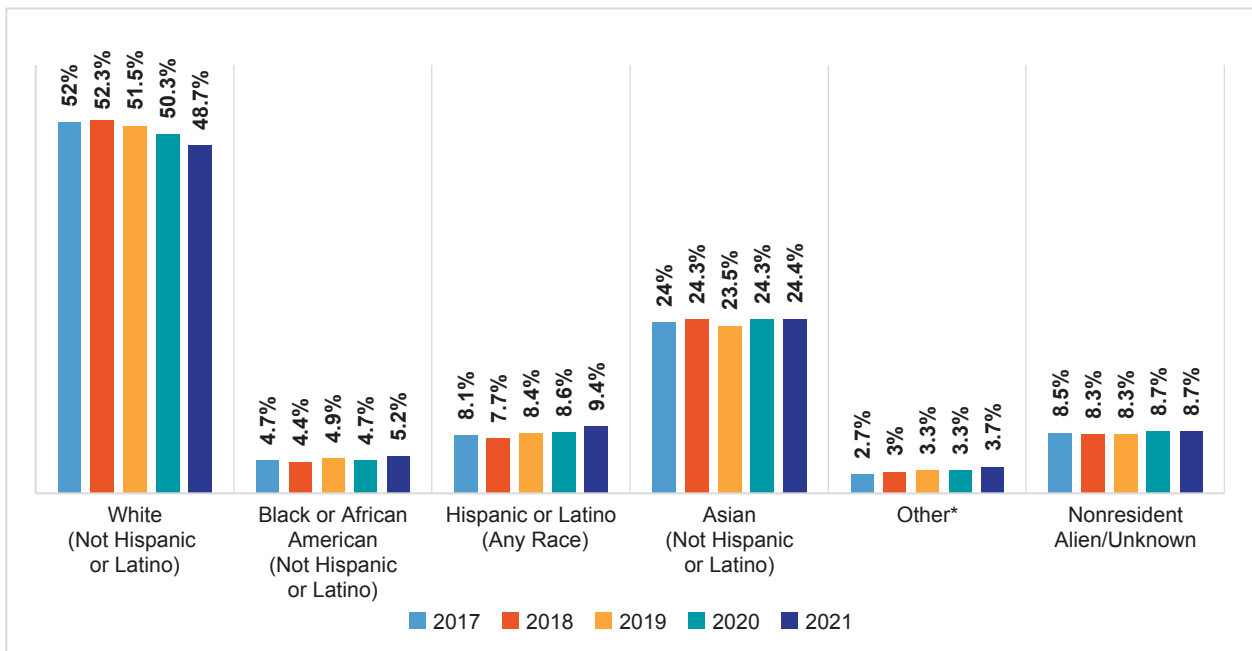
Figure L-10. U.S. Dental School Graduates by Race/Ethnicity. American Dental Association Health Policy Institute (ADA HPI) and the Commission on Dental Accreditation (CODA), 2020–2021.
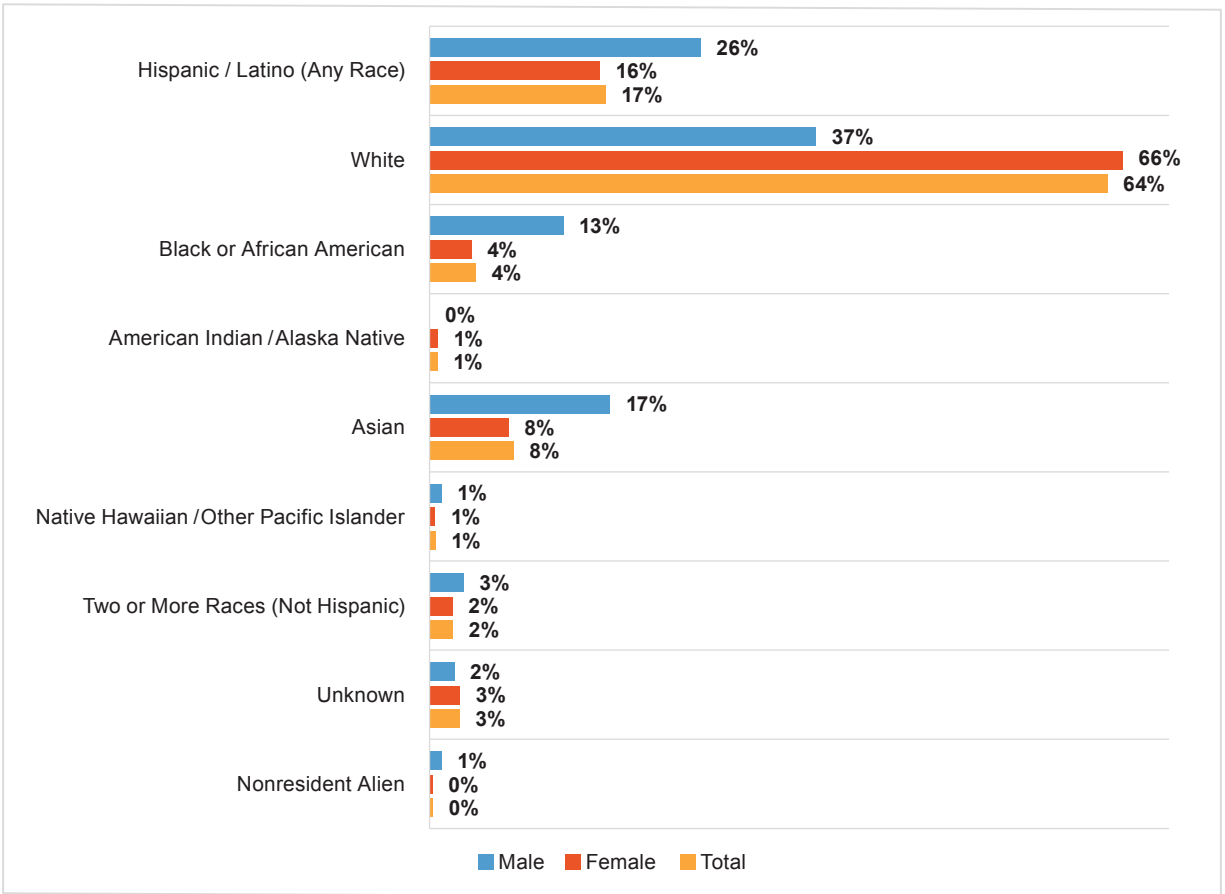
Figure L-11. U.S. Dental Hygiene Graduates by Gender and Race/Ethnicity. American Dental Association Health Policy Institute (ADA HPI) Survey of Dental Hygiene Education Programs, 2020-2021.

CHAPTER 13:
WORKFORCE PLANNING (WFP)
FOR MINORITY ORAL HEALTH CARE

Background

Several models and proposals have been published in the last 20 years to make projections in the health care workforce at U.S. national and international levels. Currently, the trend in global public health recommends planning health workforces to address health care needs for specific populations and respond to changes in needs over time. Health workforce planning is also critical to avoid challenges related to the following (O'Malley et al., 2002):

  a. lack of access to services and inability to address unmet needs in the population,

  b. degradation of the quality of care and increased risks to patient safety,

  c. low staff morale and concerns about staff retention, and

  d. poor stewardship of health care budgets.

In oral health care, workforce planning tends to be inflexible and disconnected from the strategic and financial planning of oral health care services, especially those related to public services or funded by federal or state sources (Brocklehurst & Tickle, 2012). Traditional workforce planning in oral health has been focused on supply and demand models or "stock and flow models." These have primarily focused on projecting the supply or availability of mainly dentists, often excluding other members of the oral health care team. Traditional workforce planning has also focused on how many practitioners are needed to replace those who retire or leave the service and responding to anticipated changes in demand for care. Other models have been focused on workforce productivity or expected treatment times (O'Malley et al., 2022; Brocklehurst et al., 2012).

Literature suggests that quantitative models must be used to estimate the future workforce, including specific requirements that consider other variables, such as population size, demographic characteristics, oral health needs, evidence-based approaches to addressing needs, and methods of service provision that maximize productivity (McPake et al., 2013). Traditional approaches do not include demographic changes and sometimes only include the analysis of specific services, such as extractions per 1,000 population, without considering the specific oral health care needs of the target population (Gallagher et al., 2015).

The expected data collection to provide innovative workforce planning in oral health must have a minimum of four main components, as identified by researchers of this topic. This supports the implementation of a contemporaneous needs-based model (Birch, 2007).

To plan an oral health workforce according to the demographic characteristics of a multicultural country such as the U.S., the following should be included (O'Malley et al, 2022) (Figure M-1):

1. Health care needs and risks linked with the specific population to be served,
2. The level of service that policymakers plan to provide for that specific population (evidence-based care pathways),
3. The productivity of the workforce associated with alternative skill mix (multicultural competencies), and
4. Innovation in health care to reduce unmet needs and health inequities, thus improving the sustainability of health care systems.
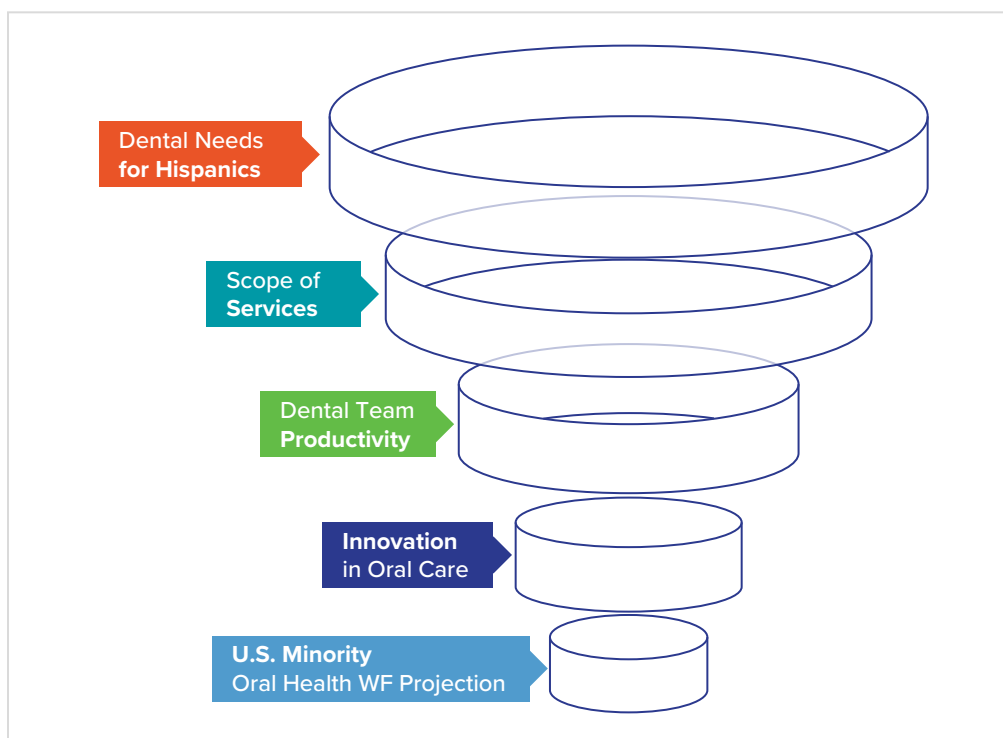
Figure M-1 Proposed Workforce Planning Model to Project Oral Health Care Providers for Hispanics.

Research Questions in Workforce Projections

- How many dental students (enrolled/graduate) should be Hispanic to improve representation in the oral health workforce?

- How long will it take, given the current trend, to improve representation (to at least 10%)?

Workforce Variables

Variables in each color in these tables can be combined, if appropriate.

Variable	Source	Details	Reference Data
Total First Year Enrollment in CODA-Accredited Dental Education Programs	American Dental Association Health Policy Institute, Commission on Dental Accreditation, Surveys of Dental Education	5-year trend (2017–20; 2021–22) 2017 = 6,184 2022 = 6,360 2.8% increase over 5-year period	First-Year Enrollment in Accredited Dental Education Programs, 2017–18 to 2021–22
First-Year Enrollment in U.S. Predoctoral Dental Education Programs (Hispanic/Latino)		5-year trend (2017–18; 2021–22) 2017 = 9.4% 2022 = 10.7% 1.3% increase over 5-year period	First-Year Enrollment in Predoctoral Dental Education Programs by Gender and Race/Ethnicity, 2017–18 to 2021–22
First-Year Enrollment in U.S. Advanced Education in General Dentistry Programs		5-year trend (2017–18; 2021–22) 2017 = 791 2022 = 790 -0.1% decrease over 5-year period	First-Year Enrollment in Accredited Dental Education Programs, 2017–18 to 2021–22

Variable	Source	Details	Reference Data
Total Enrollment in Predoctoral Dental Education Programs	American Dental Association Health Policy Institute, Commission on Dental Accreditation, Surveys of Dental Education, Surveys of Advanced Dental Education, and Surveys of Allied Dental Education	5-year trend (2017–18; 2021–22) 2017 = 25,010 2022 = 26,228 4.9% increase over 5-year period	Total Enrollment in Accredited Dental Education Programs, 2017–18 to 2021–22
Total Enrollment in Predoctoral Dental Education Programs (Hispanic/Latino)		5-year trend (2017–18; 2021–22) 2017 = 8.8% 2022 = 10.3% 1.5% increase over 5-year period	Total Enrollment in Predoctoral Dental Education Programs by Gender and Race/Ethnicity, 2017–18 to 2021–22
Total Enrollment in U.S. Advanced Education in General Dentistry Programs		5-year trend (2017–18; 2021 –22) 2017 = 935 2022 = 939 0.4% increase over 5-year period	Total Enrollment in Accredited Dental Education Programs, 2017–18 to 2021–22
Total Enrollment in Advanced Dental Education Programs (Hispanic/Latino)		Only 2021–22 data available N=687 students Percentage of total enrollment = 9.3%	Total Enrollment in Advanced Dental Education Programs by Gender and Race/Ethnicity, 2021–22

Variable	Source	Details	Reference Data
Graduates of Accredited Dental Education Programs	American Dental Association Health Policy Institute, Commission on Dental Accreditation, Surveys of Dental Education, Surveys of Advanced Dental Education, and Surveys of Allied Dental Education	5-year trend (2017–2021) 2017 = 6,238 2022 = 6,665 6.8% increase over 5-year period	Graduates of Accredited Dental Education Programs, 2017 to 2021
Graduates of Predoctoral Dental Education Programs (Hispanic/Latino)		5-year trend (2017–2021) 2017 = 8.1% 2022 = 9.4% 1.3% increase over 5-year period	Graduates of Predoctoral Dental Education Programs by Gender and Race/Ethnicity, 2017 to 2021
Graduates of Advanced Education in General Dentistry		5-year trend (2017–2021) 2017 = 807 2022 = 790 -2.1% decrease over 5-year period	Graduates of Accredited Dental Education Programs, 2017 to 2021
Graduates of Advanced Dental Education Programs (Hispanic/Latino)		Only 2021–22 data available N=391 Percentage of total enrollment = 10.3%	Graduates of Advanced Dental Education Programs by Gender and Race/Ethnicity, 2021

Variable	Source	Details	Reference Data
Number of Accredited Dental Education Programs in U.S.	American Dental Association Health Policy Institute, Commission on Dental Accreditation, Surveys of Dental Education, Surveys of Advanced Dental Education, and Surveys of Allied Dental Education	2017 = 66 2021 = 68 3% increase over 5-year period	Number of CODA-Accredited Dental Education Programs, 2017–18 to 2021–22
Number of U.S. Advanced Education in General Dentistry Programs		2017 = 89 2021 = 91 2.2% increase over 5-year period	Number of CODA-Accredited Dental Education Programs, 2017–18 to 2021–22
Dental School Attrition?	American Dental Association Health Policy Institute, Commission on Dental Accreditation Surveys of Dental Education (U.S. Group II)	2017–18 First year = 1.2 Total = 0.7 2020–21 First year = 1.1 Total=0.6	U.S. Dental School First-Year Enrollment and Withdrawals with Attrition by Class, 2017–18 to 2020–21

Variable	Importance	Detail	Data Link
Population Provider Race Concordance	Diversification of dental workforce and a better geographic distribution of providers could lead to improvements in access to care for low-income patients. A more representative dental workforce may result in higher patient satisfaction, better access to care, and more positive health outcomes.	Hispanics represent 18.5% of total population (U.S. Census, 2020), projected to account for around 29% of population in 2040	https://pubmed.ncbi.nlm.nih.gov/27920306/ https://doi.org/10.1177/10775587221108751

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