Burden of Oral Disease in West Virginia

Original Publication Date: 2013
Updated March 2022

West Virginia Department of Health and Human Resources

Oral Health Program

Table of Contents

Executive Summary

Introduction

The mouth is our primary connection to the world. It serves to nourish our bodies as we take in water and nutrients to sustain life. It is our primary means of communication, the most visible sign of our mood, and greatly influences how we are perceived by others. Oral refers to the whole mouth: the teeth, gums, hard and soft palate, linings of the mouth and throat, tongue, lips, salivary glands, chewing muscles, and upper and lower jaws. Therefore, the mouth is an integral part of human anatomy and plays a major role in our overall physiology, making oral health intimately related to the health of the rest of the body.

Manifested in poor nutrition, school absences, missed workdays, and increasing public and private expenditures for dental care, the burden of oral disease is overwhelming. Poor oral health, ranging from tooth decay to cancers, causes unnecessary pain, suffering and disabilities for countless Americans.

Oral health is an essential and integral component of overall health. Not only does good oral health mean being free of tooth decay and gum disease, but it also means being free of chronic oral pain, oral cancer, birth defects such as cleft lip and palate, and other conditions that affect the mouth and throat. Similarly, changes in the mouth are often the first signs of problems elsewhere in the body, such as infectious diseases, immune disorders, nutritional deficiencies, and cancer. Current research suggests that periodontal (gum) disease increases the risk of heart disease, puts pregnant women at greater risk of premature delivery, complicates control of blood sugar for people living with diabetes, and respiratory infection in susceptible individuals.[1] Good oral health helps ensure overall health and well-being. It is dependent on a variety of factors including diet, oral hygiene, and other lifestyle choices, as well as community-based preventive interventions and access to professional dental services.

As age increases, the burden of untreated disease does as well. Tooth decay can result in acute or chronic pain, dental abscesses, infections, and tooth loss. Though this disease is largely preventable, the repercussions may be extreme if care is not sought in a timely manner. The childhood years are the optimum time for preventive measures. Many adults struggle with oral health care due to several barriers, including inconvenient timings for dental appointments, lack of insurance coverage, and more.

The West Virginia Oral Health Program seeks to reduce dental disease and improve the oral health of West Virginia citizens by planning, implementing, and evaluating oral health promotion and disease prevention programs. The purpose of this report is to provide an overview of current available information concerning the burden of oral disease among the children and adults of West Virginia. This report can only present our best efforts at representing oral health in West Virginia. One shortcoming is the time lag in data availability. Some of the data presented is several years old. The degree of time lag differs across information sources.

This report summarizes the most current information available on the oral disease burden of people in West Virginia. Comparisons are made with national data whenever possible and to the *Healthy People* objectives when appropriate. This summary of the oral disease burden should help raise awareness of the need for

[1] Hegde R, Awan KH. Effects of periodontal disease on systemic health. Dis Mon. 2019;65:185-92.

monitoring oral health in West Virginia and guide efforts to prevent and treat oral diseases and enhance the quality of life of West Virginia's residents.

Methods

Data in this report include surveillance indicators that are outlined in the West Virginia Oral Health Surveillance Plan. Indicators represent five domains:

- Oral disease – including dental caries (tooth decay), tooth loss, periodontal (gum) disease, oral and pharyngeal cancer, and cleft lip/palate.
- Prevention – including dental screenings, cleaning, sealants, water fluoridation, fluoride varnish, and oral health education.
- Risk factors – including tobacco use.
- Access to care – including recent dental visits, receipt of needed care, reasons for not receiving care, dental insurance, and Medicaid and Children's Health Insurance Program (CHIP) claims.
- Dental health workforce – including dental professions (dentists and hygienists), school-based programs, and dental health professional shortage areas.

This report, originally published in 2013 and updated in 2022, used *The Burden of Oral Disease: A Tool for Creating State Documents* provided by the Centers for Disease Control and Prevention (CDC) as a reference guide. Indicators are reported for the most recent year of data available; trend data is also reported for a small number of key indicators. Select indicators are presented for demographic subgroups.

Use for Program Development

This report was created to provide oral health related data to members of the oral health workforce, public health professionals, legislators, and others engaged in maintaining and improving oral health in West Virginia. This information is necessary to develop and guide public health activities, monitor and evaluate progress, and identify disparate population groups. Moreover, data presented in this report can support the establishment of new priorities regarding surveillance.

Key Findings

Tooth decay among West Virginia's children

- Too many children in West Virginia have experienced tooth decay. During the 2017-2018 school year, a statewide survey found that 48% of third grade children had experienced tooth decay sometime during their lifetime.
- Many children in West Virginia are not getting the dental care they need. In 2017-2018, almost 1-of-5 third grade children (19%) had untreated tooth decay.

Tooth loss among West Virginia's adults

- West Virginia's older adults are keeping their teeth longer. The percentage of older adults (65+ years) with no natural teeth decreased from 34% in 2012 to 22% in 2020; a relative reduction of 35%.
- Although more older adults in West Virginia are keeping their teeth, West Virginia continues to have a higher percentage of adults with total tooth loss compared to the United States average (22% vs.13%)

- In 2020, about 23% of West Virginia adults aged 18+ years smoked cigarettes. The prevalence of any tooth loss among West Virginia adults 18+ years is significantly higher among current smokers compared to never smokers (74% vs. 45%).
- Risk factors for tooth loss among adults 18+ years include age, education, income, self-reported health status, and smoking.

Oral and pharyngeal cancer in West Virginia

- From 2014-2018, the age-adjusted incidence rate of oral and pharyngeal cancer among West Virginians was 14.2 per 100,000 population, whereas the U.S. rate was 11.9 per 100,000.
- From 2015-2019, the average annual mortality rate from oral and pharyngeal cancer among West Virginians was 2.9 per 100,000 population, slightly higher than the U.S. average of 2.5 per 100,000.

Preventive oral health services

- In 2019-2020, 79% of West Virginia's parents reported that their child aged 1-17 years had a preventive dental service during the past 12 months compared to a national average of 78%. Children from families with lower household incomes were less likely to have had a preventive dental visit in the past year, as compared to their more affluent counterparts.
- About 1-of-3 women (32%) with a recent live birth reported having their teeth cleaned during their pregnancy. Higher income women and women with a college degree were more likely to have had their teeth cleaned during pregnancy.
- Among children aged 0-20 years with Medicaid, fewer than half (46%) received a preventive dental service during 2019.
- During the 2017-2018 school year, fewer than 3-of-10 third graders (28%) in West Virginia had protective dental sealants on their permanent molars.
- In 2018, 91% of West Virginians served by community water systems (CWS) were receiving fluoridated water.

Use of the dental care delivery system

- In 2019-2020, 82% of West Virginia's parents reported that their child aged 1-17 years had a dental visit during the past 12 months compared to a national average of 80%. Children from families with lower household incomes were less likely to have had a dental visit in the past year, as compared to their more affluent counterparts.
- In 2020, about 6-of-10 adults (58%) aged 18+ years in West Virginia had a dental visit in the past year, substantially lower than the national average of 68%. West Virginia adults were less likely to have a dental visit if they had lower education, lower income, reported their overall health as less than good, or were current smokers.
- Among children aged 0-20 years with Medicaid, about half (51%) had a dental visit during 2019.

Dental workforce

- West Virginia has fewer dentists per capita than the U.S. overall. In 2021, West Virginia had 49 dentists per 100,000 population, while the U.S. overall had 61 dentists per 100,000 population.

Conclusions

Although there have been some improvements in the oral health of West Virginia's residents throughout the years, there are many areas of need. The data presented indicates several specific areas that require increased focus to address the burden of oral disease, as well as further analysis and for program development. These include the following:

- Lack of access to dental care is common and is associated with significant levels of untreated tooth decay among West Virginians.
- Large socioeconomic disparities in oral health exist; these are observed in decay experience among children and tooth loss among adults.
- Tobacco use is a major risk factor for the development of oral disease.
- Ongoing assessment of the dental workforce is necessary to assure adequate access to care for West Virginians, as well as improving oral health status.

Increased efforts in control and surveillance of oral disease and conditions, preventive interventions, workforce development, and redistribution of oral health care professionals are key elements in improving and maintaining the oral health status of West Virginians.

Background

West Virginia Demographics

West Virginia is the second most rural state in the Nation and is the only state located entirely within the area known as "Appalachia". West Virginia reached its population peak a half century ago with 2,005,552 residents counted in the 1950 Census. The State's population has not exceeded two million since then, fluctuating between 1.7 and 1.9 million depending on the State's economy. Charleston, the State capitol and largest city, and Huntington are the only places with populations exceeding 40,000 people (2021 population estimates). Two-thirds of the State's 1.8 million people live in communities with less than 2,500 residents; 37 of the 55 counties in West Virginia are designated as non-metropolitan by the Federal Office of Management and Budget[2] and 46 counties are designated fully or in part as Medically Underserved Areas.[3] Chronic conditions are more prevalent among rural populations, with 28% of the adult (18+years) rural population having two or more chronic condition(s) compared with 23% in urban areas.[4] According to the Rural Health Information Hub, rural populations have fewer dentists, lower dental care utilization, lower health literacy, and higher rates of permanent tooth loss than urban populations.[5]

Appalachia is distinguished by mountainous terrain, geographic isolation, and a history of economic underdevelopment. Although conditions in Appalachia have improved in recent years, these improvements have not benefited all communities equally. Isolated rural areas continue to experience the most adverse social, economic, and educational deficits, resulting in significant health disparities in the incidence, prevalence, mortality, burden of chronic diseases and their risk factors, as well as access to care. Not surprisingly, West Virginia ranks at the top nationally in adults self-reporting their general health as either fair or poor.[6] Data from the 2020 Behavioral Risk Factor Surveillance System (BRFSS) indicates that 11% of individuals could not afford needed health care services and that approximately 18% of adult West Virginians do not have a specific personal doctor or health care provider.[6]

According to the 2020 U.S. Census, the State's population is predominantly non-Hispanic White (89%), with other racial and ethnic minorities being non-Hispanic multi-racial (4%), and non-Hispanic Black/African American (4%). West Virginia has the third highest percentage of its population over age 65 (21%)[7] and the

---

2 U.S. Department of Agriculture. West Virginia rural definitions: state-level maps. Rural definition based on Office of Management and Budget metro counties. https://www.ers.usda.gov/webdocs/DataFiles/53180/25604_wv.pdf. Accessed February 14, 2022.

3 Health Resources and Services Administration. HPSA Find. https://data.hrsa.gov/maps/map-tool/. Accessed February 14, 2022.

4 National Center for Health Statistics. Health, United States, 2017. Table 39. https://www.cdc.gov/nchs/data/hus/2017/039.pdf. Accessed February 14, 2022.

5 Rural Health Information Hub. Oral health in rural communities. https://www.ruralhealthinfo.org/topics/oral-health#disparities. Accessed March 1, 2021.

6 Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Division of Population Health. BRFSS Prevalence & Trends Data. 2020. https://www.cdc.gov/brfss/brfssprevalence/. Accessed February 14, 2022.

7 Population Reference Bureau. Which U.S. states have the oldest population? https://www.prb.org/resources/which-us-states-are-the-oldest/. Accessed February 14, 2022.

fourth highest percentage of its population living at or below the poverty level (16%).[8] According to the CDC, 39% of West Virginia's population 18+ years of age had a disability in 2017.[9] In terms of education, West Virginia ranks 22nd in the percentage of its adults aged 25 to 44 with at least a high school diploma (92%) and 48th in the percentage of adults aged 25 to 44 with a bachelor's degree or higher (26%).[10] West Virginia consistently rates near the top in rankings of states with a prevalence of heart disease, diabetes, and other chronic conditions. Yet with all these challenges, West Virginia also has a diverse and well-developed system of community health partners consisting of hospitals, community health centers, local health departments, aging programs, academic health institutions, teaching programs and non-profit organizations that, when working together, can support and strengthen health improvement efforts.

Data Sources

Data for this report were obtained from multiple sources, including, but not limited to, state and national surveys, dental screenings, Medicaid claims, cancer surveillance systems, professional licensure databases, and professional journals (refer to the references section of this report). It is important to note that all data have limitations, and this report can only present best efforts at representing oral health in West Virginia. One weakness is the time lag in data availability. Some of the data shown are several years old since the degree of time lag differs across information sources, and data presented are often from different time periods. However, for the data to have significance, efforts have been made to keep variations in time as limited as possible.

Another limitation is our inability to present statistics for some important subgroups. Compared to many areas of the U.S., West Virginia is relatively homogenous with respect to race and ethnicity. We generally lack the ability to present significant and stable comparisons across racial/ethnic groups. Nevertheless, there should be no reason to believe that the racial/ethnic disparities that have been well-documented nationally do not apply to West Virginia. Similarly, data concerning subpopulations that may require special attention in public health practice are also lacking, such as those with disabilities.

---

8 United States Department of Agriculture, Economic Research Service. Percent of total population in poverty, 2019. https://data.ers.usda.gov/reports.aspx?ID=17826#P0e3274af84fe40109cf79e6a49ebe75f_2_229iT3. Accessed March 1, 2021

9 Centers for Disease Control and Prevention. Disability & health U.S. state profile data for West Virginia (adults 18+ years of age). https://www.cdc.gov/ncbddd/disabilityandhealth/impacts/west-virginia.html. Accessed March 1, 2021.

10 National Center for Science and Engineering Statistics, National Science Board. Science and engineering indicators: state indicators. https://ncses.nsf.gov/indicators/states/. Accessed February 14, 2022.

National and State Oral Health Objectives

Oral Health in America: A Report of the Surgeon General (the *Report*) alerted Americans to the importance of oral health in their daily lives.[11] Issued in May 2000, the report further detailed how oral health is promoted, how oral diseases and conditions are prevented and managed, and what needs and opportunities exist to enhance oral health. The report's message was that oral health is essential to general health and well-being and can be achieved. However, several barriers hinder the ability of some Americans to attain optimal oral health. The report concluded with a framework for action, calling for a national oral health plan to improve the quality of life and eliminate oral health disparities. In December 2021, *Oral Health in America: Advances and Challenges*, a follow-up to the 2000 report was released.[12] The 2021 report outlined three areas where action could be taken to improve oral health. First, dental, and other health care professionals, must work together to provide integrated oral, medical, and behavioral health care in schools, community health centers, nursing homes, and medical care settings, as well as dental clinics. Second, we need to diversify the composition of the nation's oral health professionals, address the costs of educating and training the next generation, and ensure a strong research enterprise dedicated to improving oral health. Finally, to reduce or eliminate social, economic, and other systemic inequities that affect oral health and access to care, policy changes are needed. To accomplish this at the state level requires a comprehensive oral health plan.

One component of an oral health plan is a set of measurable and achievable objectives on key indicators of oral disease burden, oral health promotion, and oral disease prevention. One set of national indicators is *Healthy People*, released by the U.S. Department of Health and Human Services every decade since 1980. *Healthy People* identifies science-based objectives with targets to monitor progress and motivate and focus action. *Healthy People 2020 (HP2020)* served as a roadmap for improving the health of all people in the United States during the second decade of the 21st century while *HP2030* will guide health improvement efforts over the coming decade. *HP2020* included 38 oral health and oral health related objectives while the number of oral health and oral health related objectives in *HP2030* was reduced to 15. The Appendix includes a crosswalk of the oral health and oral health related objectives for *HP2020* and *HP2030*

The 2000 Surgeon General's report on oral health was a wake-up call, spurring policy makers, community leaders, private industry, health professionals, the media, and the public to affirm that oral health is essential to general health and well-being and to take action. That call to action led a broad coalition of public and private organizations and individuals to generate *A National Call to Action to Promote Oral Health*.[13] The vision of the *Call to Action* is "To advance the general health and well-being of all Americans by creating critical partnerships at all levels of society to engage in programs to promote oral health and prevent disease." The goals of the *Call to Action* reflect those of *HP2020* and *HP2030*:

---

[11] U.S. Department of Health and Human Services. Oral health in America: A report of the surgeon general. Rockville, MD: U.S. Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research. NIH Publication No. 00--4713. 2000.

[12] National Institutes of Health. Oral Health in America: Advances and Challenges. Bethesda, MD: US Department of Health and Human Services, National Institutes of Health, National Institute of Dental and Craniofacial Research, 2021. https://www.nidcr.nih.gov/oralhealthinamerica. Accessed February 14, 2022.

[13] U.S. Department of Health and Human Services. National call to action to promote oral health. Rockville, MD: U.S. Department of Health and Human Services, Public Health Service, National Institutes of Health, National Institute of Dental and Craniofacial Research. NIH Publication No. 03---5303. 2003.

- To promote oral health
- To improve quality of life
- To eliminate oral health disparities

National objectives on oral health such as those in *HP2020* and *HP2030* provide measurable targets for the nation, but most core public health functions of assessment, assurance, and policy development occur at the state level. The *National Call to Action to Promote Oral Health* calls for the development of plans at the state and community levels, with attention to planning, evaluation, and accountability.[13] Table 1 includes the targets, current national status, and the status of West Virginia for the *HP2020* objectives with corresponding *HP2030* objectives. **IMPORTANT NOTE:** *HP2030* combines age groups such that, in most cases, data from West Virginia cannot be directly compared to the national objectives.

Table 1. Select Healthy People Oral Health Related Objectives with HP2020 Target and Current Status in the U.S. and West Virginia

Healthy People 2020 Objective	Target (%)	National (%)	West Virginia (%)
OH-1: Dental caries (tooth decay) experience			
• Children aged 3 – 5 years*	30.0	27.9[a]	25.1[c]
• Children aged 6 – 9 years**	49.0	51.6[a]	48.3[d]
• Adolescents aged 13 – 15 years	48.3	49.9[a]	DNC
OH-2: Untreated tooth decay			
• Children aged 3 – 5 years*	21.4	11.9[a]	19.1[c]
• Children aged 6 – 9 years**	25.9	15.5[a]	18.7[d]
• Adolescents aged 13 – 15 years	15.3	14.1[a]	DNC
OH-3: Adults with untreated tooth decay			
• Adults aged 35 – 44 years	25.0	28.2[a]	DNC
• Adults aged 65 – 74 years	15.4	15.8[a]	DNC
• Adults aged 75 years and older (root caries)	34.1	29.1[b]	DNC
OH-4: Permanent tooth loss			
• Adults aged 45 – 64 years (any)	68.8	71.7[a]	65.3[e]
• Adults aged 65 – 74 years (lost all teeth)	21.6	12.5[a]	17.9[e]
OH-12: Dental sealants			
• Children aged 3 – 5 years on primary molars*	1.5	DSU[a]	DNC
• Children aged 6 – 9 years on permanent molars**	28.1	38.2[a]	28.3[d]
• Children aged 13 – 15 years on permanent molars	21.9	42.4[a]	DNC
OH-13: Community water fluoridation	79.6	63.4[f]	90.7[f]

[a] National Health and Nutrition Examination Survey, 2013-2016. https://www.healthypeople.gov/2020/data-search/
[b] National Health and Nutrition Examination Survey, 2015-2016. https://www.healthypeople.gov/2020/data-search/
[c] West Virginia Universal Pre-Kindergarten Oral Health Survey, 2014-2015
[d] West Virginia 3rd Grade Oral Health Survey, 2017-2018
[e] Behavioral Risk Factor Surveillance System, 2020
[f] Centers for Disease Control and Prevention, National Water Fluoridation Statistics, 2018
DNC = Data not collected (at this time)

DSU = Data estimate unstable
*West Virginia collects data on Universal Pre-K, whereas HP 2020 & national data reports children aged 3-5 years old.
** West Virginia collects data on 3rd graders, whereas HP 2020 & national data reports children aged 6-9 years old.

Prevalence of Disease and Unmet Needs

Children

Dental caries (tooth decay) experience and untreated decay are monitored in West Virginia using standards set by the National Oral Health Surveillance System (NOHSS), which allows for comparisons with other states and with the nation. According to the most recent universal pre-kindergarten oral health survey conducted during the 2014-2015 school year, 25% of West Virginia children aged 3-5 surveyed in pre-kindergarten had a history of tooth decay, which is about 17% lower than the *HP2020* target (30%) for children aged 3-5 years. Similarly, among the state's third grade population screened during the 2017-2018 school year, 48% had experienced tooth decay; just under the *HP2020* target of 49% among children aged 6-9 years.

While West Virginia succeeded in meeting or surpassing the *HP2020* targets for the percentage of children with decay experience, untreated decay, and dental sealants, the oral health of the state's children lags behind national averages. About 19% of pre-kindergarten children in West Virginia have untreated decay compared to a national average of 12% and 19% of 3rd grade children in West Virginia have untreated decay compared to a national average of 16%. For comparisons of dental caries experience, untreated decay, and dental sealants among children in the U.S., West Virginia and the *HP2020* target, refer to Figures 1 and 2.

Figure 1. Dental Caries Experience and Untreated Decay Among Children Aged 3-5 Years in the U.S., HP2020 Target, and Pre-K in West Virginia

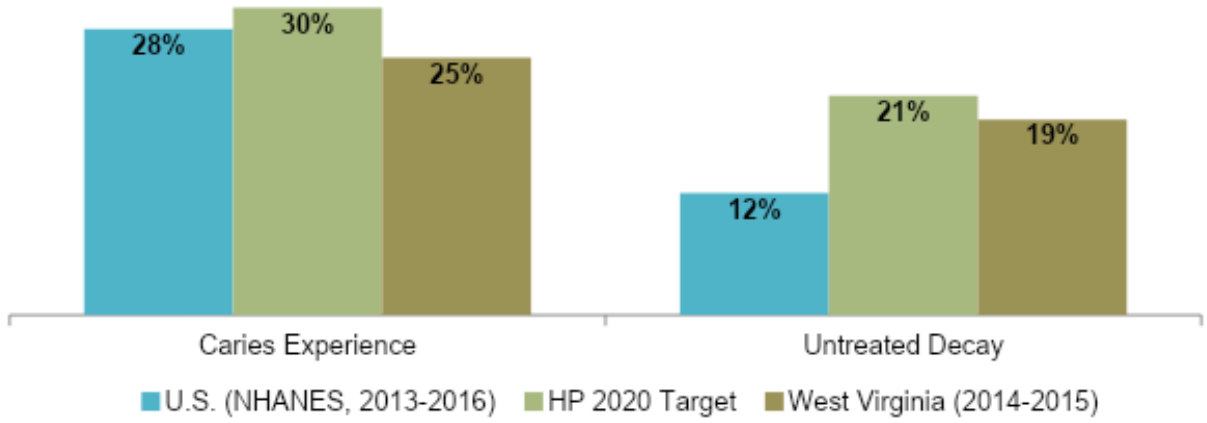
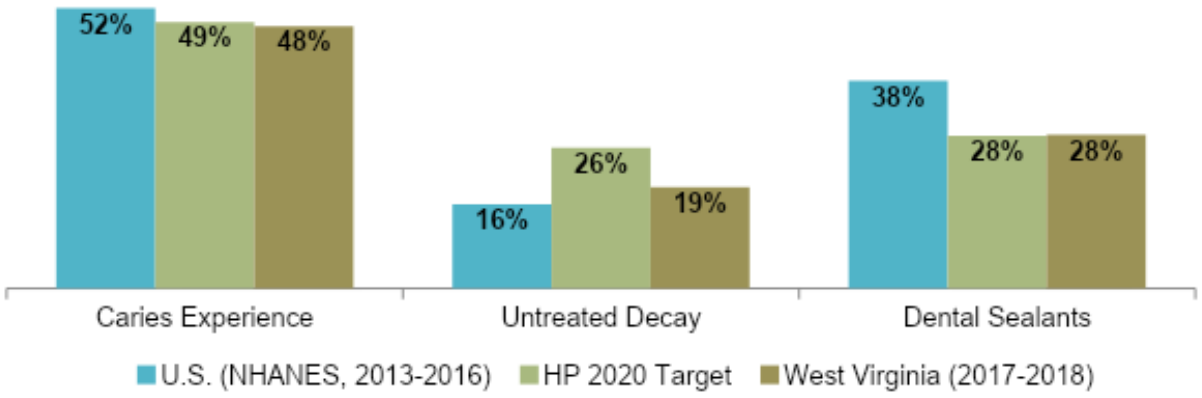
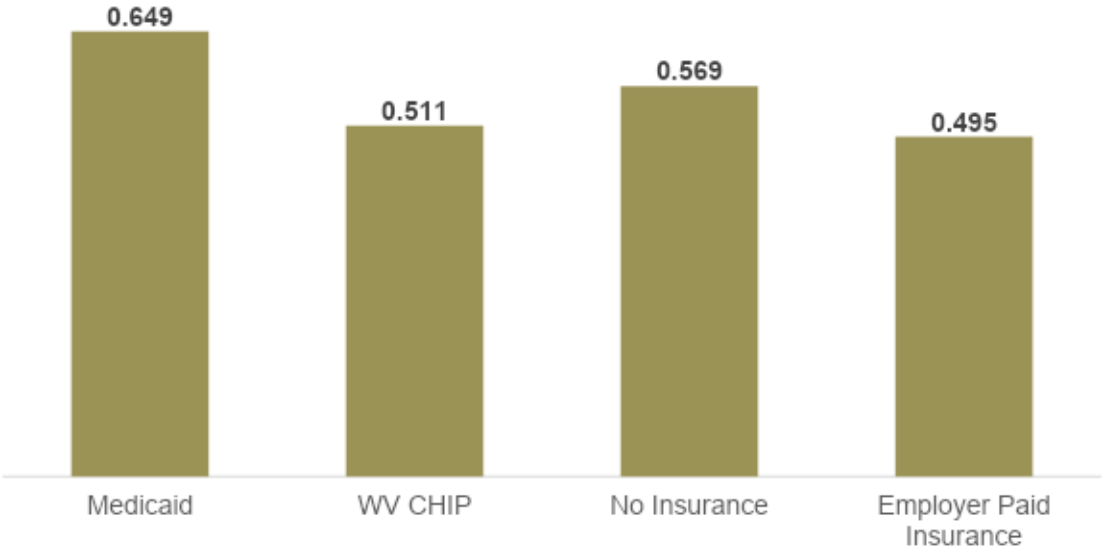


Figure 2. Dental Caries Experience, Untreated Decay and Dental Sealants Among Children Aged 6-9 in the U.S., HP2020 Target, and 3rd Graders in West Virginia



Data from the Oral Health Program's School Sealant Project for the 2019-2020 school year suggests that dental insurance coverage is associated with the prevalence of untreated decay. Participating students with Medicaid insurance had a considerably higher prevalence of untreated decay (65%) compared to those with employer paid insurance (50%). **NOTE:** Children participating in the School Sealant Project have a higher prevalence of untreated decay compared to the statewide average.

Figure 3. Percentage of Children Participating in the WV School Sealant Project with Untreated Decay by Insurance Type, 2019-2020*



*Source: WV School Sealant Project database for the 2019-2020 school year. Based on data from the initial visit.

Although West Virginia met the *HP2020* target for children with caries experience, disparities persist. Low-income children continue to carry the burden of oral disease; therefore, more focus and effort are needed to eliminate this disparity.

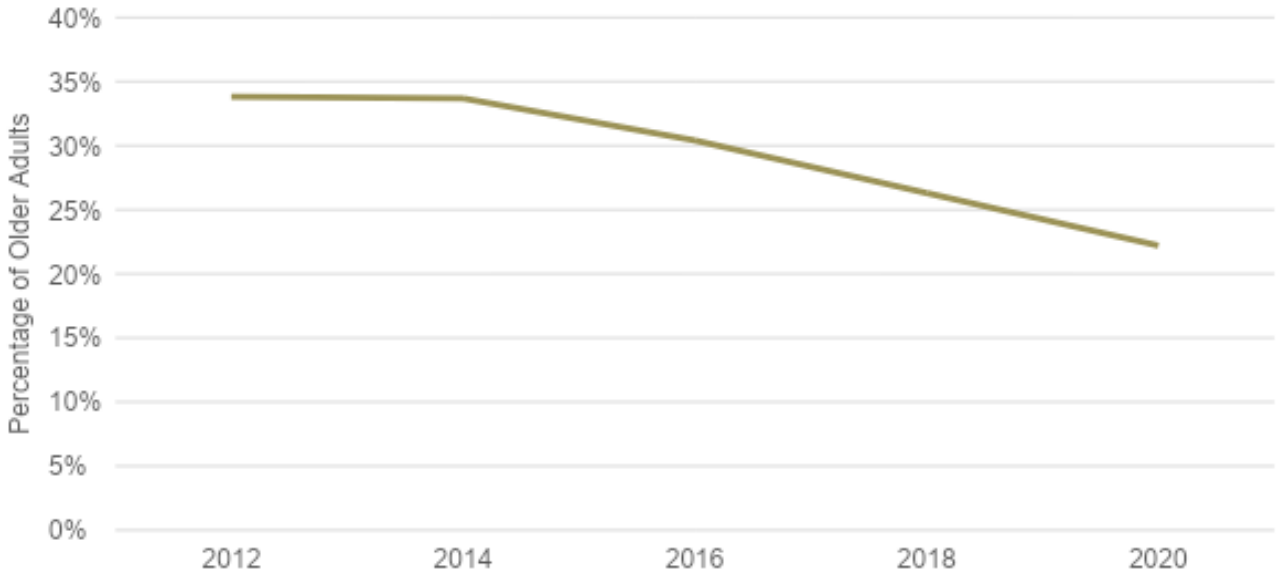
Adults

Dental Caries: People are susceptible to dental caries throughout their lifetime. Like children and adolescents, adults may also experience new decay on the crown (enamel covered) portion of the tooth. Yet, because of gum recession, adults may also develop caries on the root surfaces of teeth as those surfaces become exposed to bacteria and carbohydrates. Approximately 90% of U.S. adults aged 20-64 years have at least one tooth with decay or a filling while 96% of those aged 65+ years have experienced tooth decay.[14]

Tooth Loss: Most adults have 32 permanent (adult) teeth. While a person may lose one or more teeth due to trauma or orthodontic care, most people can keep their permanent teeth for life with adequate personal and professional care. The most common causes of tooth loss in adults are tooth decay and periodontal (gum) disease. Tooth loss can also result from head and neck cancer treatment, unintentional injury, and infection. In addition, certain orthodontic and prosthetic services sometimes require the removal of teeth.

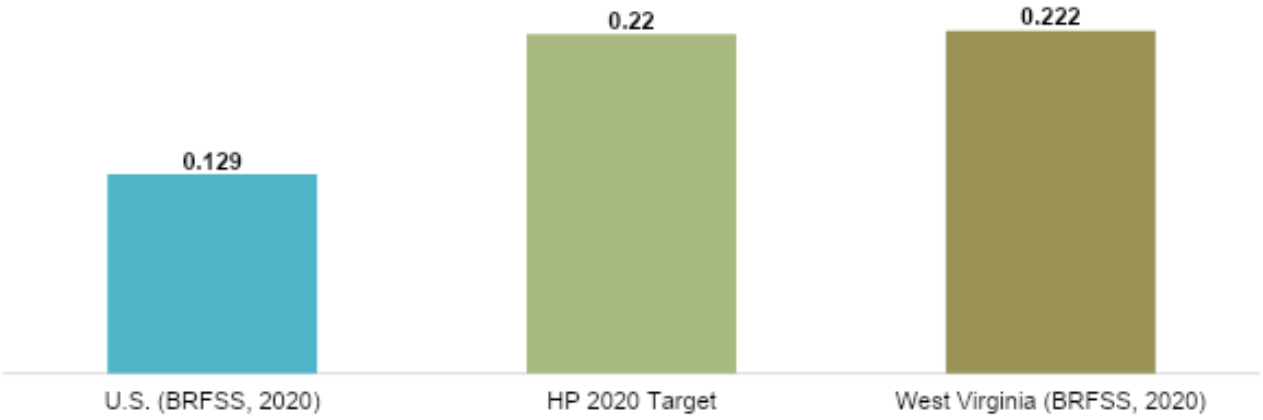
In 2020, almost 6-of-10 adults (56%) aged 18+ years in West Virginia had lost at least one permanent tooth for reasons other than trauma or orthodontia, compared to a national average of 40%.[6] Among West Virginia adults aged 65+ years, about 22% had lost all their natural teeth. Despite an overall downward trend since 2012, total tooth loss among adults aged 65+ in West Virginia is still much higher than the national average of 13% (Figures 4 and 5).

Figure 4. Total Tooth Loss Among West Virginia Adults Aged 65+, BRFSS 2012-2020



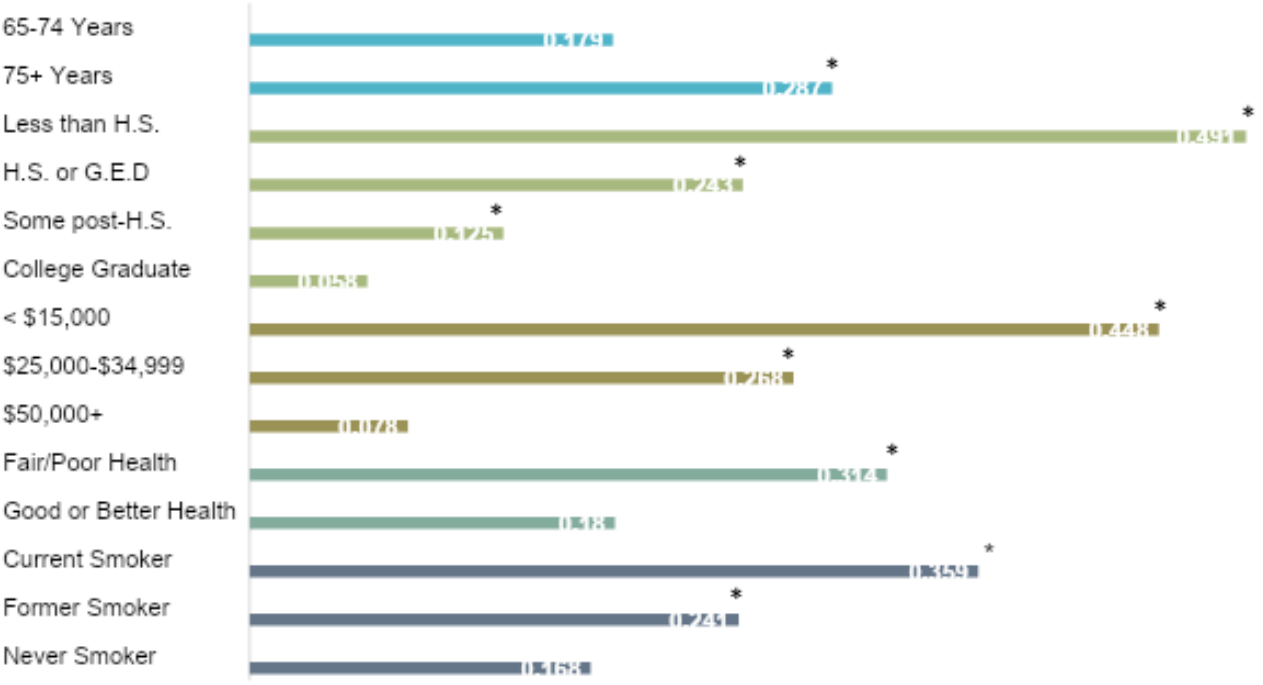
[14] Centers for Disease Control and Prevention. Oral Health Surveillance Report: Trends in Dental Caries and Sealants, Tooth Retention, and Edentulism, United States, 1999–2004 to 2011–2016. Atlanta, GA: Centers for Disease Control and Prevention, US Dept of Health and Human Services; 2019.

Figure 5. Percentage of Adults Aged 65+ Years with No Natural Teeth in the U.S., HP2020 Target, and West Virginia



In West Virginia, as in the nation, there are oral health disparities as measured by total tooth loss due to dental disease. Factors associated with total tooth loss in West Virginia include age, education, income, self-reported health status, and smoking (Figure 6). The percentage of older adults with total tooth loss increases with age, decreases with increasing education and income, is lower among those with good or better overall health, and is lower among never smokers.

Figure 6. Percentage of WV Adults Aged 65+ Years with No Natural Teeth by Age, Education, Income, Self-Reported Health Status, and Smoking, BRFSS 2020



* Significantly higher than reference (p<0.05)

Cancers of the Oral Cavity and Pharynx

Cancers of the oral cavity (mouth) and pharynx (throat) account for about 3% of all cancers diagnosed in the United States each year. Cancers at these sites can differ anatomically and histologically and might have different causal factors, such as tobacco use, alcohol use, and infection with human papillomavirus (HPV). The incidence of oral cavity and pharyngeal cancers declined during the 1980s but began to increase around 1999. During 2007–2016, incidence rates increased for cancers of the oral cavity and pharynx combined, base of tongue, anterior tongue, gum, tonsil, and oropharynx. Incidence rates declined for cancers of the lip, floor of mouth, soft palate and uvula, hard palate, hypopharynx, and nasopharynx, and were stable for cancers of the cheek and other mouth and salivary gland.[15] Because tobacco use has declined in the United States, accompanied by a decrease in incidence of many tobacco-related cancers, the increase in oral cavity and pharynx cancers may be due to cancers associated with HPV. Ongoing implementation of proven population-based strategies to prevent tobacco use initiation, promote smoking cessation, reduce excessive alcohol use, and increase HPV vaccination rates might help prevent cancers of the oral cavity and pharynx.[15]

Overall survival rates for oral cancer have improved. In 1975-1977, the 5-year survival rate was 53% and in 2010-2016 it had improved to 69%. Survival varies by stage of disease at diagnosis. In 2010-2016, the 5-year relative survival rate for persons with oral cancer diagnosed at a localized stage was 85%. In contrast, the 5-year survival rate was only 40% for those with distant metastasis.[16]

The American Cancer Society estimates that in the United States, there will be 54,000 new cases of oral and pharyngeal cancer and 11,230 deaths from these cancers in 2022.[17] In 2014-2018, the age-adjusted incidence in West Virginia was almost three times higher among men (21.5) than among women (7.5); as was the mortality rate (4.5 vs 1.5). The age-adjusted incidence rates of oral cancer per 100,000 population for the U.S. and West Virginia from 2014 to 2018 are shown in Figure 7. West Virginia had a slightly higher incidence rate compared to that of the U.S. (14.2 vs. 11.9, respectively).[18]

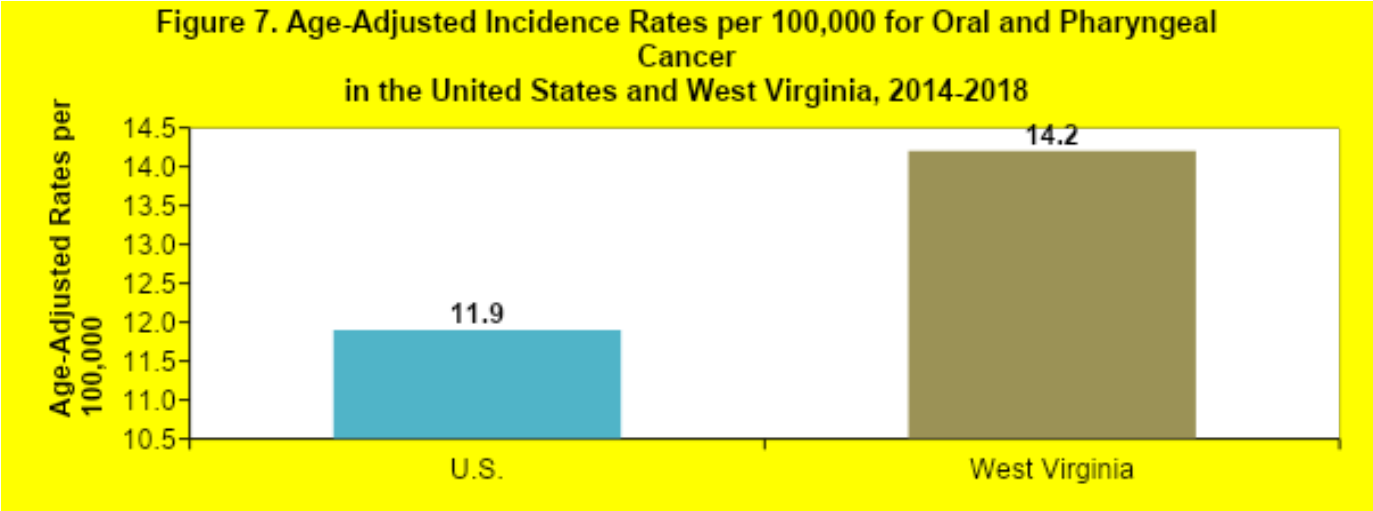
---

15 Ellington TD, Henley SJ, Senkomago V, et al. Trends in incidence of cancers of the oral cavity and pharynx, United States 2007-2016. MMWR Morb Mortal Wkly Rep 2020;69:433-8.

16 Howlader N, Noone AM, Krapcho M, et al. SEER Cancer Statistics Review, 1975-2017, National Cancer Institute. Bethesda, MD. https://seer.cancer.gov/csr/1975_2017/. Accessed March 2, 2021.

17 American Cancer Society. Key statistics for oral cavity and oropharyngeal cancers. 2022. https://www.cancer.org/cancer/oral-cavity-and-oropharyngeal-cancer/about/key-statistics.html. February 16, 2022.

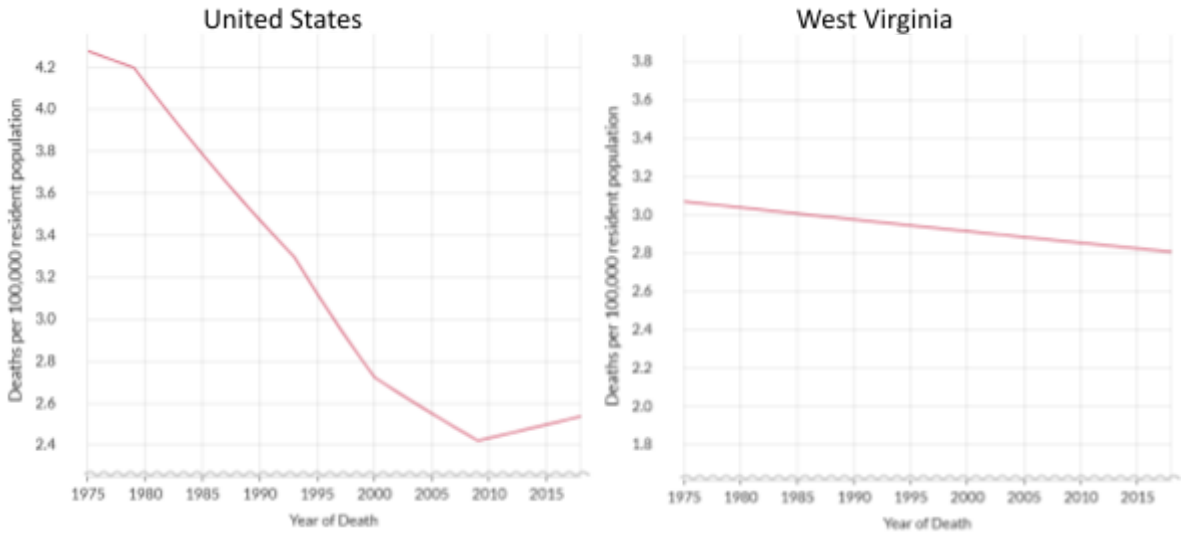
18 National Cancer Institute. State cancer profiles. 2022. https://statecancerprofiles.cancer.gov/index.html. Accessed February 16, 2022.



West Virginia's age-adjusted incidence rates of cancer of the oral cavity and pharynx have increased over time, while mortality rates have remained stable. In 2002, the age-adjusted incidence rate was 10.6/100,000 compared to 14.2/100,000 in 2014-2018. The 1975-2018 trend in age-adjusted mortality was -0.2.[18]

From the mid-1970s until 2009, mortality rates from cancers of the oral cavity and pharynx in the United States declined. This decline has been attributed to declines in risk factors such as smoking, and to earlier diagnosis and improved treatment. Unfortunately, U.S. mortality rates began increasing in 2009 which may be attributable to an increase in HPV related oral cancers. Figure 8 presents historical trends in mortality from oral and pharyngeal cancer in the U.S. and West Virginia from 1975 to 2018. Only in the past two decades, has West Virginia's oral and pharyngeal cancer mortality rate surpassed that of the United States.

Figure 8. Historical Trends in Mortality Rates for Oral and Pharyngeal Cancer in the United States and West Virginia, 1975-2018[18]



Development of oral and pharyngeal cancer is influenced by both genetic and epigenetic factors including tobacco, alcohol, diet and nutrition, viruses, radiation, ethnicity, familial and genetic predisposition, oral thrush,

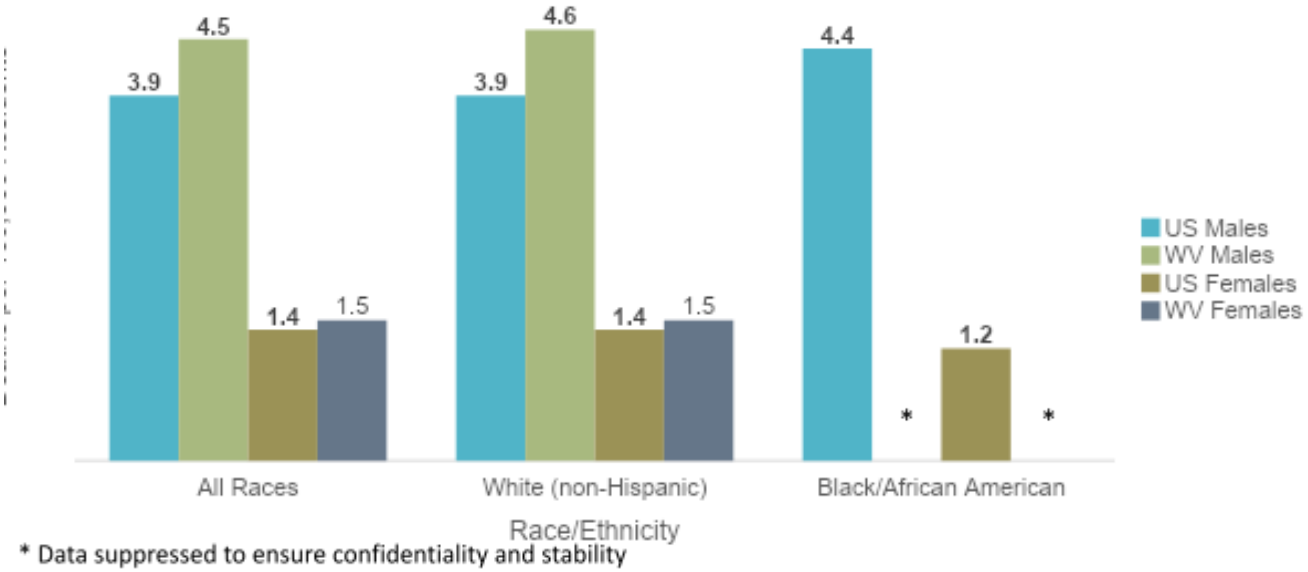
immunosuppression, use of mouthwash, syphilis, dental factors, and occupational risks.[19] In the United States, oral cancer rates vary by sex and race/ethnicity. Cancer of the oral cavity and the pharynx is the ninth most common cancer in White men (18.3/100,000), and the 10th most common cancer in Black/African American men (12.4/100,000).[20] Incidence rates are substantially lower in women – 7.5/100,000 in West Virginia and 6.5/100,000 in the United States.[18]

Figure 9 presents mortality rates from oral and pharyngeal cancer by selected demographic characteristics for the U.S. and West Virginia from 2015 to 2019.[18] Rates for Black/African American males and females in West Virginia are not reported to ensure confidentiality and estimate stability. Regardless, mortality rates among U.S. females (no matter the race/ethnicity) were much lower than their male counterparts. Black/African American males in the U.S. (4.4 deaths per 100,000) had higher mortality rates than White males in the U.S. (4.1 deaths per 100,000), while Black/African American females had slightly lower rates than White females (1.2 and 1.4 deaths per 100,000 respectively).

[19] Kumar M, Nanavati R, Modi TG, Dobariya C. Oral cancer: Etiology and risk factors: A review. J Cancer Res Ther. 2016;12:458-63.

[20] U.S. Cancer Statistics Working Group. U.S. Cancer Statistics Data Visualizations Tool, based on 2020 submission data (1999-2018): U.S. Department of Health and Human Services, Centers for Disease Control and Prevention and National Cancer Institute; www.cdc.gov/cancer/dataviz. June 2020. Accessed February 15, 2022.

Figure 9. Mortality Rate from Oral and Pharyngeal Cancer by Race/Ethnicity and Sex in the United States and West Virginia, 2015-2019



* Data suppressed to ensure confidentiality and stability

Women's Health

Most oral diseases and conditions are complex, and are the product of interactions between genetic socioeconomic, behavioral, environmental, and general health influences. Multiple factors may act synergistically to place some women at higher risk of oral diseases. For example, the comparative longevity of women, compromised physical status over time, and the combined effects of multiple chronic conditions and side effects from multiple medications used to treat them can result in increased risk of oral disease.[21]

Many, but not all, indicators show women to have better oral health status compared to men. Adult females are less likely than males at each age group to have severe periodontal disease.[22] Both Black/African American and White females have a significantly lower incidence rate of oral and pharyngeal cancers compared to Black/African American and White males.[18] However, a higher proportion of women have oral-facial pain than men, including pain from oral sores, jaw joints, face/cheek and burning mouth syndrome.[23]

The oral health of women in West Virginia has improved since 2012 based on the data collected from the Behavioral Risk Factor Surveillance System (BRFSS). From 2012 to 2020, the prevalence of women aged 65+ years with complete edentulism due to tooth decay or gum disease decreased by almost 40% (34.7% vs. 21.2%). In 2020, a greater proportion of women than men reported visiting the dentist, dental hygienist, or a dental clinic within the past year (61% vs. 55%).

Given emerging evidence suggesting an association between periodontal disease and increased risk for pre-term labor and low birth weight babies, teeth cleanings during pregnancy are recommended to avoid the

21 Steinberg BJ. Women's oral health issues. J Calif Dent Assoc. 2000;28(9):663-7.

22 Eke PI, Borgnakke WS, Genco RJ. Recent epidemiologic trends in periodontitis in the USA. Periodontol 2000. 2020;82:257-267.

23 Häggman-Henrikson B, Liv P, Ilgunas A, et al. Increasing gender differences in the prevalence and chronification of orofacial pain in the population. Pain. 2020;161(8):1768-1775.

consequences of poor health.[24] In 2019, approximately one-third (32%) of West Virginia women with a recent live birth had their teeth cleaned during pregnancy.

Many women live in poverty, are not insured, and are the sole head of their household. For these women, obtaining necessary oral health care becomes challenging. Moreover, gender-role expectations of women may affect their interaction with dental care providers and could affect treatment recommendations as well. A greater percentage of women who were older, more educated, married, White, and non-Medicaid enrolled were found to have their teeth cleaned during their pregnancies.

People with Disabilities

The oral health problems of individuals with disabilities are complex. These problems may be due to underlying congenital anomalies, as well as an inability to receive the personal and professional care needed to maintain oral health. According to the U.S. Census Bureau, almost 13% of the noninstitutionalized population has a disability (40.6 million individuals). In 2018, 19% of the noninstitutionalized population in West Virginia had a disability – the highest rate of any state in the nation. Utah, at 10%, had the lowest rate.[25]

No national studies have been conducted to determine the prevalence of oral and craniofacial disease among the various populations with disabilities. A recent review of the literature found that people with intellectual disabilities had poorer oral health, greater numbers of tooth extractions, more decayed teeth, fewer fillings, greater gingival inflammation, greater rates of edentulism, and had less preventive dentistry and poorer access to services when compared to the general population. Anxiety during dental procedures was a key issue for females with intellectual disabilities.[26]

Cleft lip and cleft palate are birth defects that occur when a baby's lip or mouth do not form properly during pregnancy. Together, these birth defects are often referred to as orofacial clefts. CDC reports that the following factors may increase the chance of having a baby with an orofacial cleft:[27]

- Smoking – Women who smoke during pregnancy are more likely to have a baby with an orofacial cleft than women who do not smoke.
- Diabetes – Women with diabetes diagnosed before pregnancy have an increased risk of having a child with a cleft lip with or without cleft palate, compared to women who did not have diabetes.
- Use of certain medicines – Women who used certain medicines to treat epilepsy, such as topiramate or valproic acid, during the first trimester (the first 3 months) of pregnancy have an increased risk of having a baby with cleft lip with or without cleft palate, compared to women who didn't take these medicines.

---

24 Walia M, Saini N. Relationship between periodontal diseases and preterm birth: Recent epidemiological and biological data. Int J Appl Basic Med Res. 2015;5(1):2-6.

25 U.S. Census Bureau. Anniversary of Americans With Disabilities Act: July 26, 2021. https://www.census.gov/newsroom/facts-for-features/2021/disabilities-act.html. Accessed February 17. 2022.

26 Wilson NJ, Lin Z, Villarosa A, George A. Oral health status and reported oral health problems in people with intellectual disability: A literature review, Journal of Intellectual & Developmental Disability. 2019;44: 292-304.

27 Centers for Disease Control and Prevention. Facts about cleft lip and cleft palate. 2020. https://www.cdc.gov/ncbddd/birthdefects/cleftlip.html. Accessed March 3, 2021.

Concerning orofacial birth defects, between 2012 and 2016, West Virginia observed a significantly lower birth prevalence of those children born with a cleft lip (with and without cleft palate), as compared to the U.S. (2004-2006) (4.7 per 10,000 live births vs. 10.6 per 10,000 live births). Similarly, though not as drastic of a difference, the State's prevalence of cleft palate without cleft lip birth defects (4.5 per 10,000 live births) was lower than the national rate of 6.4 per 100,000 live births.[28, 29]

West Virginia data are presently not available on the oral health and prevalence of oral and craniofacial disease among individuals with disabilities.

Disparities

The nation's oral health has greatly improved since the 1960s, but not all Americans have equal access to these improvements.[11] Some racial/ethnic and socioeconomic groups have worse oral health as a result of the social determinants of health—conditions in the places where people are born, live, learn, work, and play. For example, some groups of people:

- Can't afford to pay out of pocket for dental care, do not have private or public dental insurance, or can't get time off from work to get to dental care.
- Live in communities where they don't have access to fluoridated water and school sealant programs, healthy foods, and public transportation to get to dental appointments.

Racial and Ethnic Disparities

Although there have been gains in oral health status for the overall population, they have not been evenly distributed across racial/ethnic sub-populations. Blacks/African Americans, Hispanics, American Indians/Alaska Natives, and Native Hawaiians/Pacific Islanders generally have poorer oral health when compared to non-Hispanic Whites. Regardless of age, individuals from racial/ethnic minority populations are generally more likely to experience dental caries, are less likely to have received treatment for it, and have more extensive tooth loss. Mexican American adults are more likely than other racial/ethnic groups to have periodontal (gum) disease.[30]

The oral health status of West Virginians mirrors national findings with respect to the disparities in oral health found among the different racial/ethnic groups within the state, to a certain extent. Since West Virginia is predominately non-Hispanic White (89%), data regarding race/ethnicity is rarely collected; and when collected, drawing conclusions based on the resulting information is difficult because sample sizes are generally too small.

Socioeconomic Disparities

People living in low-income households bear a disproportionate burden of oral diseases and conditions. For example, despite progress in reducing dental caries in the U.S., children and adolescents in families living below the federal poverty level experience more dental decay and are more likely to have untreated decay than those

---

[28] National Birth Defects Prevention Network. Peristats. www.marchofdimes.org/peristats. Accessed February 17, 2022.

[29] National Institute of Dental and Craniofacial Research. Prevalence of cleft lip and cleft palate. https://www.nidcr.nih.gov/research/data-statistics/craniofacial-birth-defects/prevalence. Accessed February 17, 2022.

[30] Eke PI, Dye BA, Wei L, Thornton-Evans GO, Genco RJ. Prevalence of periodontitis in adults in the United States: 2009 and 2010. J Dent Res. 2012;91:914-20.

from economically sound households. Nationally, 30% of poor and near-poor children (<200% FPL) aged 2-5 years have experienced tooth decay compared to 16% of children who are not poor (≥200% FPL).[14] This trend continues into adolescence with 65% of poor and near poor adolescents 12-19 years of age having experienced tooth decay and 22% having untreated decay – compared to 49% and 11% among adolescents from higher income households.[14] Lower income adults, aged 20-64 years, are more than twice as likely to have untreated decay compared to their higher income peers (41% vs. 18%). Among West Virginia's older adults aged 65+ years, 45% of those with a household income less than $15,000 were edentulous in 2020, compared with 8% of older adults with a household income of $50,000 or more.[6]

Geographic Disparities

According to the Rural Health Information Hub, children living in rural areas are less likely to receive preventive dental care and are less likely to report having excellent/very good oral health compared to their urban peers; and rural adults are less likely to have an annual dental visit and are more likely to have missing teeth compared to their urban counterparts.[5] In 2004, the National Advisory Committee on Rural Health and Human Services identified several factors that contribute to the problems of accessing dental care in rural America including acute provider shortages, lack of adequate transportation**,** higher poverty rates, larger older adult population**,** fewer providers willing to accept Medicaid, and lack of dental insurance.[31]

Societal Impact of Oral Disease

Social Impact

Oral health is related to well-being and quality of life as measured along functional, psychosocial, and economic dimensions. Diet, nutrition, sleep, psychological status, social interaction, school, and work are affected by impaired oral and craniofacial health. Oral and craniofacial diseases and conditions contribute to compromised ability to bite, chew, and swallow foods therefore limiting food selection and leading to poor nutrition. These conditions include tooth loss, diminished salivary functions, oral-facial pain conditions such as temporo-mandibular disorders, alterations in taste, and functional limitations of prosthetic replacements. Oral-facial pain, as a symptom of untreated dental and oral problems and as a condition itself, is a major source of diminished quality of life. It is associated with sleep deprivation, depression, and multiple adverse psychosocial outcomes.

More than any other body part, the face bears the stamp of individual identity. Appearance has an important effect on psychological development and social relationships. Considering the importance of the mouth and teeth in verbal and nonverbal communication, diseases that disrupt their functions are likely to damage self-image and alter the ability to sustain and build social relationships. The social functions of individuals encompass a variety of roles, from intimate interpersonal contacts to participation in social or community activities. Dental diseases and disorders can interfere with these social roles at any or all levels. Whether it is because of social embarrassment or functional problems, people with oral conditions may avoid conversation, laughing, smiling, or other nonverbal expressions that show their mouth and teeth.

---

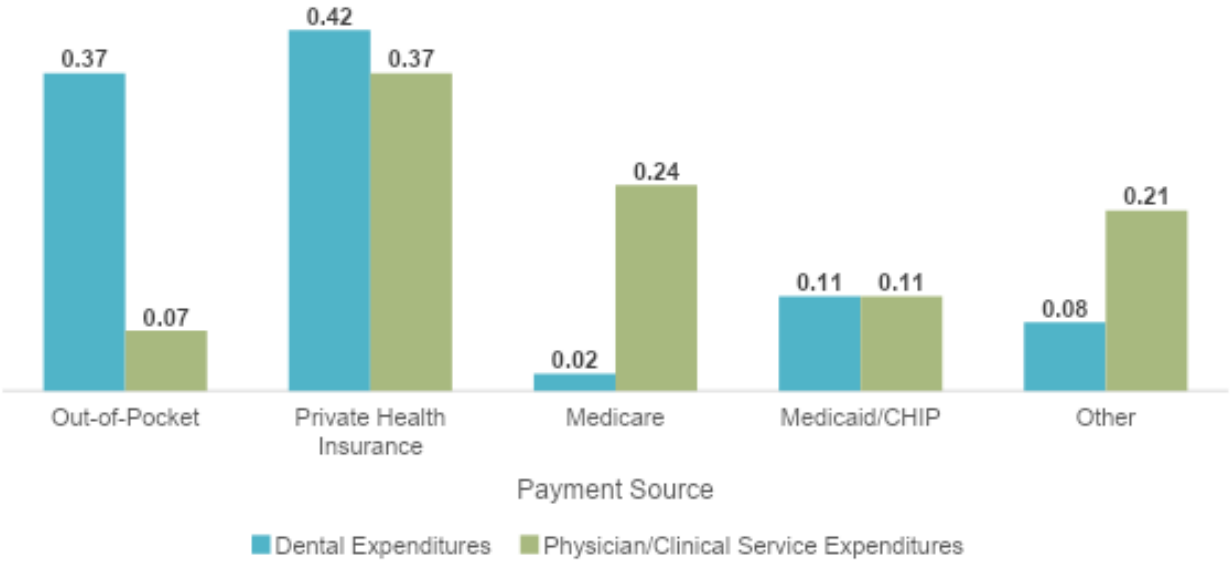
[31] The National Advisory Committee on Rural Health and Human Services. The 2004 Report to the Secretary: Rural Health and Human Service Issues. 2004. https://www.hrsa.gov/sites/default/files/hrsa/advisory-committees/rural/reports-recommendations/2004-report-to-secretary.pdf. Accessed March 3, 2021.

Economic Impact

Direct Cost of Oral Disease: National dental care expenditures in 2020 were $142.4 billion, about 3.5% of the total amount spent on health care services that year.[32] For West Virginia, dental care expenditures in 2014 were $549 million, about 3% of the state's total health expenditures for 2014.[33]

Figure 10 illustrates the distribution of national dental expenditures compared to physician/clinical service expenditures by source of funding during 2020. Consumer out-of-pocket payments accounted for about 37% of national dental expenditures, whereas private health insurance covered 42% and Medicaid/CHIP covered 11% of all dental services. In comparison, 7% of physician/clinical services were paid out-of-pocket, 37% were covered by private health insurance, 24% were paid by Medicare, and 11% were paid by Medicaid/CHIP.[32]

Figure 10. National Dental and Physician/Clinical Service Expenditures by Payment Source, 2020



Indirect Costs of Oral Disease: Oral and craniofacial diseases and their treatment place a burden on society in the form of ill-health, lost school and workdays, and lost years of productive work. Among young children, severe tooth decay has been related to impaired development, low educational performance, poor behavior, family stress, diminished quality of life, and even disability and death.[34] Among economically disadvantaged school-age children in Los Angeles, CA, students who reported having toothaches were approximately four times more likely than asymptomatic children to experience poor academic achievement. Children who needed but could not access dental care were nearly three times more likely to miss school than comparable children

---

[32] Centers for Medicare & Medicaid Services. National Health Expenditure Account. 2021. https://www.cms.gov/files/zip/national-health-expenditures-type-service-and-source-funds-cy-1960-2020.zip. Accessed February 17, 2022.

[33] Kaiser Family Foundation (KFF). State health facts. https://www.kff.org/statedata/. Accessed March 3, 2021.

[34] Casamassimo PS, Thikkurissy S, Edelstein BL, Maiorini E. Beyond the dmft: the human and economic cost of early childhood caries. J Am Dent Assoc. 2009;140:650-7.

with access.[35] Among children and youth in North Carolina, those reported by parents to be in poor oral health were more than three times more likely to miss school because of dental pain. Poor oral health was also found to be directly related to poorer academic performance. And the problem continued to increase into adolescence with high school students experiencing one-third more missed school days than elementary school children.[36] In addition, conditions such as oral and pharyngeal cancers contribute to premature death and years of life lost.

Oral Disease and Other Health Conditions

Oral health and general health are intimately associated with each other. Many systemic diseases and conditions have oral signs and symptoms, and these manifestations may be the initial sign of clinical disease and therefore may serve to inform health care providers and individuals of the need for further assessment. The oral cavity is a portal of entry as well as the site of disease for bacterial and viral infections that affect general health status. Recent research suggests that inflammation associated with periodontitis may increase the risk for heart disease and stroke, premature births in some females, difficulty in controlling blood sugar in people with diabetes, and respiratory infection in susceptible individuals.[37,38,39,40] More research is needed in these areas, not just to determine the effect, but to also determine whether or which treatments have the most beneficial outcomes.

---

35 Mulligan R, Seirawan H, Faust S, Barzaga C. Dental caries in underprivileged children of Los Angeles. J Health Care Poor Underserved. 2011;22:648-62.

36 Jackson SL, Vann WF Jr, Kotch JB, Pahel BT, Lee JY. Impact of poor oral health on children's school attendance and performance. Am J Public Health. 2011;101:1900-6.

37 Sanz M, Marco Del Castillo A, Jepsen S, et al. Periodontitis and cardiovascular diseases: Consensus report. J Clin Periodontol. 2020;47:268-288.

38 Manrique-Corredor EJ, Orozco-Beltran D, Lopez-Pineda A, et al. Maternal periodontitis and preterm birth: Systematic review and meta-analysis. Community Dent Oral Epidemiol. 2019;47:243-251.

39 Nascimento GG, Leite FRM, Vestergaard P, et al. Does diabetes increase the risk of periodontitis? A systematic review and meta-regression analysis of longitudinal prospective studies. Acta Diabetol. 2018;55:653-667.

40 Jerônimo LS, Abreu LG, Cunha FA, et al. Association between periodontitis and nosocomial pneumonia: A systematic review and meta-analysis of observational studies. Oral Health Prev Dent. 2020;18:11-17.

Risk & Protective Factors Affecting Oral Diseases

Oral diseases may be prevented or delayed through regular dental care that includes regular dental cleanings, placement of dental sealants, topical fluoride treatments, and screening for oral cancer. In addition, exposure to optimally fluoridated community drinking water helps to prevent dental caries, and to maintain oral health.

Community Water Fluoridation

Community water fluoridation is the process of adjusting the natural fluoride concentration of a community's water supply to a level that is best for the prevention of dental caries (0.7 parts per million).[41] In the U.S., community water fluoridation has been the basis for primary prevention of dental caries for over 75 years and has been recognized as one of 10 great achievements in public health of the 20th century.[42] It is an ideal public health method because it is effective, eminently safe, and inexpensive. Furthermore, it requires no behavioral change by individuals, and does not depend on access or availability of professional services. Water fluoridation reduces or eliminates disparities in preventing dental caries among different socioeconomic, racial, and ethnic groups. Fluoridation helps to lower the cost of dental care and dental insurance and helps residents retain their teeth throughout life.[41]

Fluoridated water works by keeping a low level of fluoride in the mouth throughout the day. Fluoride and water mix with saliva and are absorbed by dental plaque, and the fluoride bonds with any weakened tooth enamel it encounters. Even when common fluoride products, such as toothpaste and mouth rinses are used, fluoridated water reduces tooth decay another 25% among children and adults. School children in communities with water fluoridation have, on average, two fewer decayed teeth than children in communities that do not fluoridate.[43] Not only does community water fluoridation effectively prevent dental caries, it is also one of very few public health prevention measures that offer significant cost savings to almost all communities. A 2016 economic analysis found that for communities of 1,000 or more people, the savings associated with water fluoridation exceeded estimated program costs, with an average annual savings of $20 per dollar invested. Additionally, individuals in communities that fluoridate water save an average of $32 per person by avoiding treatment for dental caries.[44]

Recognizing the importance of community water fluoridation, *HP2030* objective OH-11 is to "Increase the proportion of persons served by community systems with optimally fluoridated water systems to 77%". In the U.S. during 2018, approximately 270 million persons (73% of the population served by public water systems) received optimally fluoridated water.[45] About 9-of-10 (91%) West Virginians on public drinking water are

---

41 U.S. Department of Health and Human Services Federal Panel on Community Water Fluoridation. U.S. Public Health Service Recommendation for Fluoride Concentration in Drinking Water for the Prevention of Dental Caries. Public Health Rep. 2015;130:318-331.

42 Centers for Disease Control and Prevention. Achievements in public health, 1900–1999: Fluoridation of drinking water to prevent dental caries. *MMWR* 1999, 48(41), 933–40.

43 Centers for Disease Control and Prevention. 75 Years of Community Water Fluoridation. 2020. https://www.cdc.gov/fluoridation/basics/anniversary.htm. Accessed March 5, 2021.

44 O'Connell J, Rockell J, Ouellet J, et al. Costs and savings associated with community water fluoridation in the United States. Health Aff (Millwood). 2016;35:2224-32.

45 Centers for Disease Control and Prevention. 2018 fluoridation statistics. 2020. https://www.cdc.gov/fluoridation/statistics/2018stats.htm. Accessed March 5, 2021.

receiving fluoridated water, compared to 7-of-10 (73%) nationally.[45] As of 2018, West Virginia ranks 13th among the nation for population served by fluoridated water at optimum levels.[45]

Topical Fluorides

Because frequent exposure to small amounts of fluoride each day best reduces the risk for dental caries in all age groups, all people should drink water with an optimal fluoride concentration and brush their teeth twice daily with a fluoride containing toothpaste. For communities that do not receive fluoridated water and persons at high risk for dental caries, additional fluoride measures might be needed. Community measures include topical fluoride programs, typically conducted in pre-schools and schools. Individual measures include professionally applied topical fluoride gels or varnishes for persons at high risk for caries.

Fluoride varnish is a thin coating of resin that is applied to the tooth surface to protect it from decay. According to the Food & Drug Administration (FDA), fluoride varnish falls under the category of "drugs and devices" that presents minimal risk and is subject to the lowest level of regulation. The purpose of applying fluoride varnish is to retard, arrest, and reverse the process of cavity formation. It is easy to apply and does not require special dental equipment or a professional cleaning prior to application. It also requires minimal training and is inexpensive. Fluoride varnish dries immediately upon contact with saliva and is safe and well tolerated by infants, young children, and individuals with special needs.[46]

Dental Sealants

Since the early 1970s, the incidence of childhood dental caries on smooth tooth surfaces (those without pits and fissures) has declined markedly because of widespread exposure to fluorides. Most decay among school age children now occurs on tooth surfaces with pits and fissures, particularly the molar teeth.

Pit-and fissure dental sealants (plastic coatings bonded to susceptible tooth surfaces) have been approved for use for many years and have been recommended by professional health associations and public health agencies. First permanent molars erupt into the mouth around age 6. Placing sealants on these teeth shortly after their eruption protects them from the development of caries in areas of the teeth where food and bacteria are retained. If sealants were applied routinely to susceptible tooth surfaces, in conjunction with the appropriate use of fluoride, most tooth decay in children could be prevented.[47] Second permanent molars erupt into the mouth at about age 12-13. Pit-and-fissure surfaces of these teeth are as susceptible to dental caries as the first permanent molars of younger children. Therefore, young teenagers need dental sealants shortly after the eruption of their second permanent molars.

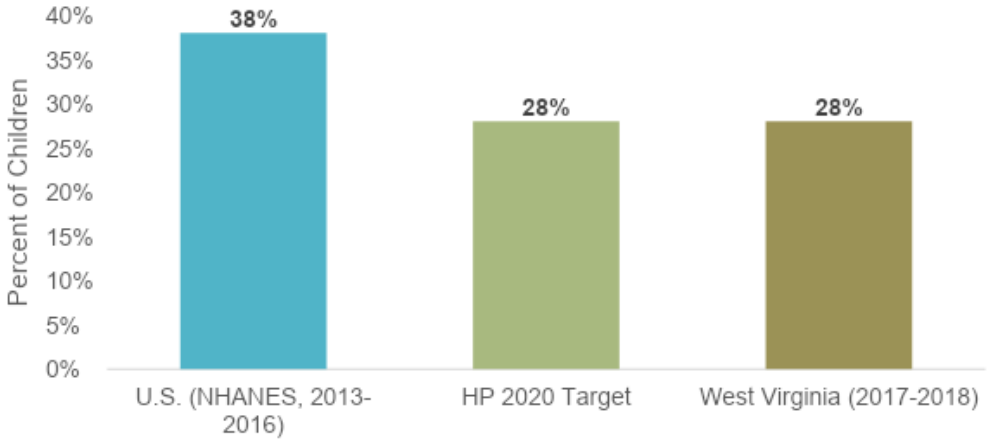
The *HP2020* targets for dental sealants on permanent molars were 28% for 6-9 year-olds and 22% for 13-15 year-olds. During the 2017-2018 school year, 28% of 3rd graders in West Virginia had at least one of their permanent molars sealed, meeting the *HP2020* target but below the current national average (Figure 11).

---

46 Marinho VC, Worthington HV, Walsh T, Clarkson JE. Fluoride varnishes for preventing dental caries in children and adolescents. Cochrane Database Syst Rev. 2013;(7):CD002279.

47 Wright JT, Tampi MP, Graham L, et al. Sealants for preventing and arresting pit-and-fissure occlusal caries in primary and permanent molars: A systematic review of randomized controlled trials-a report of the American Dental Association and the American Academy of Pediatric Dentistry. J Am Dent Assoc. 2016;147:631-45.

Figure 11. Percentage of Children Aged 6-9 Years with Sealants in the U.S., HP2020 Target, and 3rd Graders in West Virginia



To improve access to dental sealants, West Virginia's Oral Health Program implemented a school-based dental sealant project within a set of Title I priority elementary schools. The priority schools are among the lowest 5% of Title I schools based on school-wide student achievement and a historical lack of progress over three years. This school-based project is essential for improving sealant rates among high-risk children.

Preventive Dental Visits

Maintaining good oral health requires ongoing efforts from the individual, caregivers, and health care providers. Daily oral hygiene routines and healthy lifestyle behaviors play an important role in the prevention of oral diseases. Regular preventive dental care can reduce the development of disease and facilitate early diagnosis and treatment.

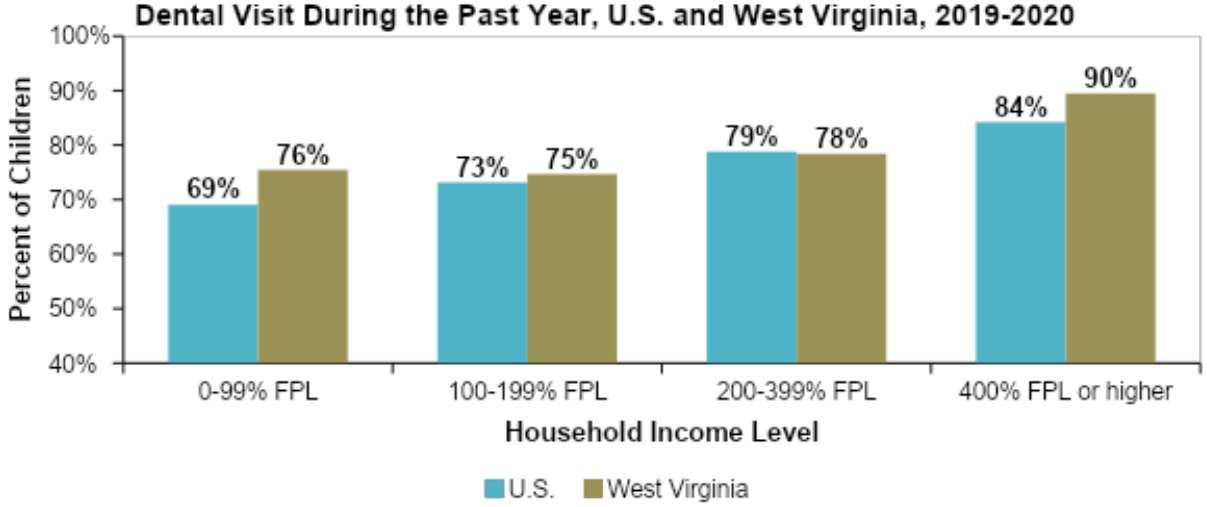
Children

The 2019-2020 National Survey of Children's Health (NSCH) showed that 8-of-10 (79%) West Virginia children aged 1-17 years visited their dentist one or more times for preventive dental care, such as check-ups or dental cleanings, in the past 12 months. This is similar to the national average of 78%.[48]

As expected, socio-demographic disparities exist in preventive dental visits. NSCH 2019-2020 data for West Virginia shows that children in families with lower household incomes were less likely to have had a preventive dental visit in the past year, as compared to their more affluent counterparts (Figure 12).

[48] Child and Adolescent Health Measurement Initiative. Data Resource Center for Child and Adolescent Health. National Survey of Children's Health, 2019-2020. https://www.childhealthdata.org/browse/survey. Accessed February 17, 2022.

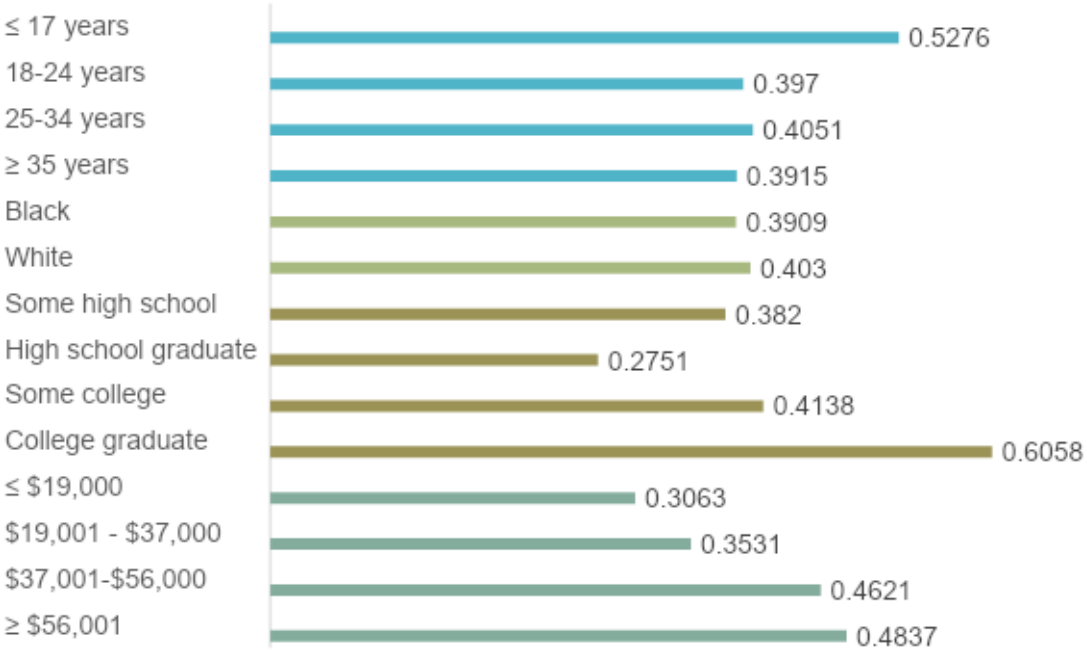
Figure 12. Percentage of Children, Aged 1-17 Years, with a Preventive Dental Visit During the Past Year, U.S. and West Virginia, 2019-2020



Pregnant Women

According to the 2019 West Virginia Pregnancy Risk Assessment Monitoring System (PRAMS), only 32% of women with a recent live birth reported having their teeth cleaned during pregnancy. Women with a college degree were significantly more likely to have their teeth cleaned during pregnancy compared to those with only a high school diploma (61% vs. 28%) and those with a household income over $56,000 were significantly more likely to have their teeth cleaned than those with an income of $19,000 or less (48% vs. 31%).

Figure 13. Percentage of West Virginia Women with a Recent Live Birth that had a Teeth Cleaning During Pregnancy, 2019



Screening for Oral Cancers

Oral cancer detection is generally accomplished by a thorough examination of the head and neck; an examination of the mouth, including the tongue, the entire oral and pharyngeal mucosal tissues, and the lips; and the palpation of the lymph nodes. Other methods that have been used to augment clinical detection of oral lesions include toluidine blue, brush biopsy, and fluorescence staining. The routine examination of asymptomatic and symptomatic patients can lead to detection of earlier-stage cancers and premalignant lesions. There is no definitive evidence, however, to show that this screening can reduce oral cancer mortality.[49] If suspicious tissues are detected during an examination, definitive diagnostic tests, such as biopsies, are necessary for a confirmed diagnosis.

Oral cancer is more common after the age of 60 years. The primary risk factors for oral cavity, oropharynx, hypopharynx, and laryngeal cancers in American men and women are tobacco (including smokeless tobacco) use and alcohol use. Infection with HPV-16 has been associated with an excess risk of developing squamous cell carcinoma of the oral tongue and oropharynx. Risk factors for nasopharyngeal cancer include heavy alcohol intake (but not smoking), family history, Chinese (or Asian) ancestry, and Epstein-Barr virus (EBV) persistent infection.[49]

Recognizing the need for dental and medical providers to examine adults for oral and pharyngeal cancer, *HP2020* objective OH-14 (developmental) was to "increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers". Overall, only a fraction (~20%) of Americans receive an oral cancer examination. Black/African American patients, Hispanic patients, and those who have a lower level of education are less likely to have such an examination, perhaps because they lack access to medical care.[49] West Virginia does not collect data on oral and pharyngeal cancer screening.

Tobacco Control

Use of tobacco has a devastating impact on the health and well-being of the public. About 480,000 Americans die each year as a direct result of cigarette smoking, making tobacco the nation's leading preventable cause of premature mortality in addition to the $225 billion in direct medical care for adults.[50] The use of any form of tobacco (including cigarettes, cigars, pipes, and smokeless tobacco) has been established as a major risk factor for oral and pharyngeal cancer.[49] The evidence is sufficient to consider smoking a causal factor for periodontitis; one-half of the cases of periodontal disease in this country may be attributable to cigarette smoking.[51] Tobacco use substantially worsens the prognosis of periodontal therapy and dental implants, impairs oral wound healing, and increases the risk for oral soft tissue changes.[52]

---

[49] National Cancer Institute. Oral Cavity, Pharyngeal, and Laryngeal Cancer Screening – Health Professional Version. https://www.cancer.gov/types/head-and-neck/hp/oral-screening-pdq. Accessed March 30, 2021.

[50] Centers for Disease Control and Prevention. Smoking and Tobacco Use – Fast Facts. 2021. https://www.cdc.gov/tobacco/data_statistics/fact_sheets/fast_facts/. Accessed February 17, 2022.

[51] Tomar SL, Asma S. Smoking-attributable periodontitis in the United States: findings from NHANES III. National Health and Nutrition Examination Survey. J Periodontol. 2000;71:743-51.

[52] U.S. Department of Health and Human Services. The Health Consequences of Smoking – 50 Years of Progress: A Report of the Surgeon General. Atlanta: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health, 2014.

Comprehensive tobacco control would also have a large impact on oral health status. The goal of these programs is to reduce disease, disability, and death related to tobacco use by:

- Preventing the initiation of tobacco use among young people;
- Promoting quitting among young people and adults;
- Eliminating nonsmokers' exposure to secondhand tobacco smoke;
- Identifying and eliminating the disparities related to tobacco use and its effects among different population groups.

West Virginia continues to have the highest reported adult smoking rates in the nation. In 2020, 23% of adults living in West Virginia were current smokers - smoking every day or some days.[6] This rate decreased the last nine reported years of BRFSS (from 29% in 2011 to 23% in 2020).[53] In 2020, the national smoking prevalence for adults was 15%. Other West Virginia data and facts to consider:[53]

- 10 WV residents die each day because they smoked cigarettes.
- 19% of the State's mortality among adults aged 35 & older is attributed to smoking.
- Smoking and smoking-related illnesses annually cost West Virginia employers $1,865 per smoker in excess medical expenses.
- Smoking and smoking-related illnesses annually amount to $2,811 per smoker in lost productivity.

The State is aggressively addressing the problem via implementation of evidence-based comprehensive tobacco control programs throughout the Bureau for Public Health's Division of Tobacco Prevention (DTP). The West Virginia State Tobacco Quitline (1-800-QUIT-NOW) continues to be a key evidence-based component of the DTP's cessation efforts.

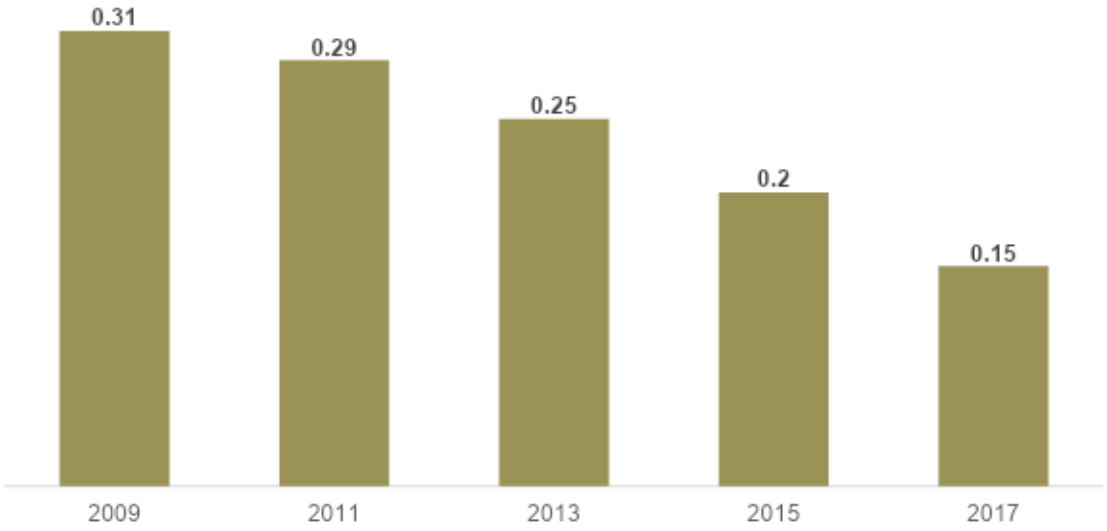
Youth

Cigarette Smoking and Smokeless Tobacco: There has been significant effort made in the past 20 years with on-going youth tobacco prevention efforts in West Virginia. Those efforts have caused consistent declines in the prevalence of youth cigarette smoking in the state. Between 2007 and 2017, the percentage of West Virginia middle school students who had ***ever*** smoked cigarettes decreased by 57% from 35% in 2007 to 15% in 2017 (Figure 14).[54]

[53] West Virginia Department of Health & Human Resources. West Virginia Tobacco Use Reduction State Plan, 2020-2025. https://dhhr.wv.gov/wvdtp/Documents/WV%20Tobacco%20Use%20Reduction%20Plan.pdf. Accessed March 30, 2021.

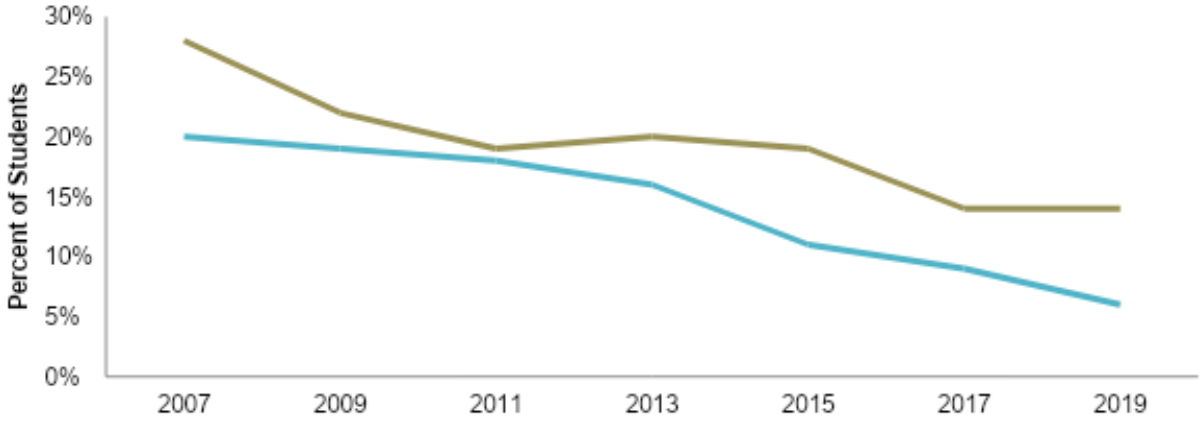
[54] West Virginia Department of Education. Youth Risk Behavior Surveillance System. 2017 Middle School Trend Report. http://wvde.state.wv.us/healthyschools/documents/yrbs/2017/2017WVM%20Trend%20Report%2010%20Years.pdf. Accessed March 30, 2021.

Figure 14. Percentage of West Virginia Middle School Students Who Have Ever Smoked Cigarettes



Significant improvements concerning cigarette smoking were also observed among the high school population; the prevalence of current cigarette smoking (on at least 1 day during the 30 days before the survey) decreased from 28% in 2007 to 14% in 2019 (Figure 15).[55] The nation is experiencing similar trends. However, current cigarette smoking among the high school population in West Virginia remains higher than the national average (Figure 15).

Figure 15. Percentage of High School Students who are Current Cigarette Smokers* United States and West Virginia, 2007-2019



*Smoked cigarettes on at least 1 day during the 30 days before the YRBS survey.

[55] Centers for Disease Control and Prevention. 1991-2019 High School Youth Risk Behavior Survey Data. http://nccd.cdc.gov/youthonline/. Accessed March 30, 2021.

Table 2 presents information on smokeless tobacco use and cigarette smoking among high school students by sex and grade.[55] As previously stated, West Virginia high school students, when compared to the national average, have a higher prevalence of smokeless tobacco and cigarette use. In 2019, the percentage of male high school students that used smokeless tobacco in the past 30 days was similar to the percentage that smoked in the last 30 days (15%) while female high school students were more likely to smoke cigarettes than use smokeless tobacco (12% vs. 4%).[55]

Table 2. Percentage of Students in High School Who Smoked Cigarettes or Used Smokeless Tobacco by Selected Characteristics, United States and West Virginia, 2019[55]

	Smokeless Tobacco		Cigarettes					
	Ever Used in Past 30 Days		Ever Tried Cigarette Smoking		Smoked Before Age 13 Years		Ever Smoked in Past 30 Days	
	U.S.	WV	U.S.	WV	U.S.	WV	U.S.	WV
Total	3.8	9.5	24.1	38.5	7.9	12.7	6.0	13.5
Sex								
Male	5.8	14.5	25.3	41.3	8.5	14.2	6.9	14.5
Female	1.6	3.6	22.9	35.2	7.1	10.4	4.9	12.1
Grade								
9th	2.0	8.1	18.1	30.5	8.8	11.6	3.8	10.4
10th	3.6	5.2	21.6	31.4	7.5	12.1	5.2	10.3
11th	3.9	13.5	25.4	43.7	6.8	12.8	5.9	17.2
12th	5.5	10.9	32.0	50.2	7.8	14.1	9.0	16.2

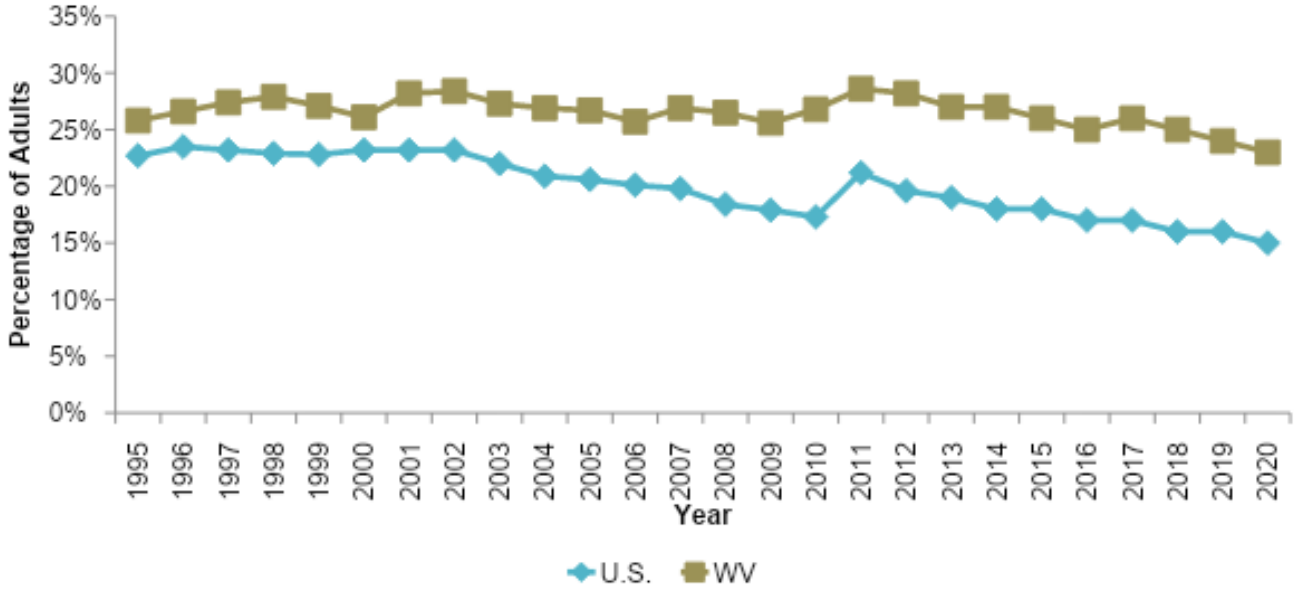
E-Cigarettes: E-cigarettes were first introduced more than a decade ago when tobacco use among youth was continuing to decline in West Virginia. Vaping among youth was present, but markedly lower than use of combustible cigarettes. With the development of small, readily disguisable, and flavored products, youth nicotine use in West Virginia has skyrocketed. From 2017 to 2019, there was a 150% increase in the percentage of high school students reporting current use of e-cigarettes (14% in 2017 and 36% in 2019). Youth tobacco use in West Virginia has historically exceeded national levels and e-cigarette use is no exception – 36% of West Virginia high schoolers are current users of e-cigarettes compared to a national average of 28%.[56]

Adults

In 1995, 1-of-4 West Virginia adults (26%) was a current smoker. Smoking has declined nationally but remained stagnant in West Virginia. In 2020, West Virginia's current smoking prevalence was 23%, whereas the U.S. prevalence had been reduced to 15% from 22% in 1995.[6] Figure 16 shows the prevalence of current smokers from 1995 to 2020, comparing national rates to West Virginia.

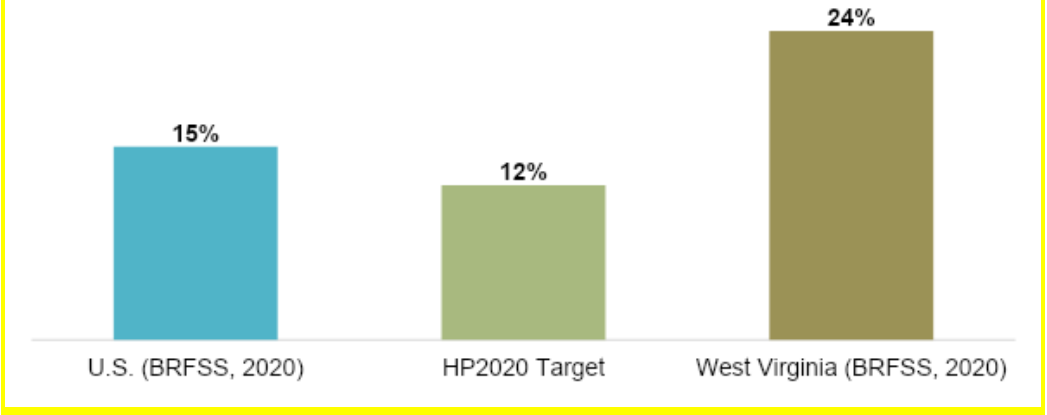
[56] West Virginia Department of Health & Human Resources. West Virginia Youth and Vaping: A Dangerous Combination. 2020. https://dhhr.wv.gov/wvdtp/youth2/Documents/Youth%20Vaping%20Summary%201-23-20.pdf. Accessed March 30, 2021.

Figure 16. Percentage of Adults Aged 18+ Years that are Current Smokers in the U.S. and West Virginia, 1995-2020 (BRFSS)



As with youth trends in smoking, adults in West Virginia have a higher smoking prevalence as compared to the average U.S. current smoking prevalence. The State rate is far from meeting the *HP2020* target (Figure 17).

Figure 17. Percentage of Current Smokers Among Adults Aged 18+ Years, United States, HP2020 Target, and West Virginia



The prevalence of smoking in West Virginia varies by age, education, and income (BRFSS, 2020):

- Age: 9% of adults aged 18-24 years are current smokers compared to 31% and 32% of those aged 25-34 years and 35-44 years, respectively. After age 44, the prevalence of smoking decreases and is 13% among adults aged 65+ years.
- Education: The prevalence of smoking decreases with increasing educational attainment – 38% of those with less than a high school education are current smokers compared to 10% among those with a college degree.

- Income: The prevalence of smoking decreases with increasing income – 42% of those with an annual household income less than $15,000 are current smokers, compared to 14% of those with an annual household income of $50,000 or more.

Oral Health Education

Oral health education for the community is a process that informs, motivates, and helps people adopt and maintain beneficial health practices and lifestyles; advocates environmental changes, as needed, to facilitate this goal; and conducts professional training and research to the same end. Although health information or knowledge alone does not necessarily lead to desirable health behaviors, knowledge may empower people and communities to take action to protect their health.

Provision of Dental Services

Dental Workforce and Capacity

The oral health care workforce is critical to society's ability to deliver high-quality dental care in West Virginia and the United States. Effective health policies intended to expand access, improve quality, or constrain costs must take into consideration the supply, distribution, preparation, and use of the health workforce.

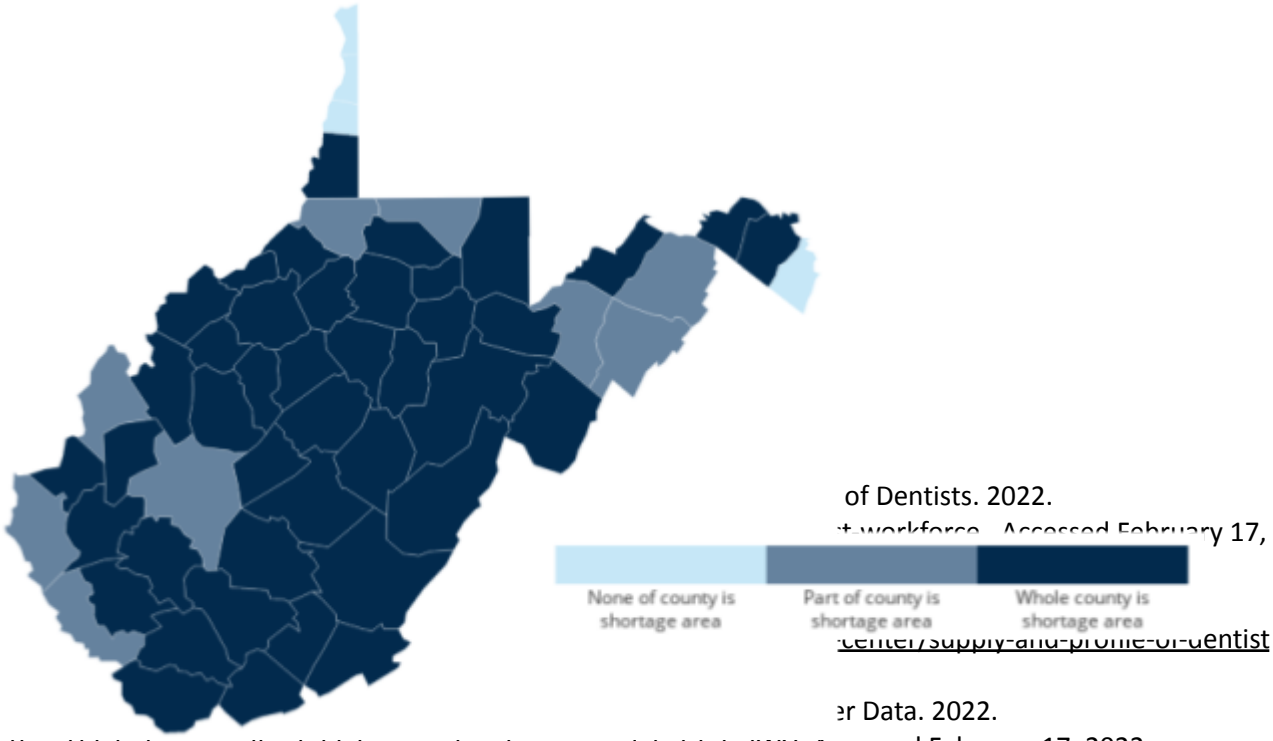
Distribution of Dental Workforce in West Virginia

Treatment of oral disease begins with the availability to oral health professionals. In 2021, there were 868 actively practicing dentists in West Virginia, which translates to 49 dentists per 100,000 population – substantially lower than the national average of 61 dentists per 100,000 population.[57] According to a survey conducted by the American Dental Association, 94% of West Virginia's dentists are non-Hispanic White, 74% are male, and 51% are aged 50 years or older.[58]

Increasing Access to Dental Services

In 2010, West Virginia invested in Community Health Centers (CHC) to purchase equipment for dental operatories; 20 received new equipment and 15 new operatories were made available in local communities. In 2020, almost 39,000 individuals received dental services at CHCs in West Virginia – 8% of all patients served by CHCs.[59] Figure 18 shows county-level data on Dental Care Health Professional Shortage Areas (HPSAs), indicating counties that are entirely in a HPSA, partially in a HPSA, or not in a HPSA. As of February 2022, there are 106 dental HPSAs in West Virginia – 5 geographic HPSAs (Doddridge, Jefferson, Lincoln, McDowell, Mineral), 47 population HPSAs (low-income), and 54 facility designations.

Figure 18. Dental Care Health Professional Shortage Areas by County, 2021



57 of Dentists. 2022.
t workforce. Accessed February 17,

58 center/supply-and-profile-of-dentist

59 er Data. 2022.
https://data.hrsa.gov/tools/data-reporting/program-data/state/WV. Accessed February 17, 2022.

Growth in the Demand of Dental Professionals in West Virginia

In the early 2000s, it become increasingly clear that West Virginia was facing a dentist retention crisis. The West Virginia University School of Dentistry reported that, in 2011, only 13% of the graduating students were going immediately into a practice in West Virginia. The percentage of graduates planning on practicing in West Virginia has increased since 2011. Of the 57 students graduating in 2018, 25% were going to practice in West Virginia. Another 10 graduates were going into out-of-state residency programs but stated that were planning on returning to West Virginia. If all 10 return to WV, the percentage of the 2018 graduating class practicing in West Virginia would increase to 42%.

Reported problems for declining retention rates include high costs for practice start-ups, high student loan debt, and isolation of rural areas. As a result, out-of-state practices are successfully recruiting West Virginia University graduates. If this trend is not reversed, the number of practicing dentists available to West Virginia will begin to decline. With nearly 18% of West Virginia's practicing dentists being aged 65 years or older, the future of the current dental practices play an essential role in workforce planning.[58] According to the West Virginia Oral Health Program Dentist and Dental Hygienist Survey, about 36% of current practicing dentists plan to retire within the next ten years (Figure 19).

Source: WV Oral Health Program Dentist and Dental Hygienist Survey, 2020-2021

Figure 19. Percentage of WV Dentists Planning to Retire

Dental Education Institutions

West Virginia's only dental school, the West Virginia University School of Dentistry, is in Morgantown, West Virginia. Prior to 2013, the number of first year enrollees was 50 but in 2013 the number of first year enrollees in the dental school was increased to 60. Of the 57 that graduated in 2018, 46% were West Virginia residents while 54% were non-residents.

In addition to West Virginia's dental school, the State has three dental hygiene schools; West Virginia University, West Liberty University, and BridgeValley Community and Technical College.

Financing Dental Education in West Virginia

According to the American Dental Education Association, in 2021, only 17% of all dental school graduates left school debt free.[60] For those with debt, the average debt was $301,583. Federal loans are the top source of funding for dental education. On average, 2021 dental school graduates financed almost two-thirds of their dental education through loans (65%), the rest covered to a large degree by a combination of financial support from close ones (19%) and scholarships (10%).

West Virginia offers two financial incentive programs for dental professionals who are interested in practicing in one of the State's underserved communities: The State Loan Repayment Program (SLRP) and the Recruitment and Retention Community Project (RRCP).[61] SLRP professionals receive $40,000 for a two-year commitment, with two one-year extensions that may be rewarded for a maximum of $25,000 for each additional year of service. The practice site must be in a Dental HPSA, and the employer must be non-profit.

The RRCP is funded through the State and community and can be used for qualified government and commercial educational loans obtained for dental school tuition, reasonable educational expenses required by the dental school and/or reasonable living expenses. The program provides dollars to a community to help recruit or retain a dental professional for the community. The sponsoring organization must provide matching funds. Professionals receive $20,000 maximum for a one-year commitment, with four one-year extensions that may be awarded.

Dental Workforce Diversity

One cause of oral health disparities is lack of access to oral health services among under-represented minorities. Increasing the number of dental professionals from under-represented racial and ethnic groups is viewed as an integral part of the solution to improving access to care. Data on the race/ethnicity of dental care providers were derived from surveys of professionally active dentists conducted by the American Dental Association.[58] In 2016, 4% of active dentists in the United States identified themselves as Black/African American, yet that group comprised 13% of the U.S. population. Hispanic/Latino dentists comprised 5% of U.S. dentists, as compared to 19% of the population that was Hispanic/Latino.

Since West Virginia is predominantly White (89%), there is limited data concerning race/ethnicity for many topics, information on WVU School of Dentistry's first-time enrollees is no different. Enrollment of under-represented minority students of WVU's dental school has not kept pace with national enrollment levels. Of the 60 reported enrollees in West Virginia in 2013, only 13 students reported being a minority (Black/African American, Hispanic, Asian/Pacific Islander, or other).

Use of Dental Services

Adults

Although appropriate home and oral health care and population-based prevention are essential, professional care is also necessary to maintain optimal dental health. Regular dental visits provide an opportunity for the

---

60 American Dental Education Association. Dentists of Tomorrow 2021. https://www.adea.org/Seniors2021/#Fig5. Accessed February 17, 2022.

61 West Virginia State Office of Rural Health. Loan Repayment Programs. https://dhhr.wv.gov/ruralhealth/repayment/Pages/default.aspx. Accessed February 17, 2022.

early diagnosis, prevention, and treatment of oral diseases and conditions for people of all ages, and for the assessment of self-care practices. People who have lost all their natural teeth are less likely to seek periodic dental care than those with teeth, resulting in the decrease in likelihood of early detection of oral cancer or soft tissue lesions from medications, medical conditions, and tobacco use, as well as from poor fitting or poorly maintained dentures.

Based on data from the 2020 Behavioral Risk Factor Surveillance System, disparities were found in the proportion of West Virginia adults aged 18+ years visiting the dentist within the previous 12 months based on education, income, self-reported health status, and smoking status (Table 3). Individuals with less education and more limited income were less likely to have visited a dentist or dental clinic within the last year as were those that reported poor/fair health, and current smokers. Compared to other adults nationally, West Virginia had a lower percentage of adults, overall, visiting a dentist or dental clinic within the past year, regardless of demographic factors (55% vs. 68%).

Table 3. Percentage of West Virginia Adults Aged 18+ Years with a Dental Visit in the Past Year by Selected Characteristics, 2020 (BRFSS)

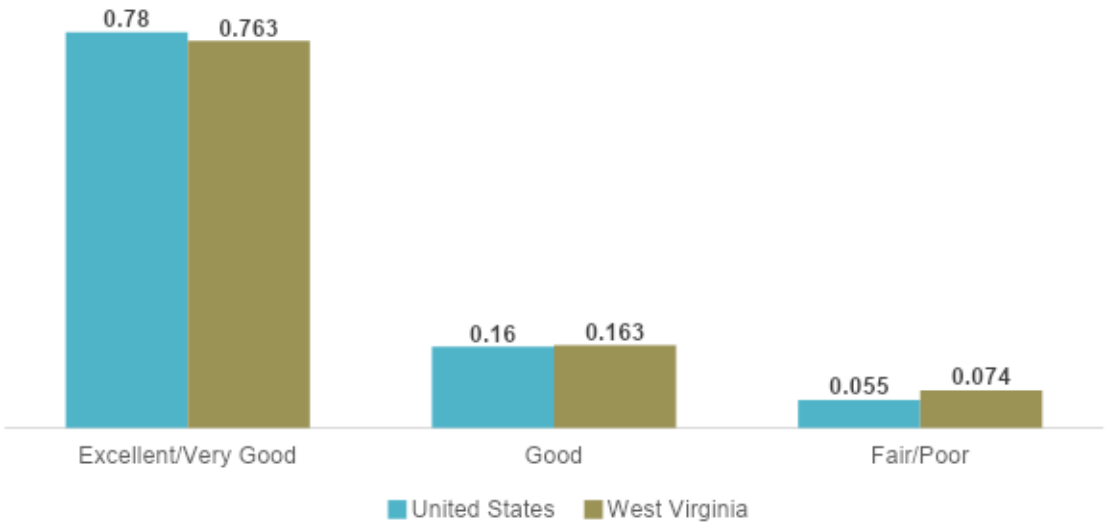
Characteristic	Percent	Lower 95% CL	Upper 95% CL
Overall	57.7	56.1	59.3
Age Group			
18-24	71.7	65.6	77.9
25-34	53.3	48.5	58.1
35-44	59.9	55.6	64.2
45-54	56.5	52.6	60.3
55-64	52.5	49.2	55.7
65+	56.8	54.3	59.3
Education			
Less than H.S.	26.1	36.0	26.1
H.S. or G.E.D.	51.3	56.6	51.3
Some post-H.S.	60.3	66.0	60.3
College graduate	72.8	77.9	72.8
Sex			
Female	60.8	58.7	62.8
Male	54.5	52.1	56.9
Income			
Less than $15,000	26.5	37.3	26.5
$15,000-$24,999	37.1	45.3	37.1
$25,000-$34,999	44.3	53.9	44.3
$35,000-$49,999	53.3	61.6	53.3
$50,000+	71.5	76.3	71.5
Self-Reported Health Status			
Fair or Poor Health	40.4	37.2	43.5
Good or Better Health	62.6	60.8	64.4
Smoking Status			

Current smoker-every day	35.6	43.3	35.6
Current smoker-some days	41.2	55.8	41.2
Former smoker	53.1	59.3	53.1
Never smoked	63.3	67.7	63.3
Race/Ethnicity			
White, non-Hispanic	58.6	57.0	60.3
Black/African American, non-Hispanic	53.4	41.6	65.1
Multiracial, non-Hispanic	47.6	33.7	61.5

Children

The National Survey of Children's Health (NSCH) collects national and state-level data on many child health indicators, including the oral health of children aged 1-17 years. In 2019-2020, 82% of West Virginia parents reported that their child had one or more dental visits during the previous 12 months, compared to 80% nationwide. Additionally, over 76% of parents believed their children's teeth were in very good or excellent condition (Figure 20). However, 18%, or an estimated population of 61,016, reported they had one or more oral health problems during the previous 12 months (e.g., toothache, decayed teeth, or unfilled cavities).[48]

Figure 20. Parent Reported Condition of Child's Teeth for Children Aged 1-17 Years, 2019-2020



The establishment of dental clinics located on school property is seen as a way to further improve the condition of children's teeth. Moreover, they can expand access to, and provide needed services, as well as minimize lost school days. Students requiring dental services can visit the clinic and often return to classes the same day, thereby reducing absenteeism. The location of dental clinics on school property is also seen as a way of addressing dental issues in a more timely and collaborative manner because of facilitated communication between education and clinic staff.

During the 2020-2021 school year, 3,319 West Virginia children at 221 schools received school-based oral health services. About 1,330 had dental sealants applied on one or more molars while 3,187 received a dental prophylaxis (cleaning), and 3,156 received a topical fluoride treatment.

Pregnant Women

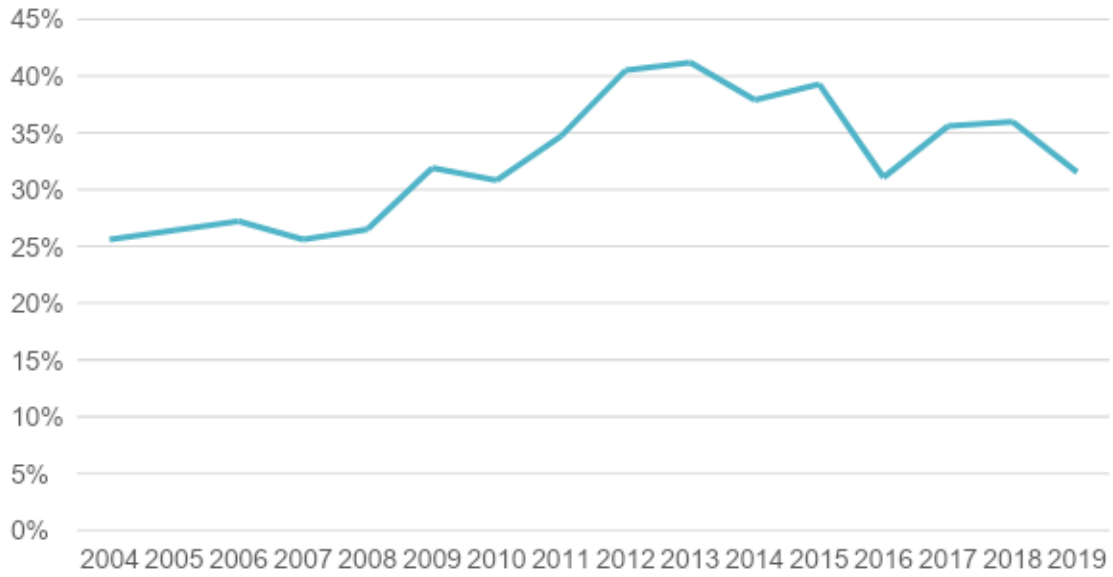
Nearly 60-75% of pregnant women have gingivitis, an early stage of periodontal disease that occurs when the gums become red and swollen from inflammation that may be aggravated by changing hormones during pregnancy.[62] If gingivitis is not treated, it can proceed to periodontitis, which results in loss of bone that

[62] Centers for Disease Control and Prevention. Pregnancy and Oral Health. 2019. https://www.cdc.gov/oralhealth/publications/features/pregnancy-and-oral-health.html. Accessed April 8, 2021.

supports the teeth. Recent evidence suggests that oral infections, such as periodontitis, during pregnancy may increase the risk for pre-term or low birth weight deliveries.[24] During pregnancy, a woman may be particularly amenable to disease prevention and health promotion interventions that could enhance her own health or that of her infant.

In 2018, 54% of births in West Virginia were financed by Medicaid.[63] Prior to 2021, West Virginia Medicaid did not cover preventive oral health services for adults, so pregnant women often went without necessary dental care. In addition, many dentists are reluctant to provide care to this population in fear of malpractice suits (miscarriages, birth defects, etc.). Although the number of women that received dental care during pregnancy increased from 26% in 2004 to 32% in 2019 (Figure 21), less than one-third of all women received care during their pregnancy.

Figure 21. Percentage of West Virginia Women with a Recent Live Birth who had Their Teeth Cleaned During Pregnancy, 2004-2019



Dental Medicaid and State Children's Health Insurance Program (CHIP)

Medicaid provides health coverage to millions of Americans, including eligible low-income adults, children, pregnant women, elderly adults, and people with disabilities. Medicaid is administered by states, according to federal requirements. The program is funded jointly by states and the federal government. States are required to provide dental benefits to children covered by Medicaid and the Children's Health Insurance Program (CHIP), but states choose whether to provide dental benefits for adults.

Nationally, federal and state Medicaid/CHIP expenditures for dental services totaled $14.9 billion in 2020, or about 10% of the $142.4 billion spent on dental services nationally.[32] West Virginia spent $3.9 billion for Medicaid in 2018, of which about 3% was for dental services.

---

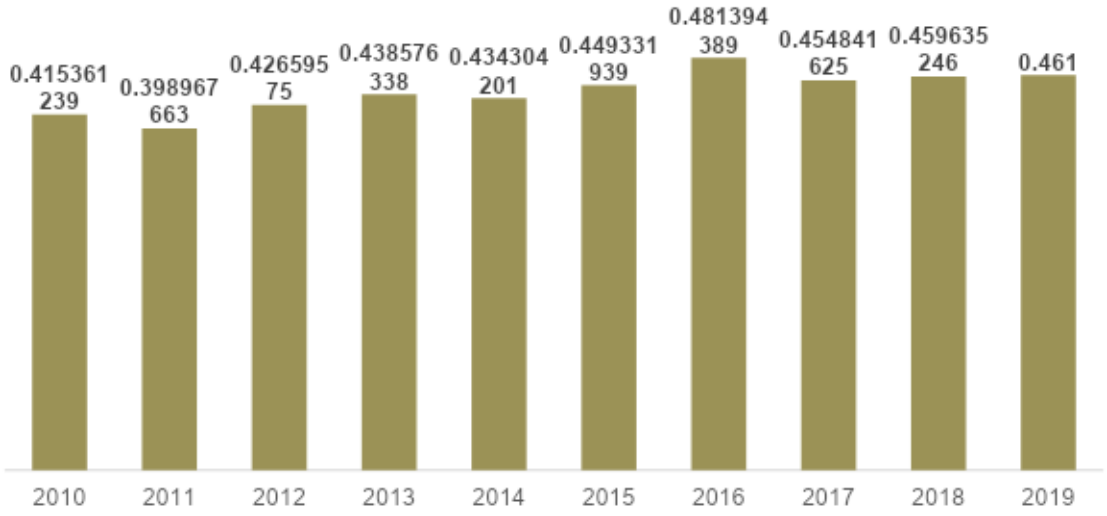
[63] Kaiser Family Foundation. State Health Facts – Births Financed by Medicaid. https://www.kff.org/medicaid/state-indicator/births-financed-by-medicaid/. Accessed April 10, 2021.

West Virginia Medicaid

In West Virginia, Medicaid reimburses dentists for general dentistry, orthodontics, and oral and maxillofacial surgery services. Children up to 21 years of age are eligible for diagnostic, preventive, restorative, periodontics, prosthodontics, maxillofacial prosthetics, oral and maxillofacial services, and orthodontics. Prior to 2021, adults aged 21+ years, however, were limited to emergent procedures to treat fractures, reduce pain, or eliminate infection. On January 1, 2021, West Virginia's Medicaid program expanded dental services for adults to include diagnostic, preventive, and restorative services with a coverage limit of $1,000 per member per calendar year. Emergent services do not count toward the annual coverage limit.

In FY 2019, about 51% of Medicaid-eligible children aged 0-20 years used the dental care delivery system and 46% had at least one preventive service.[64] Figure 22 presents 10-year trends in the percentage of West Virginia's Medicaid beneficiaries under age 21 that have received at least one preventive dental service in the fiscal year.

Figure 22. Percentage of West Virginia's Medicaid Children Aged 0-20 Years with a Preventive Dental Visit by Year



West Virginia CHIP

WVCHIP provides health insurance coverage to uninsured children under the age of 19 in families whose income disqualifies them from coverage available through the Medicaid program but is less than or equal to 300 percent of the current Federal Poverty Level. In July 2019, WVCHIP began covering pregnant women over age 19 with coverage continuing through 60-days post-partum. The WVCHIP benefit plan covers a full range of preventive and restorative dental service, although some services may require a copayment of $25. During

[64] Centers for Medicare & Medicaid Services. CMS 416, Annual Data Reporting Files. 2021. https://www.medicaid.gov/medicaid/benefits/early-and-periodic-screening-diagnostic-and-treatment/index.html. Accessed April 8, 2021.

FY2019, WVCHIP served 36,897 children and 253 pregnant women.[65,66] During the state fiscal year ending June 30, 2019, CHIP dental expenditures were $7.6 million. Expenditures for the state fiscal year ending June 20, 2020 decreased to $6.8 million which may have been partially due to closure of dental clinics due to COVID-19.[66]

Community Health Centers and Other State, County and Local Programs

Community Health Centers

Community health centers, also referred to as primary care centers, are made up of Federally Qualified Health Centers (FQHC) and FQHC Look-Alikes. Community health centers provide access to comprehensive, integrated primary care to everyone – adults, children, homeless, uninsured, Medicaid, Medicare, or private insurance. Community health centers receive a bundled payment from Medicare and Medicaid to assure that primary care is provided to their patients. In West Virginia, there are 31 community health center organizations with about 180 locations across the state.

The *HP2020* objective OH-10.1 was to "Increase the proportion of Federally Qualified Health Centers that have an oral health component". In the U.S., 71% of Federally Qualified Health Centers (FQHCs) had an oral health component in 2015; the *HP2020* target was 73%. In 2020, only 9% of patients served by West Virginia's FQHCs received oral health services, compared to 21% of patients served by FQHCs throughout the U.S., and a *HP2020* target of 33% (Figure 23).[67] In 2020, the FQHCs in West Virginia employed 35.4 FTE dentists and 29.7 FTE hygienists.[68] As of April 2021, West Virginia has 88 FQHC sites that provide dental services; 53 provide dental services onsite and 36 are referral sites.

---

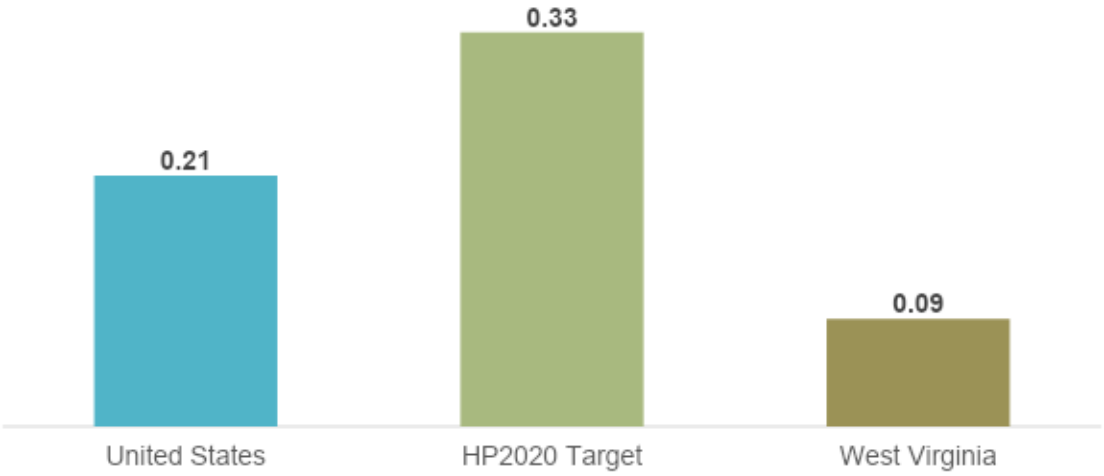
65 Kaiser Family Foundation. State Health Facts – Total Number of Children Ever Enrolled in CHIP Annually. https://www.kff.org/other/state-indicator/annual-chip-enrollment/. Accessed April 10, 2021.

66 West Virginia Department of Health & Human Resources. West Virginia Children's Health Insurance Program Annual Report 2020. https://chip.wv.gov/SiteCollectionDocuments/2020%20Annual%20Report_final.pdf. Accessed April 10, 2021.

67 Health Resources & Services Administration. National Health Center Data. https://data.hrsa.gov/tools/data-reporting/program-data/national. Accessed February 17, 2022.

68 Health Resources & Services Administration. West Virginia Health Center Data. Table 5: Staffing and Utilization. https://data.hrsa.gov/tools/data-reporting/program-data/state/WV/. Accessed February 17, 2022.

Figure 23. Percentage of Patients Served by a Federally Qualified Health Center that Received an Oral Health Service, 2020



School-Based Health Services

The state of West Virginia has made considerable progress in expanding access to school-based dental care. For example, the State passed legislation to expand the scope of practice for dental hygienists with a public health certificate allowing them to apply dental sealants without a prior examination by a dentist. This policy change allowed for the development of school-based preventive oral health programs to be provided by dental professionals through collaborative agreements between dental providers and the West Virginia Board of Education.

In 2018, the West Virginia Oral Health Program received a five-year award from CDC (State Actions to Improve Oral Health Outcomes) which has allowed the State to expand access to evidence-based, preventive oral health services in school-based settings through school sealant programs (SSPs.) The SSPs target school-aged youth without access to dental care in economically distressed, at-risk, and transitional counties in West Virginia. As of 2022, West Virginia has 184 SSPs that provide a wide range of oral health services to students in over 30 counties.

West Virginia Oral Health Program (OHP)

The State Oral Health Program seeks to improve the oral health of West Virginians through assisting community initiatives to prevent, control and reduce oral diseases, by planning, implementing, and evaluating programs for oral health promotion and disease prevention, and by providing statewide coordination and integration of community-based oral health services through increased access and removal of barriers. The Program supports community-based/community level dental disease prevention programs through collaborations, eventually integrating them into the State Program. The OHP also coordinates data collection and analysis to document oral health status and needs.

Furthermore, the OHP works to:

- Provide training, consultation, and technical assistance to assist program collaborators in providing oral health education and disease prevention strategies.
- Assist communities in authorizing and maintaining community water fluoridation.

- Collect/coordinate data documenting oral health status and needs between State and local/community-based programs.
- Implement and update strategies set forth in the WV OHP Plan, in association with state-level and community partners.
- Assess and track dental disease rates to document gains and disparities by supporting systems for collecting, tracking and reporting oral health and program information.
- Promote and support dental disease prevention activities and access to affordable dental care.
- Build public/private partnerships to promote and support state and local programs and policies.
- Assure an adequate and competent oral health workforce.
- Use evidence-based strategies to promote best oral health practices and policies.
- Evaluate effectiveness, availability, and quality of oral health programs and services.
- Promote media or education campaigns to educate the public in coordination with other State OHP partners.

Conclusions & Future Considerations

Although much is known about the status of oral health in the State, there remain several deficiencies. The oral health status of developmentally disabled persons and several racial and ethnic groups is difficult to assess across the state. These groups, along with their oral health needs should not be forgotten due to the lack of information.

Considerable statewide efforts are necessary to assist the State in achieving the goals set forth by *Healthy People*. Additional health promotion efforts are needed for the integration of oral health as a component of overall health status and well-being. Individuals must practice healthy behaviors (daily brushing, flossing, regular dental visits, proper nutrition, etc.) to prevent disease. With West Virginia ranked as the second most rural state in the nation, access to care is one of the most challenging obstacles for the State. Citizens need access to an adequately trained oral health workforce who can provide education, prevention, and treatment.

Oral health is vital to overall health. Statewide collaborations between West Virginia residents, communities, policymakers, health care professionals and other private and public sectors is an integral step in ensuring that every West Virginian has access to complete dental care, regardless of socioeconomic or health insurance status.

The purpose of this report is to provide information about the status of oral health and disease in West Virginia, and to provide an overview of factors that influence oral health. The data presented in this report provide a baseline to measure the effectiveness of interventions in improving oral health, to decrease disparities related to oral health, and to reduce the burden of oral health. Moreover, the data presented in this report can support the development of new interventions and facilitate the establishment of additional priorities for surveillance.

The West Virginia Oral Health Program, in conjunction with the Bureau for Public Health, West Virginia Department of Health and Human Resources, trusts that readers will find *The Burden of Oral Disease in West Virginia* a useful tool in helping them to achieve a greater understanding of oral health, along with the factors influencing the oral health of West Virginians.

Appendix

Oral Health Related Objectives, Healthy People 2020 and 2030	
Oral Health Related HP2020 Objectives	**Oral Health Related HP2030 Objectives**
OH-1: Reduce the proportion of children and adolescents who have dental caries experience in their primary or permanent teeth	OH-1: Reduce the proportion of children and adolescents aged 3-19 years with lifetime tooth decay
OH-1.1: Children aged 3 to 5 years	
OH-1.2: Children aged 6 to 9 years	
OH-1.3: Adolescents aged 13 to 15 years	
OH-2: Reduce the proportion of children and adolescents with untreated dental decay	OH-2: Reduce the proportion of children and adolescents aged 3-19 years with active and untreated tooth decay
OH-2.1: Children aged 3 to 5 years	
OH-2.2: Children aged 6 to 9 years	
OH-2.3: Adolescents aged 13 to 15 years	
OH-3: Reduce the proportion of adults with untreated dental decay	OH-3: Reduce the proportion of adults aged 20-74 years with active or untreated tooth decay
OH-3.1: Adults aged 35 to 44 years	
OH-3.2: Adults aged 65 to 74 years (coronal caries)	
OH-3.3: Adults aged 75+ years (root caries)	OH-4: Reduce the proportion of older adults aged 75+ years with untreated root surface decay
OH-4: Reduce the proportion of adults who have ever had a permanent tooth extracted because of dental caries or periodontal disease	
OH-4.1: Adults 45 to 64 years with 1+ teeth lost	
OH-4.2: Adults 65 to 74 years with all teeth lost	OH-5: Reduce the proportion of adults aged 45+ years who have lost all their teeth
OH-5: Reduce the proportion of adults aged 45 to 74 years with moderate or severe periodontitis	OH-6: Reduce the proportion of adults aged 45+ years with moderate and severe periodontitis
OH-6: Increase the proportion of oral and pharyngeal cancers detected at the earliest stage	OH-7: Increase the proportion of oral and pharyngeal cancers detected at the earliest stage
OH-7: Increase the proportion of children, adolescents, and adults who used the oral health care system in the past year	OH-8: Increase use of the oral health care system
OH-8: Increase the proportion of low-income children and adolescents who received any preventive dental service during the past year	OH-9: Increase the proportion of low-income (<200% FPL) youth aged 1-17 years who have a preventive dental visit
OH-9: Increase the proportion of school-based health centers with an oral health component that includes	
OH-9.1: Dental sealants	
OH-9.2: Dental care	
OH-9.3: Topical fluoride	
OH-10: Increase the proportion of local health departments and FQHCs that have an oral health program	
OH-10.1: FQHCs	

Oral Health Related Objectives, Healthy People 2020 and 2030	
Oral Health Related HP2020 Objectives	**Oral Health Related HP2030 Objectives**
OH-10.2: Local health departments	
OH-11: Increase the proportion of patients who receive oral health services at FQHCs each year	
OH-12: Increase the proportion of children and adolescents who have received dental sealants on their molar teeth	OH-10: Increase the proportion of children and adolescents aged 3-19 years who have dental sealants on 1 or more molars
OH-12.1: Aged 3 to 5 years – primary molars	
OH-12.2: Aged 6 to 9 years – permanent 1st molars	
OH-12.3: Aged 13 to 15 years – permanent molars	
OH-13: Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water	OH-11: Increase the proportion of people whose water systems have the recommended amount of fluoride
OH-14: Increase the proportion of adults who receive preventive interventions in dental offices	
OH-14.1: Tobacco use or smoking cessation	
OH-14.2: Oral and pharyngeal cancer screening	
OH-14.3: Glycemic control	
OH-15: Increase the number of States DC that have a system for recording and referring infants and children with cleft lips and cleft palates to craniofacial anomaly rehabilitative teams	
OH-15.1: Recording system	
OH-15.2: Referral system	
OH-16: Increase the number of States and DC that have an oral and craniofacial health surveillance system	OH-D01: Increase the number of states and DC that have an oral and craniofacial health surveillance system
OH-17: Increase health agencies that have a dental public health program directed by a dental professional with public health training	
OH-17.1: Local health agencies that serve jurisdictions of 250,000 or more persons	
OH-17.2: Indian Health Service Areas and Tribal health programs that serve jurisdictions of 30,000 or more persons	
AHS-1.2: Increase the proportion of persons with dental insurance	AHS-2: Increase the proportion of people with dental insurance
AHS-6.3: Reduce the proportion of persons who are unable to obtain or delay in obtaining necessary dental care	AHS-5: Reduce the proportion of people who can't get the dental care they need when they need it
NWS-17.2: Reduce consumption of calories from added sugars in person aged 2+ years	NWS-10: Reduce consumption of added sugars by people aged 2 years and over
C-6: Reduce the oropharyngeal cancer death rate	

References