



THE BURDEN OF ORAL DISEASE IN WEST VIRGINIA 2014

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Burden of Oral Disease:

Tool for Creating State Documents

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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: 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 the 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. Ranging from caries to cancers, poor oral health causes unnecessary pain, suffering, and disabilities for countless Americans.

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 conditions, oral cancer, birth defects such as cleft lip and palate, as well as 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) diseases increase the risk of heart disease, put pregnant women at greater risk of premature delivery, respiratory infection in susceptible individuals and complicate control of blood sugar for people living with diabetes.¹⁶ 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. Caries 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 out in a timely manner. The childhood years are the optimum time for preventive measures. Many adults struggle with oral health care due to a number of barriers, including inconvenient timings for dental appointments, lack of insurance coverage and more.

The Oral Health Program (OHP) of the State of West Virginia 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 *Healthy People* (HP) 2020 Objectives when appropriate. This summary of the oral health disease burden should help raise awareness of the need for monitoring the oral health burden in West Virginia and guide efforts to prevent and treat oral diseases and enhance the quality of life of West Virginia's residents.

Method

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

- 1) Oral disease: includes dental caries, tooth loss, periodontal disease, oral and pharyngeal cancer, and cleft lip/palate;
- 2) Prevention: includes dental screenings, cleaning, sealants, and water fluoridation;
- 3) Risk factors: includes tobacco use;
- 4) Access to care: includes recent dental visits, receipt of needed care, reasons for not receiving care, dental insurance, and Medicaid and Children's Health Insurance Program (CHIP) claims; and
- 5) Dental health workforce: includes dental professions (dentists and hygienists), school-based programs, and community health centers with oral health components.

This report 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 Children

- West Virginia children have significant experience of tooth decay. During the 2010-2011 school year, a statewide survey showed that 34% of the universal Pre-K population had experience with caries, while 3rd grade children had a prevalence of 42% for caries experience. More recent data from the 2013-2014 school year show this prevalence in 3rd graders to have increased to 56%. This may be in part due to better surveillance efforts during the 2013-2014 school year.
- Untreated dental decay among the universal Pre-K population showed a prevalence of 21%, while 3rd grade children observed a prevalence of 17.1% during the 2010-2011 school year. Findings from the 2013-2014 oral health survey showed an increase in decay to 21% among 3rd graders. This may be in part due to better surveillance efforts during the 2013-2014 school year.
- During the 2012-2013 school year, Marshall University - School Sealant Program showed children and adolescents who have not visited the dentist in more than one year are more susceptible to untreated tooth decay than those who have visited the dentist in the past year (62.4% vs. 37.6%, respectively).

Tooth Loss Among West Virginia Adults

- Though some improvement has been observed in the extent of tooth loss among adults since the late 1990s, in 2010, over half (64.9%) of adults aged 18+ years had at least one permanent tooth extracted; among the adult population aged 65+ years, 33.8% had experienced complete edentulism (loss of natural teeth). By 2012, 12.4% of all adults aged 18+ years were completely edentulous. This may be in part due to improvements in surveillance efforts in 2012.
- In 2011, 28.6% of adults aged 18+ years used some form of tobacco (cigarettes, chewing, snuff, and dip).
- Negative correlations were seen between education level and the prevalence of complete tooth loss among West Virginia adults aged 65+ years. As education level increased, the prevalence of complete tooth loss decreased. A similar relationship was observed concerning household income (HHI).

Oral and Pharyngeal Cancer in West Virginia

- From 2006-2010, the age-adjusted incidence rate for oral and pharyngeal cancer among West Virginians was 11.4 per 100,000 population, whereas the U.S. rate was 10.8 per 100,000.
- From 2000-2010, the average annual mortality rate for oral and pharyngeal cancer among West Virginians was 2.8 per 100,000 population, similar to the U.S. average.

Preventive Oral Health Services

- In 2012, half of West Virginia adults (53.3%) aged 18+ years had visited a dentist in the last 12 months.
- In 2012, 1 in 5 (22%) adults had not visited a dentist in over five years.
- In the 2010-2011 school year, 3 out of 10 (29%) 3rd graders in West Virginia had dental sealants on their permanent molars, slightly increasing (32%) during the 2013-2014 school year. This may be in part due to better surveillance efforts during the 2013-2014 school year. Nationally, in 2009-2010, 32.1% of children aged 6-9 years had dental sealants on their permanent molars.
- As of 2012, 91.1% of West Virginians served by community water systems (CWS) were receiving fluoridated water.

Access to Dental Care

- In 2012, only 40% of adults in West Virginia had dental coverage.
 - Although 81% reported some type of medical coverage, only 43% had an option to purchase supplemental dental coverage with their existing plan.
- In 2012, 16% of West Virginia adults could not access care when needed over the past 12 months.
 - The top two reasons reported for lack of access were no insurance and not being able to afford it.

Dental Health Workforce

- West Virginia has less dentists per capita than the U.S. overall; in 2012, West Virginia had 4.7 dentists per 10,000 population, while the U.S. overall had 6.2 dentists per 10,000 population.
- By 2014, there were 922 active, licensed dental hygienists working in West Virginia.
- West Virginia's dental workforce is aging, and until more recently, there has been a decreasing trend in the retention of dental professional graduates in the state. This lack in dental care providers contributes to the limitations in access to care.

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 program development. These include the following:

- 1) Lack of access to care is common, and associated with significant untreated tooth decay among West Virginia adults.
- 2) Large socioeconomic disparities in oral health exist; these are observed in caries experience among children and edentulous among adults.
- 3) Tobacco use is a major risk factor for the development of oral disease.
- 4) Analysis of the dental workforce will be imperative in assuring adequate access to care for West Virginians, as well as improving the oral health status.

Increased efforts in control and surveillance of oral disease and conditions, preventive interventions, workforce development and distribution 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 U.S. Census. The State's population has not exceeded the 2 million mark since then, but has fluctuated between 1.7 and 1.9 million depending on the State's economy. Four of the State's five largest cities have lost population since 1990. Charleston, the state capitol and largest city, and Huntington are the only cities with populations exceeding 50,000 people. Two-thirds of the State's 1.8 million people live in communities with less than 2,500 residents; 44 of the 55 counties in West Virginia are designated as non-metropolitan by the Federal Office of Management and Budget and 49 counties are designated fully or in part as Health Professional Shortage Areas (HPSA) and/or Medically Underserved Areas. Chronic conditions are more prevalent among rural populations, with nearly half (46.7%) of the adult, rural population having one or more chronic conditions compared with 39.2% in urban areas. According to the Rural Health Research Center, rural populations have fewer dentists, lower dental care utilization and higher rates of dental caries and permanent tooth loss than urban populations. Reports from the Surgeon General call for more dentists in rural populations.

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 consistently ranks in the top three nationally in adults self-reporting their general health as either “fair” or “poor.” Data indicates that 18% of individuals could not afford needed health care services and approximately 21.4% of adult West Virginians do not have a specific personal doctor or health care provider.

According to 2010 U.S. Census Bureau data, the State's population is predominantly White (94.1%) with other racial and ethnic minorities being primarily Black/African American (3.5%), Hispanic or Latino (1.3%), Asian (0.7%) and Native Americans (0.2%). West Virginia has the second highest percentage of its population over age 65 (15.8%) and the fifth highest percentage of its population living at or below the poverty level (17.6%). According to the 2000 U.S. Census Bureau, 22.5% of the population 16-64 years of age had a disability and 13.2% had a work disability. In terms of education, West Virginia ranks 36th in the percentage of its adults aged 25-64 with at least a high school diploma (86.0%), 50th in the percentage of adults aged 25-64 with a bachelor's degree or higher (18.7%) and 44th in the percentage with a graduate or professional degree (7.3%). West Virginia is consistently near the top in rankings of states with a prevalence of heart disease, diabetes and other chronic conditions. Yet with all of these challenges, West Virginia 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, support and strengthen health improvement efforts.

Data Sources

Data for this report were obtained from multiple sources, including written surveys, dental screenings and sealants databases, insurance claims, emergency department visit records, cancer incidence reports, death certificates, and professional licensure databases. The specific

data sources used are described in the Appendix located at the end of the report. For each data source, information on the purpose of data collection, population sampled, data collection methods, and frequency of data collection is provided.

Additionally, 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/ethnicity. The State generally lacks sufficient numbers to allow significant and stable comparisons across racial/ethnic groups. Nevertheless, there should be no reason to believe 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.

National and State Oral Health Objectives

Oral Health in America: A Report of the Surgeon General alerted Americans to the importance of oral health in their daily lives.⁴⁶ 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. Its 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 quality of life and eliminate oral health disparities.

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 was developed in November 2000 as part of *Healthy People 2010*, a document that presents a comprehensive, nationwide health promotion and disease prevention agenda.⁴⁷ *Healthy People 2020* is designed to serve as a roadmap for improving the health of all people in the U.S. during the second decade of the 21st century. Included are objectives for key structures, processes, and outcomes related to improving oral health. These objectives represent the ideas and expertise of a diverse range of individuals and organizations concerned about the nation's oral health.

The Surgeon General's report on oral health was a wake-up call, spurring policy makers, community leaders, private industry, health professionals, 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*.⁴⁸ 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 *Healthy People 2020*:

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

National objectives on oral health such as those in *Healthy People 2020* 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.⁴⁸ The *Healthy People 2020* oral health objectives for the nation and the current status of each indicator for the United States and for West Virginia are summarized in Table 1.

Table 1. Healthy People 2020 Oral Health Indicators, Target Levels, and Current Status in the U.S. and West Virginia

<i>Healthy People 2020 Objective</i>	Target (%)	National Status^a (%) (NHANES 1999-2004)	West Virginia Status (%) (2012-2013)
<i>OH-1: Dental caries experience</i>			
Children aged 3 – 5 years	30.0	33.3	34.0 ^h
Children aged 6 – 9 years*	49.0	45.0 ⁱ	56.0 ^k
Adolescents aged 13 – 15 years	48.3	53.7	DNC
<i>OH-2: Untreated caries (tooth decay)</i>			
Children aged 3 – 5 years	21.4	23.8	21.0 ^h
Children aged 6 – 9 years*	25.9	16.9 ⁱ	21.0 ^k
Adolescents aged 13 – 15 years	15.3	11.4 ⁱ	DNC
<i>OH-3: Adults with untreated dental decay</i>			
Adults aged 35 – 44 years	25.0	27.8	DNC
Adults aged 65 – 74 years	15.4	17.1	DNC
Adults aged 75 years and older	34.1	37.9	DNC
<i>OH-4: Permanent tooth loss</i>			
Adults aged 45 – 64 years (any)	68.8	96.2 ⁱ	72.8 ⁿ
Adults aged 65 – 74 years (lost all teeth)	21.6	15.3 ⁱ	33.8 ⁿ
<i>OH-5: Destructive periodontal disease</i>			
Adults aged 45 – 74 years	11.5	12.8 ^b	DNC
<i>C-6: Oral & pharyngeal cancer death rates reduction (per 100,000 population)</i>	2.3	2.5	2.6 ^l
<i>OH-6: Early detection of oral & pharyngeal cancers</i>	35.8	31.2 ^a	DNC
<i>OH-7: Use of oral health care system; all ages</i>	49.0	41.8 ⁱ	DNC
<i>OH-8: Dental services for low-income children & adolescents</i>	33.2	35.2 ^g	DNC
<i>OH-10: Health Centers with oral health component</i>			
Oral health care program at Federally Qualified Health Centers	83.0	76.5 ^j	55.9
Oral health prevention or care programs at local health departments	28.4	25.8 ^d	24.5
<i>OH-9: School-based centers with an oral health component</i>			
Dental Sealants	26.5	24.1 ^c	34.1
Dental Care	11.1	10.1 ^c	13.4
Topical Fluoride	32.1	29.2 ^c	34.1
<i>OH-11: Receipt of oral health services at health centers</i>	33.3	20.5 ^j	DNC
<i>OH-12: Dental sealants</i>			
Children aged 3 – 5 years on 1 or more primary molar	1.5	1.4	DNA
Children aged 6 – 9 years on 1 or more permanent molar*	28.1	32.1 ⁱ	32.0 ^k
Children aged 13 – 15 years on 1 or more permanent molar	21.9	50.5 ⁱ	DNC
<i>OH-13: Community water fluoridation</i>	79.6	72.4 ^d	91.1 ^o
<i>OH-14: Preventive dental screening & counseling (Developmental)</i>	DNA	DNA	DNA
<i>OH-15: Systems that record cleft lip/palate & referrals (Developmental)</i>	DNA	DNA	DNA
<i>OH-16: Oral & craniofacial state-based health surveillance system</i>	51 (50 states & the District of Columbia)	32 states ^e	Yes
<i>OH-17: Health agencies with a dental professional directing dental program</i>			
States & local health agencies	25.7	23.4 ^d	1 ^m
Indian health service areas & Tribal health programs	12 programs	11 programs ^g	1 ^m

*West Virginia collects data on 3rd graders, whereas *Healthy People 2020* & National data reports children aged 6-9 years old. DNA = Data Not Available; DNC = Data Not Collected (at this time); ^aData from 1994-2004, unless otherwise noted (National Health and Nutrition Examination Survey); ^bData from 2001-2004; ^cData from 2007-2008; ^dData from 2008; ^eData from 2009; ^fData from 2009-2010; ^gData from 2010; ^hData from 2010-2011; ⁱData from 2011; ^jData from 2012; ^kData from 2013-2014; ^lState Cancer Profiles 2006-2010; ^mBRFSS 2009; ⁿBRFSS 2012; ^oCDC Water Fluoridation Statistics 2012; Table 1 Source: U.S. Department of Health and Human Services. *Healthy People 2020*. Available at <http://www.healthypeople.gov/2020/topicsobjectives2020/default.aspx>

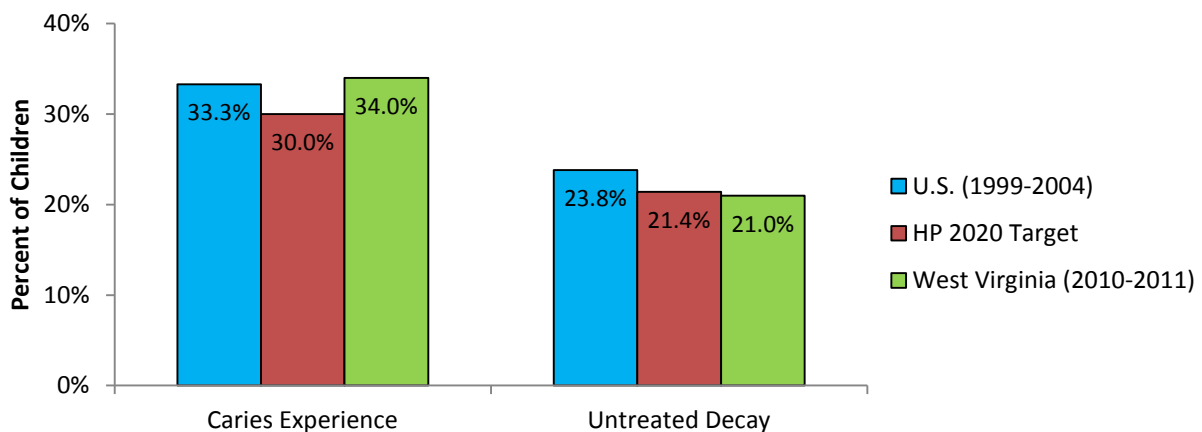
The Burden of Oral Diseases

Prevalence of Disease and Unmet Needs

Children

Caries experience and untreated decay are monitored in West Virginia as consistent with the National Oral Health Surveillance System (NOHSS), which allows for comparisons with other states and with the nation. According to the most recent Basic Screening Survey (BSS) conducted among West Virginia Pre-K students (aged 3-5 years) during the 2011-2012 school year, 34% had a history of caries, which is about 4% higher than the *Healthy People 2020* target (30%). In contrast, West Virginia succeeded in surpassing both, the national status and *Healthy People 2020* targets for Pre-K children with untreated decay, with 21% of the Pre-K population in West Virginia having active decay present (Figure 1).

**Figure 1. Dental Caries Experience and Untreated Decay Among Children
Aged 3-5 Years
U.S., *Healthy People 2020* and West Virginia**

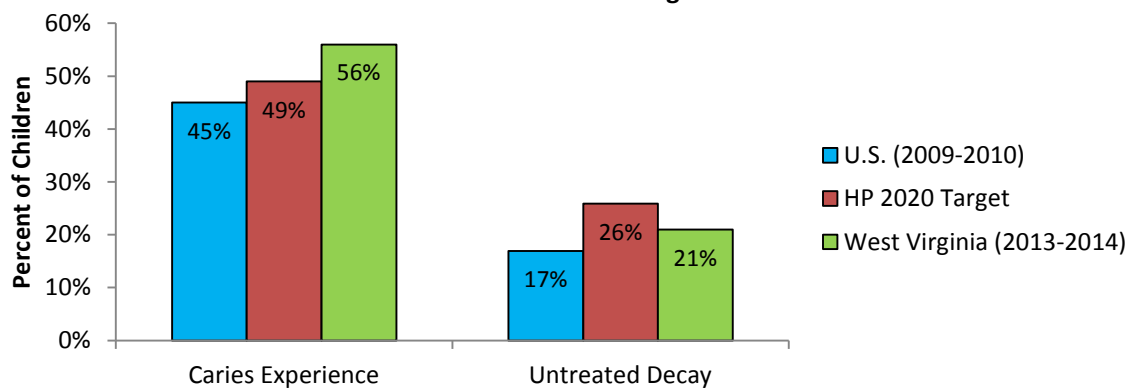


Sources: National Health & Nutrition Examination Survey (NHANES) 1999-2004, HP 2020 and Behavioral Risk Factor Surveillance System (BRFSS) 2010-2011

Over the past few years, the oral health of the State's 3rd grade student population has shown a decline. During the 2010-2011 school year, about one-fourth (42%) of West Virginia's 3rd graders had experienced dental caries, exceeding both the national status (45%) and the *Healthy People 2020* target (49%) for children aged 6-9 years. However, most recent data from the 2013-2014 school year show 56% of 3rd grade children in West Virginia with caries experience. The prevalence of untreated decay showed a similar trend, increasing from 17.1% to 21% within three years, yet West Virginia has met the *Healthy People 2020* target of 21.4% in children aged 6-9 years with untreated decay (Figure 2).

However, it is important to note that the sample size for 3rd grade children in West Virginia increased substantially from 2010-2011 (449 children) to 2013-2014 (1,673 children). A large sample size is known to increase the study's significance and precision, as well as reliably reflect the population mean. Therefore, improvements in surveillance methods may be a factor in the large difference observed between the 2010-2011 and 2013-2014 survey data, and the 2013-2014 survey data more accurately reflects the oral health status of 3rd grade children in West Virginia.

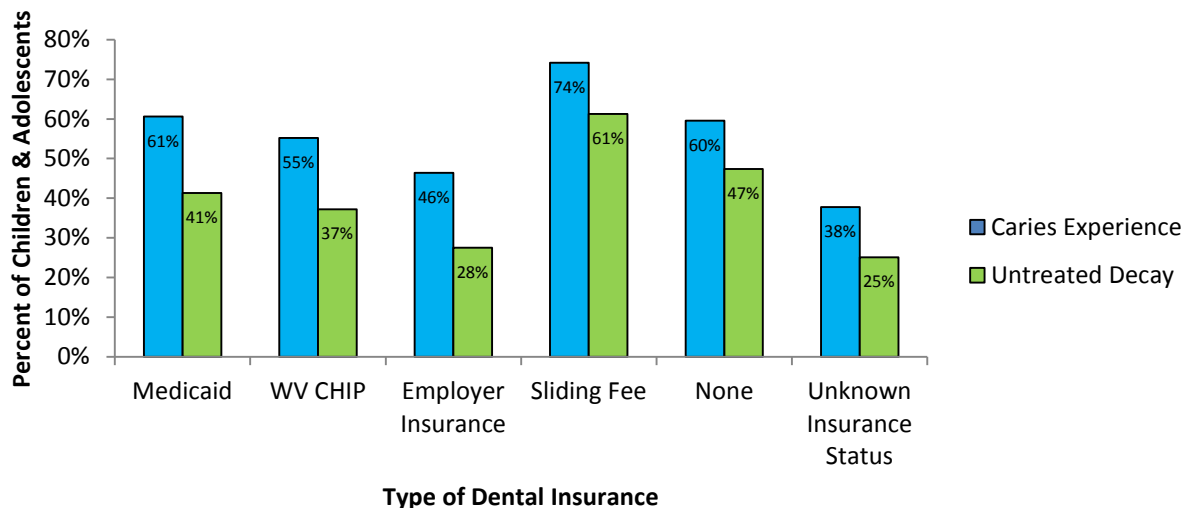
Figure 2. Dental Caries Experience, Untreated Decay and Dental Sealants Among Children Aged 6-9 in the U.S. & *Healthy People 2020* and 3rd Graders in West Virginia



Sources: NHANES 2009-2010, HP 2020 and WV BSS 2013-2014

Data from Marshall University's School Sealant Project illustrates that dental coverage is associated with prevalence of caries experience and/or untreated decay. Those students on a sliding fee have a considerably higher percentage of caries experience (74%) and untreated decay (61%) than students with any type to no insurance at all (Figure 3). Children and adolescents with no coverage had the second highest prevalence of caries experience and untreated decay, followed closely by those eligible for Medicaid.

Figure 3. Oral Health Status of Children and Adolescents Screened by Dental Insurance Coverage Type, West Virginia, 2012-2013



Source: Marshall University School Sealant Database, 2012-2013

Although West Virginia reached the *Healthy People 2020* target for children with untreated decay, disparities among certain populations still exist. Caries experience is about 1.3 times more prevalent, and untreated decay is 2 times more likely among Medicaid and CHIP children than among those with insurance. About 73% of children with insurance had no urgent dental

problems, compared to the 59% with Medicaid/CHIP. Therefore, more focus and effort are needed to eliminate this disparity.

Adults

Dental Caries

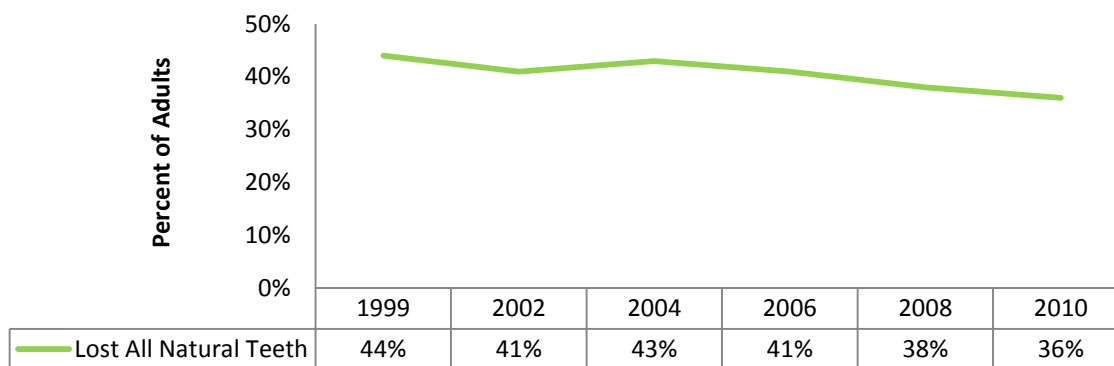
People are susceptible to dental caries throughout their lifetime. Like children and adolescents, adults may also experience new decay on the crown (enamel covered) portion of the tooth. Yet, as a result of gum recession, adults may develop caries on the root surfaces of teeth as those surfaces become exposed to bacteria and carbohydrates. In the most recent national examination survey, 85% of U.S. adults had at least one tooth with decay or a filling on the crown. Furthermore, root surface caries affect 50% of adults aged 75+ years.⁴⁶

Tooth Loss

An adult has 32 permanent teeth. While a person may lose one or more teeth due to trauma or orthodontia, 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 poor periodontal (gum) health. Many adults who lose their teeth later in life started to develop tooth decay and periodontitis during childhood or adolescence.¹¹ Tooth loss can 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 2010, about one-third (30%) of adults aged 18+ years in West Virginia had lost six or more teeth for reasons other than trauma or orthodontia. Among West Virginia adults aged 65+, 36% had lost all of their natural teeth in 2010. Although most recent data from 2012 shows a 6% decrease (34%), it cannot be compared to prior years because of changes in surveillance methods (Figure 4).

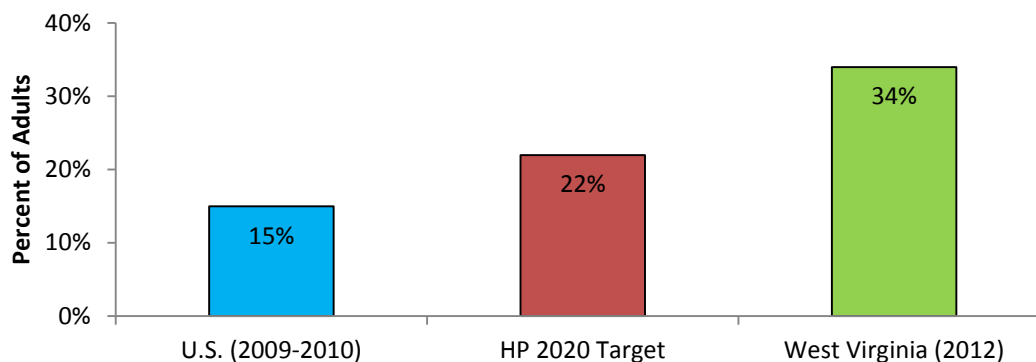
**Figure 4. Trend of Adults Aged 65+ Who Lost All Natural Teeth
West Virginia, 1999-2010**



Sources: BRFSS, 1999-2010

Despite a seemingly downward trend, complete natural tooth loss among adults aged 65+ in West Virginia is still much higher than the national average (15% from 2009-2010) and the *Healthy People 2020* target (22%). (Figure 5)

**Figure 5. Percentage of Adults Aged 65-74 Who Lost All Natural Teeth
U.S., *Healthy People 2020* and West Virginia**

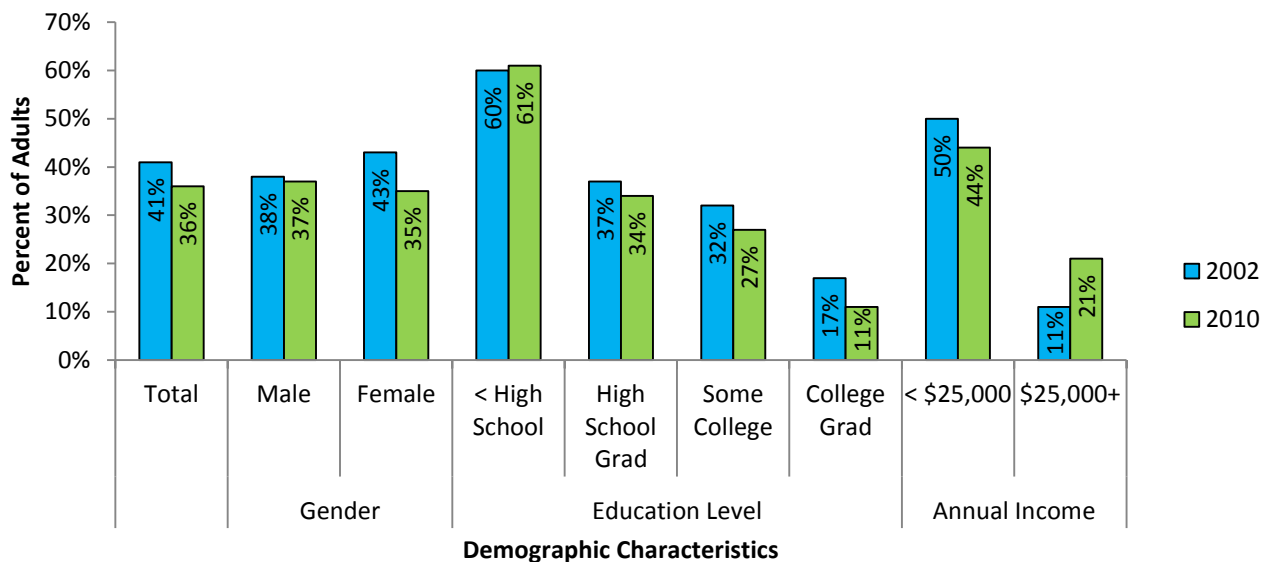


Sources: NHANES 2009-2010, HP 2020 and WV Senior Oral Health Survey 2012

Disparities in oral health, as measured by tooth loss due to dental caries or periodontal disease, were noted with not all groups benefiting to the same extent. Little variation was seen between most selected demographic characteristics between 2002 and 2010 (Figure 6). Amid the eight-year period, the rate of female tooth loss has decreased and is now lower than males; whereas the rate of males with complete tooth loss has not fluctuated much. Education has always played a major role in understanding the importance of oral health. Therefore, a negative correlation between tooth loss and education exists. As the level of education increases, the rate of tooth loss vastly decreases. This trend existed between 2002 and 2010, with only 11% of college graduate adults aged 65+ years experiencing complete tooth loss, compared to the 17% in 2002. A similar trend was observed regarding annual income. In 2002, half (50%) of West Virginia adults aged 65+ years with an annual income of less than \$25,000 lost all of their natural teeth, compared to the 11% of those with an income of \$25,000 and more. This relationship between annual income and tooth loss observed closer margins in 2010, with 44% of those with an income level less than \$25,000 experiencing complete edentulism, compared to the 21% above \$25,000 income level. Furthermore, the rate of complete tooth loss observed a significant increase between 2002 and 2010 among the West Virginia adults aged 65+ years with an income of \$25,000+ (11% vs. 21%). This increase may be attributed to many factors including variations in surveillance efforts, an increase in risk factors (dietary, work-related, etc.) to which this population is exposed or changes in the Medicaid/Medicare payment mechanism.

As previously noted, although more recent data is available for this population, different surveillance methods were used prior to 2012. Therefore data after 2010 is not comparable to prior years, and demographic data concerning education level and annual income are no longer collected.

Figure 6. Percent of Adults Aged 65+ Years With Complete Edentulism by Demographic Characteristics, West Virginia, 2002 and 2010



Source: BRFSS 2002 and 2010

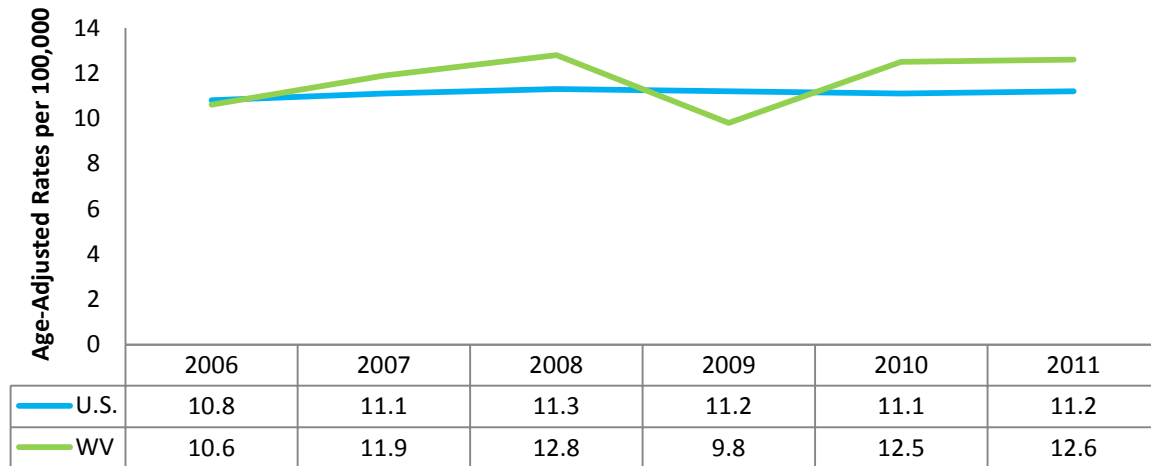
Oral Cancer

The terms “oral cancer” and “cancer of the oral cavity and the pharynx” are used interchangeably here, and refer to any cancers of the oral cavity and the pharynx. Oropharyngeal cancer is a subset of oral and pharyngeal cancer; it refers to cancer of the oropharynx, which includes the palatine and lingual tonsils, the base of the tongue (posterior one-third), the soft palate and the posterior pharyngeal wall.

Survival rates for oral cancer have not improved substantially over the past 25 years. More than 40% of persons diagnosed with oral cancer die within five years of diagnosis,³⁶ although survival varies widely by stage of disease when diagnosed. The five-year relative survival rate for persons with oral cancer diagnosed at a localized stage is 81%. In contrast, the five-year survival rate is only 51% once the cancer has spread to regional lymph nodes at the time of diagnosis and is just 29% for persons with distant metastasis.

An estimated 28,000 new cases of oral cancer and 7,200 deaths from these cancers occurred in the U.S. in 2004. The 2001 age-adjusted (to the 2000 U.S. population) incidence rate of oral cancer in the U.S. was 10.4 per 100,000 persons. Nearly 90% of cases of oral cancer in the U.S. occur among persons aged 45+ years. The age-adjusted incidence was more than two times as high among men (15.0) than among women (6.6), as was the mortality rate (4.1 vs. 1.6). The incidence rates of oral cancer for the U.S. and West Virginia from 2006-2011 are shown in Figure 7. Where rates for the U.S. remained steady, West Virginia fluctuated and remained much higher for the majority of the five-year period (11.2 vs. 12.6 in 2011). From 2000-2005, the average annual count for oral and pharyngeal cancer in West Virginia was 229 cases. This number increased by 9.2% from 2006-2011 (250 cases).

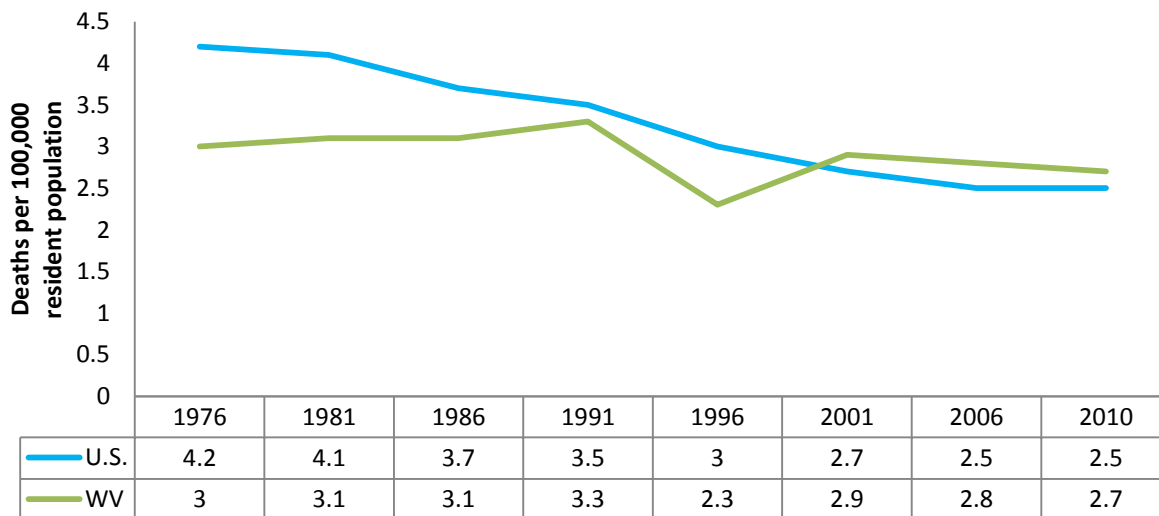
**Figure 7. Trends in Age-Adjusted Incidence Rates for Oral and Pharyngeal Cancer
United States and West Virginia, 2006-2011**



Source: United States Cancer Statistics, 2006-2011

Although the number of new cases introduced in the country has increased in recent years, over the past several decades, the number of people who have died from cancer of the oral cavity and pharynx has declined. This decrease may have been attributed to declines in risk factors, and to earlier diagnosis and improved treatment.²⁶ A similar trend was observed in West Virginia, with mortality rates decreasing since 1991. Figure 8 illustrates mortality rates of oral and pharyngeal cancer in the U.S. and West Virginia from 1976-2010. Only in the past decade (from 2001 and onward) has West Virginia's oral and pharyngeal cancer mortality rate surpassed that of the U.S.

**Figure 8. Trends in the Annual Mortality Rate of Oral and Pharyngeal Cancer
United States and West Virginia, 1976-2010**

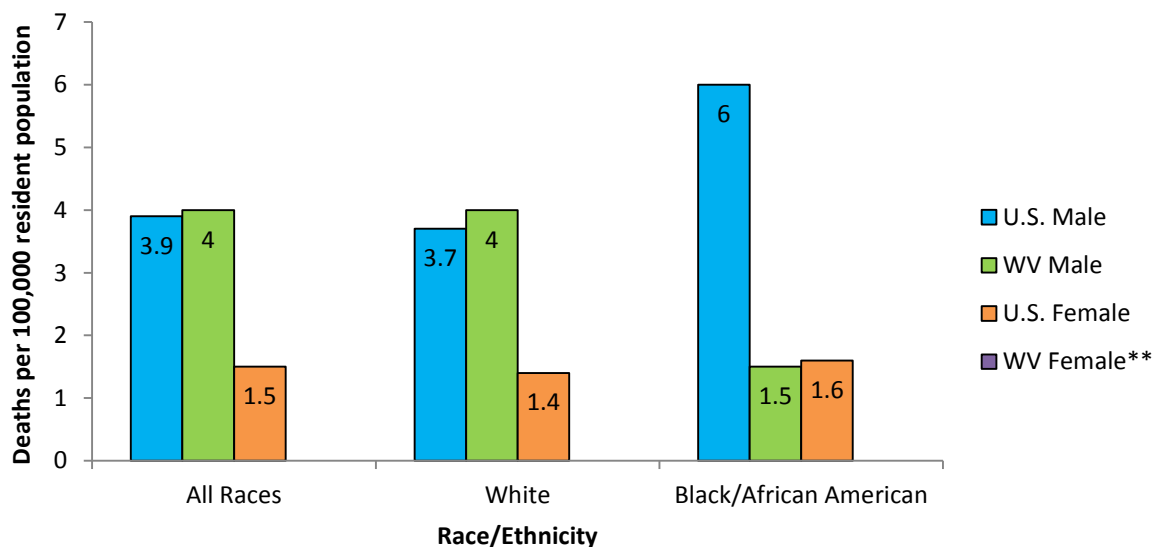


Source: State Cancer Profile, 1976-2010

Recent studies of oral cancer have shown that trends differ significantly among population subgroups and by demographic location.²⁶ Cancer of the oral cavity and the pharynx (oral cancer) is the 4th most common cancer in Black/African American men and the 7th most common cancer in White men in the U.S.³⁶ Cigarette smoking and alcohol are the major known risk factors for oral cancer in the U.S., accounting for more than 75% of these cancers.¹⁰ The use of tobacco, including smokeless tobacco⁴⁴ and cigars,³⁸ also increases the risk of oral cancer. Dietary factors, particularly low consumption of fruit, and some types of viral infections have also been implicated as risk factors for oral cancer.³⁰ Radiation from sun exposure is a risk factor for lip cancer.³⁹

Figure 9 illustrates mortality rates of oral cancer among selected demographic characteristics for the U.S. and West Virginia from 2000-2010. Rates for females in West Virginia were not reported in order to ensure confidentiality and stability of the report. However, mortality rates among U.S. females (no matter the race/ethnicity) were much lower than their male counterparts. Black/African American males and females in the U.S. (6 and 1.6, deaths per 100,000 persons) had higher mortality rates than White males and females in the U.S. (3.7 and 1.4, deaths per 100,000 persons). In contrast, White males in West Virginia had mortality rates three times higher than Black/African American males. This variation between the national and state rate may be attributed to lack in diversity among the West Virginia population. Predominately White (94.1%), Blacks/African Americans make up 3.5% of the State's population.

**Figure 9. Mortality Rate of Oral and Pharyngeal Cancer by Race/Ethnicity and Sex
United States and West Virginia, 2000-2010**



**Data suppressed to ensure confidentiality and stability.

--Difference among incidence rates were not significant, much of the data for race/ethnicity had been suppressed to ensure confidentiality and stability of rate estimates. Counts were suppressed if fewer than 16 cases were reported in a specific area-sex-race category.

Source: State Cancer Profile, 2000-2010

Disparities

Racial and Ethnic Groups

Although there have been gains in oral health status for the population as a whole, they have not been evenly distributed across subpopulations. Non-Hispanic Blacks/African Americans, Hispanics, American Indians and Alaska Natives generally have the poorest oral health of any of the racial and ethnic groups in the U.S. population. As reported above, these groups tend to be more likely than non-Hispanic Whites to experience dental caries in some age groups, are less likely to have received treatment for it, and have more extensive tooth loss. Black/African American adults in each age group are more likely than other racial/ethnic groups to have gum disease. Compared to non-Hispanic Whites, Blacks/African Americans are more likely to develop oral or pharyngeal cancer, are less likely to have it diagnosed at early stages and suffer a worse five-year survival rate.

The oral health status of West Virginians mirrors national findings with respect to the disparities in oral health found among the different racial and ethnic groups within the State, to a certain extent. Since West Virginia is predominately White, data regarding race/ethnicity is rarely collected; and when collected, drawing conclusions based on the resulting information becomes insignificant because the population samples are too small (also applies to gender, as noted in the previous section).

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 for oral disease.³⁵

Many, but not all, statistical indicators show women to have better oral health status compared to men.^{35;47} Adult females are less likely than males at each age group to have severe periodontal disease. 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. 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.

The oral health of women in West Virginia has improved since 1999 based on data collected from the BRFSS. From 1999-2010, the prevalence of women aged 65+ years with complete edentulism due to tooth decay or gum disease has decreased by 23.4% (46.2% vs. 35.4%). In 2010, a greater proportion of women than men reported visiting the dentist, dental hygienist, or a dental clinic within the past year.

Given emerging evidence showing the associations between periodontal disease and increased risk for pre-term labor and low birth weight babies, teeth cleanings during pregnancy are recommended in order to avoid the consequences of poor health. Based on data from the West Virginia Pregnancy Risk Assessment Monitoring System (PRAMS), 2010, women who did not have their teeth cleaned during pregnancy were almost four times as likely to have a baby with low birth weight (77.6% vs. 22.4%). Moreover, in 2011, it was estimated that only one-third (34.7%) of pregnant women had their teeth cleaned during pregnancy. An even lower percentage (27%) of women had their teeth cleaned after 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

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 personal and professional health care needed to maintain oral health. More than 54 million persons are defined as disabled under the Americans with Disabilities Act, including nearly 1 million children under age 6, and 4.5 million children between ages 6-16 years.

No national studies have been collected to determine the prevalence of oral and craniofacial disease among the various populations with disabilities. Several smaller scale studies show that the intellectual disability or other developmental disabilities population has significantly higher rates of poor oral hygiene and needs for periodontal disease treatment than the general population. This may be partially due to limitations in individual understanding of and physical ability to perform personal prevention practices or to obtain needed services. Caries rates vary widely among people with disabilities, but overall, their rates are higher than those of people without disabilities.⁴⁶

Concerning orofacial birth defects, between 2002 and 2006, West Virginia observed a significantly lower birth prevalence of those children born with a cleft lip (no cleft palate), as compared to the U.S. (1999-2001) (2.59 per 10,000 live births vs. 10.47 per 100,000 live births). Similarly, though not as drastic of a difference, the State's prevalence of cleft palate (without cleft lip) birth defects (4.52 per 100,000 live births) was lower than the national rate of 6.39 per 100,000 live births.²⁰

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

Socioeconomic

People living in low-income families bear a disproportionate burden via oral diseases and conditions. For example, despite the progress in reducing dental caries in the U.S., children and adolescents in families living below the poverty level experience more dental decay than children who are economically sound. Furthermore, the caries seen in individuals of all ages from poor families are more likely to be untreated than caries in those living above the poverty level.

Nationally, 50% of poor children aged 2-11 years have one or more untreated, decayed primary teeth compared with 31% of children who are not poor.⁴⁶ Poor adolescents aged 12-17 years in each racial/ethnic group have a higher percentage of untreated decay in the permanent teeth than their economically sound counterparts. This pattern is similar in adults, with the proportion of untreated decay higher among poor adults than those who are not. At every age, a higher proportion of those at the lowest income level have periodontitis, compared to that of higher income populations. Adults with some college education (25%) have 2 to 2.5 times less destructive periodontal disease than those with only high school degrees (28%) or less than a high school education (35%).⁴⁷ Overall, a higher percentage of Americans living below poverty level are edentulous than those living above it.⁴⁶ Among adults 65 years of age or older, 38.1%

with less than a high school education were edentulous in 2010, compared with 5.5% of older adults with at least some college education.

In West Virginia, 60.8% of people aged 65+ years with less than a high school education were completely edentulous in 2010, whereas those who had graduated college only had a prevalence of 10.8%. In addition, 44% of adults aged 65+ years with less than \$25,000 income level were completely edentulous, whereas only 21% of those with \$25,000+ income level observed complete edentulism.

Geographical

People living in rural areas have a higher disease burden because of difficulties in accessing preventive care and treatment services. Currently, there are 19 Federally Qualified Health Centers (FQHCs) in West Virginia that provide dental services. Though some progress has been made to expand the services of FQHCs into more counties, most of the northeastern parts of West Virginia do not offer access to dental care at FQHCs.

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.

Economic Impact

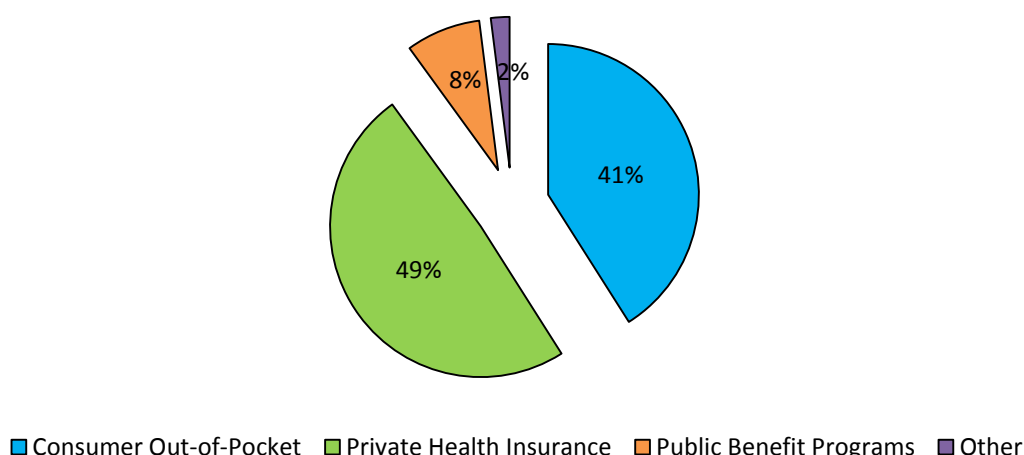
Direct Costs of Oral Disease

National dental care expenditures in 2009 were \$102.2 billion, 4.1% of the total amount spent on health care services that year.⁴² During Fiscal Year (FY) 2009, West Virginia made up 0.7% of the total national health expenditure and 3.7% (\$510 million) of the total national dental care expenditure.²⁵

Figure 10 and Figure 11 illustrate the distribution of national dental expenditure compared to physician services expenditure by source of funding during FY 2009. Consumer out-of-pocket

payments accounted for 41% of national dental expenditures, whereas private health insurance covered 49% and public benefit programs covered only 8% of all dental services.

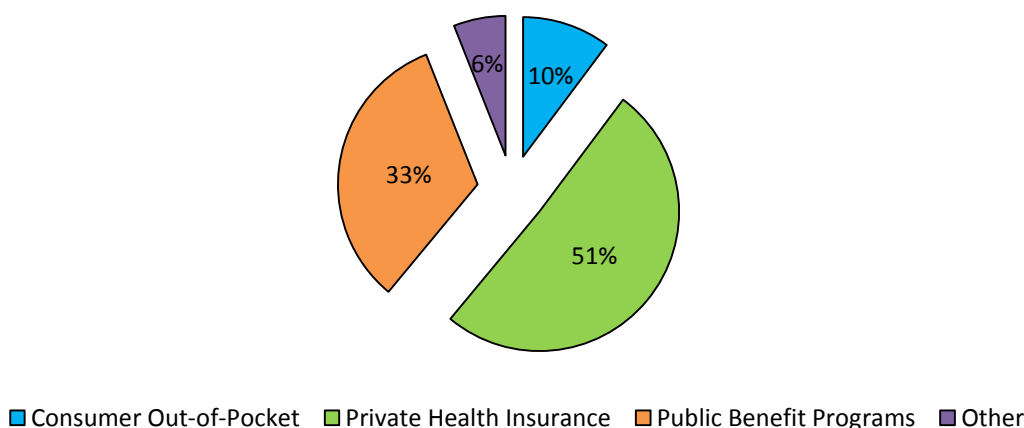
Figure 10. National Expenditures for Dental Services by Source of Funding, 2009



Source: Centers for Medicare and Medicaid Services, 2009

In comparison, 10.3% of physician services were paid out-of-pocket, 50.7% were covered by private medical insurance and 32.9% were paid by government sources.

Figure 11. National Expenditures for Physician Services by Source of Funding, 2009



Source: Centers for Medicare and Medicaid Services, 2009

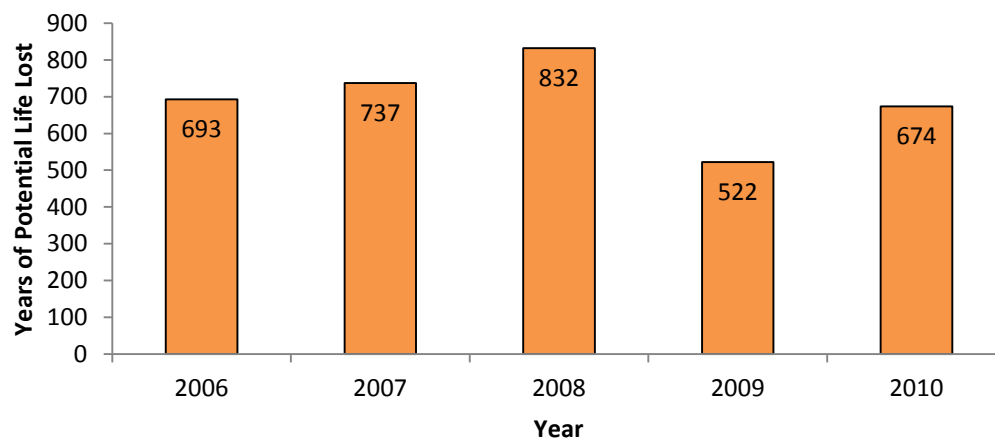
Indirect Costs of Oral Disease

Oral and craniofacial diseases and their treatment place a burden on society in the form of lost days and years of productive work. In 1996, the most recent year for which national data are available, U.S. school children missed a total of 1.6 million days of school due to acute dental conditions, or more than 3 days for every 100 students.⁴⁶ Acute dental conditions were responsible for more than 2.4 million days of work loss and contributed to a range of problems for employed adults, including restricted activity and bed days. In addition, conditions such as

oral and pharyngeal cancers contribute to premature death and can be measured by years of potential life lost (YPLL).⁴⁵ YPLL is the difference between a predetermined end point age (usually age 75 because it is approximate to the life expectancy for the U.S.) and the age at death for a death or deaths that occurred prior to that end point age.⁴⁵

There were a total of 1,327 deaths caused by cancer of the oral cavity or pharynx between 2006 and 2010 in West Virginia. This equated to 3,458 YPLL, and the average number of years of life lost was 691.6 years. The trend in YPLL for West Virginia residents who died from oral cavity and pharyngeal cancer between 2006 and 2010 is shown in Figure 12.

**Figure 12. Trend in YPLL for Oral Cavity and Pharyngeal Cancer
West Virginia, 2006-2010**



Source: West Virginia Health Statistics Center, Vital Statistics System, 2006-2010

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.^{20;21;22;34;37} More research is needed in these areas, not just to determine the effect, but to determine whether or which treatments have the most beneficial outcomes.

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, fluoride treatments, and screening for oral care.^{6;15;29} In addition, exposure to optimally fluoridated community drinking water helps prevent dental caries and 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 (0.7 parts per million⁵⁰) that is best for the prevention of dental caries. In the U.S., community water fluoridation has been the basis for primary prevention of dental caries for 60 years and has been recognized as 1 of 10 great achievements in public health of the 20th century.¹² 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.⁴⁶

Water fluoridation can reduce the occurrence of dental caries in primary teeth by up to 80%.¹⁹ The American Dental Association cites studies that indicate that community water fluoridation is responsible for preventing at least 25% of tooth decay in children and adults through the lifespan. Additionally, not only does community water fluoridation effectively prevent dental caries, it is one of very few public health prevention measures that offer significant cost savings to almost all communities.²⁴ Approximately every \$1 invested in community water fluoridation saves \$38 in averted costs. The cost per person of instituting and maintaining a water fluoridation program within a community decreases with increasing population size.

Recognizing the importance of community water fluoridation, *Healthy People 2020* objective OH-13 is to "Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water to 79.6%". In the U.S. during 2002, approximately 170 million persons (67% of the population served by public water systems) received optimally fluoridated water.⁷ Currently, about 9 out of 10 (91.5%) West Virginians on public drinking water are receiving fluoridation, compared to the 7 out of 10 (74.6%) nationally.¹⁷ The State remains steady regarding the population being served by fluoridated community water systems and continues to exceed the *Healthy People 2020* goal. As of 2012, West Virginia ranks 13th among the nation for population served by fluoridated water at optimum levels.¹⁷

Topical Fluorides and Fluoridation Supplements

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 fluoride toothpaste.¹³ 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 fluoride mouth rinse or tablet programs that are typically conducted in 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 and 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, or 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 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.⁵⁵

West Virginia has multiple programs that focus on fluoride treatment, including varnish and mouth rinse. These programs are community and school-based, and target high risk, low-income children and adolescents throughout the State:

- Marshall University School - Community Oral Health Partnership
 - Provides preventive oral health services including fluoride varnish.
 - Target population includes low-income schools.
- School-Based Mouth Rinse Project
 - Schools pass out cups of fluoride solution to participating students, swishing the fluid and disposing of garbage.
 - Requires participants to perform a weekly rinse with a 0.2% neutral sodium fluoride solution over 30 weeks.
 - Participation is voluntary. Target population includes children in Kindergarten through 6th grade in multiple counties throughout the State.
 - During FY 2013, about 9,634 children participated.
 - The OHP updated the Fluoride Rinse Manual, which was implemented this 2013-2014 school year.
- Fluoride Water Testing
 - Water test kits provided to families for testing fluoride levels of private water systems.
 - During FY 2013, the OHP assisted over 200 families test for elevated fluoride levels.

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

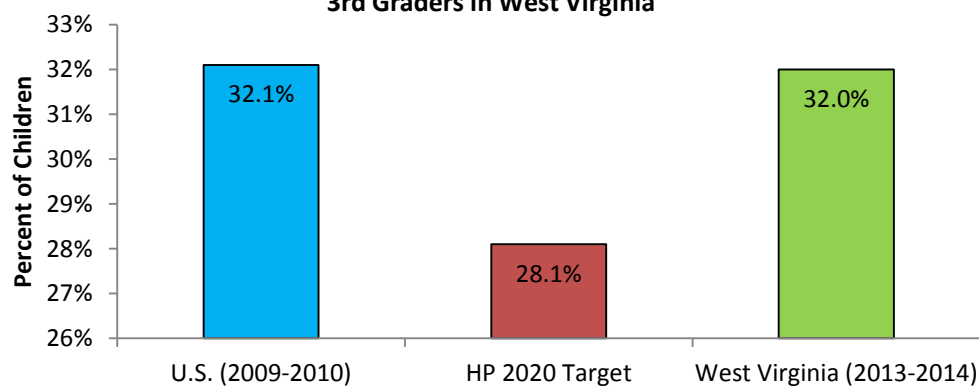
Second permanent molars erupt into the mouth at about age 12-13. Pit and fissure surfaces of these teeth are as susceptible to dental caries as the first permanent molars of younger

children. Therefore, young teenagers need dental sealants shortly after the eruption of their second permanent molars.

The *Healthy People* 2020 targets for dental sealants on molars are 1.5% for 3-5 year olds, 28.1% for 6-9 year olds, and 21.9% for 13-15 year olds. During the 2010-2011 school year, 29% of 3rd graders in West Virginia had at least one or more of their permanent molars sealed, exceeding the *Healthy People* 2020 target and the national average. The State continued to improve in sealant application, increasing the prevalence of dental sealants by 10% percent, with 32% of 3rd grade children having at least one or more sealants on their permanent molars during the 2013-2014 school year. Figure 13 illustrates comparisons between the nation, *Healthy People* 2020 target and West Virginia.

However, as previously mentioned, the sample size for 3rd grade children in West Virginia increased substantially from 2010-2011 to 2013-2014. Therefore, improvements in surveillance methods may be a factor in the difference observed between the 2010-2011 and 2013-2014 survey data, and the 2013-2014 survey data more accurately reflects the oral health status of 3rd grade children in West Virginia.

Figure 13. Percentage of Students Aged 6-9 Years with Dental Sealants in the U.S. & *Healthy People* 2020 and 3rd Graders in West Virginia



Sources: NHANES 2009-2010, HP 2020 & West Virginia BSS 2013-2014

As assessed from data collected via the 3rd grade surveillance, children aged 6-9 years throughout the nation are experiencing higher rates of dental decay with low rates of sealant application. The State aims to maintain and improve dental sealant application rates. The majority of children showing an increase in caries experience and untreated decay were either insured by Medicaid/CHIP or receiving services on a sliding fee. In addition to Marshall University's West Virginia School-Community Oral Health Partnership Project, the OHP plans to implement a school-based dental sealant project, targeting 2nd graders within the Title I Priority elementary schools by the start of the 2014-2015 school year. These schools were designated by the Board of Education as a priority. 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 project will play an essential role in improving these rates, placing West Virginia in the forefront regarding dental sealant application.

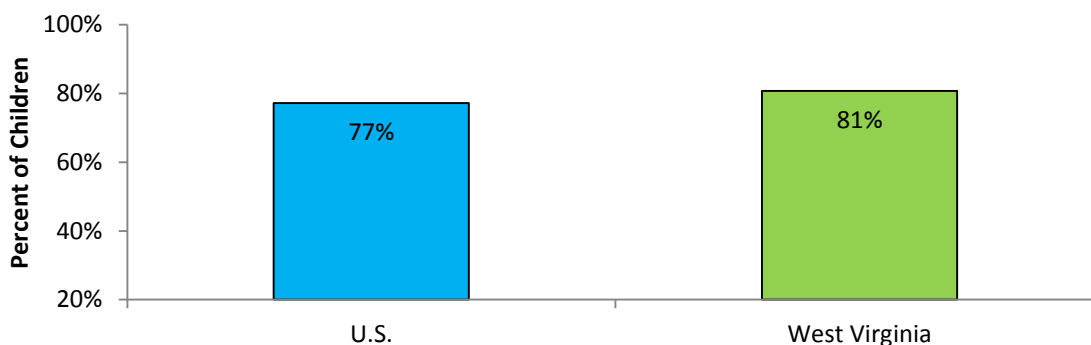
Preventive Visits

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 prevention of oral diseases. Regular preventive dental care can reduce the development of disease and facilitate early diagnosis and treatment. One measure of preventive care being tracked is the percentage of adults who had their teeth cleaned in the past year. Having one's teeth cleaned by a dentist or dental hygienist is indicative of preventive behaviors.

Children

The 2011-2012 National Survey of Children's Health (NSCH) showed that 8 out of 10 (80.7%) 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 slightly higher than the national average of 77.2% (Figure 14).

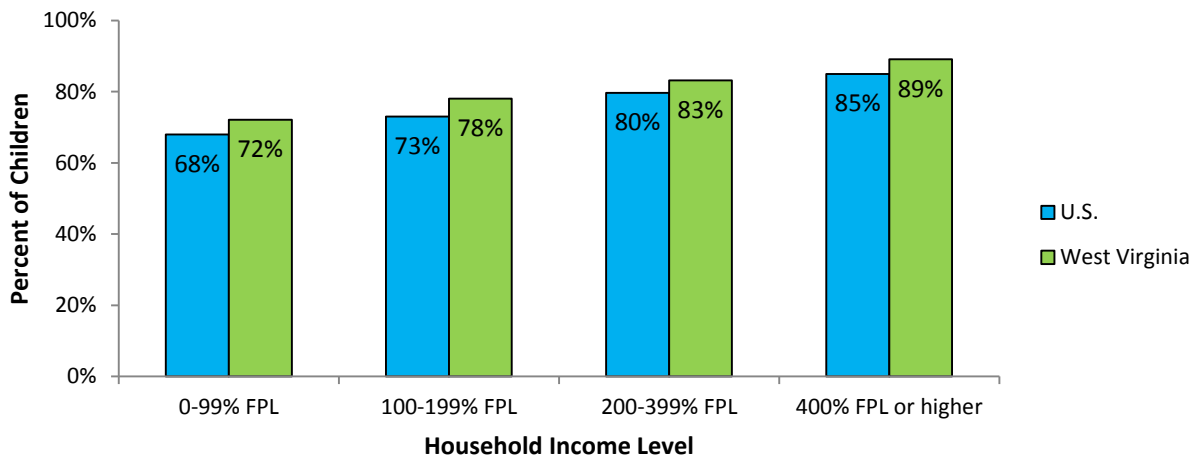
**Figure 14. Percent of Children, Aged 1-17 years, Who Had at Least One Preventative Dental Care Visit During the Past Year
U.S. and West Virginia, 2011-2012**



Source: NSCH, 2011-2012

As expected, socio-demographic disparities exist in preventive dental visits. For example, the NSCH 2011-2012 data show 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 15).

Figure 15. Percentage of Children, Aged 1-17 years, Who Had at Least One Preventive Dental Care Visit During the Past Year by Household Income U.S. and West Virginia, 2011-2012



Source: National Survey of Children's Health, 2011-2012

Adults

In 2010, 3 out of 5 (61.4%) West Virginia adults had their teeth cleaned in the previous 12 months, a rate lower than the national average of 68.5%. The 25-44 year age group was least likely to have routine teeth cleanings. Adults with more education and higher annual incomes were more likely to have their teeth cleaned than those with less education and lower income (Table 2). Additionally, according to the BSS, 22% of West Virginia adults in 2012 reported not having visited the dentist for the past five years.

Table 2. Percentage of Adults (18+) Who Had Their Teeth Cleaned in the Past Year, U.S. and West Virginia, 2010.

	U.S. %	West Virginia %
Total	68.5	61.4
Age		
18-24	66.7	58.7
25-44	65.0	57.6
45-64	70.5	64.0
65+	73.6	66.5
Education Level		
Did Not Graduate High School	45.5	36.5
High School Graduate	60.0	54.5
Attended College or Technical School	68.0	65.7
College or Technical School Graduate	80.3	81.2
Income		
<\$15,000	42.3	28.2
\$15,000-\$24,999	49.4	43.3
\$25,000-\$34,999	60.9	57.5
\$35,000-\$49,999	67.1	68.5
\$50,000+	81.0	77.5

Source: BRFSS, 2010

Pregnant Women

According to the 2011 PRAMS survey, 69.3% of mothers reported having their teeth cleaned by a dentist or hygienist in the year before their pregnancy (pre-pregnancy). However, during pregnancy, only 26.5% of women had their teeth cleaned. This rate continued to decrease after pregnancy (23.1%). From 2009-2011, the lowest prevalence of pre-pregnancy teeth cleaning occurred among mothers between age 20-24 years, less than 12 years of education, low incomes, and who smoked three months before pregnancy (Figures 16-19). In 2012, the West Virginia Prenatal Risk Screening Instrument (PRSI) reported 16.1% of pregnant women with sensitive and/or bleeding gums and 17.5% with loose, broken and/or decayed teeth. PRAMS and PRSI data indicated that the West Virginia perinatal population does not routinely visit the dentist during or after pregnancy.

Figure 16. Percentage of Mothers with Pre-Pregnancy Teeth Cleaning by Age Group, West Virginia, 2009-2011

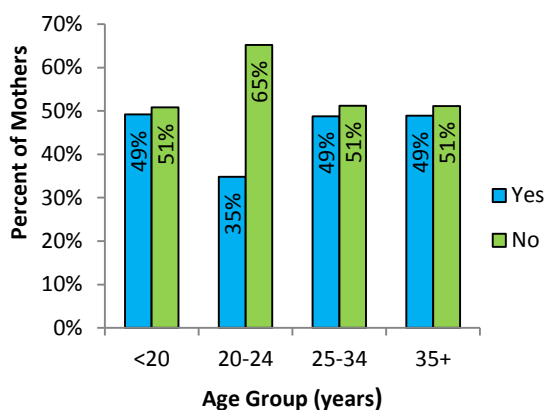


Figure 17. Percentage of Mothers with Pre-Pregnancy Teeth Cleaning by Years of Education, West Virginia, 2009-2011

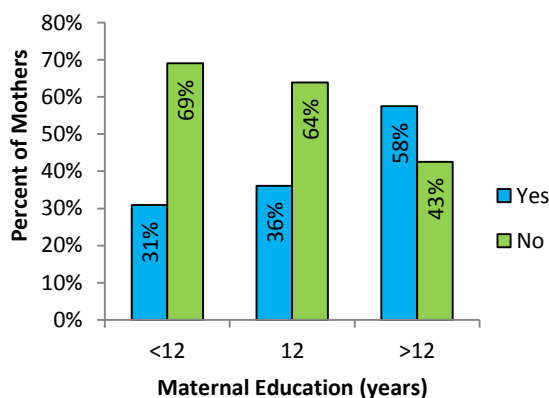


Figure 18. Percentage of Mothers with Pre-Pregnancy Teeth Cleaning by Level of Income, West Virginia, 2009-2011

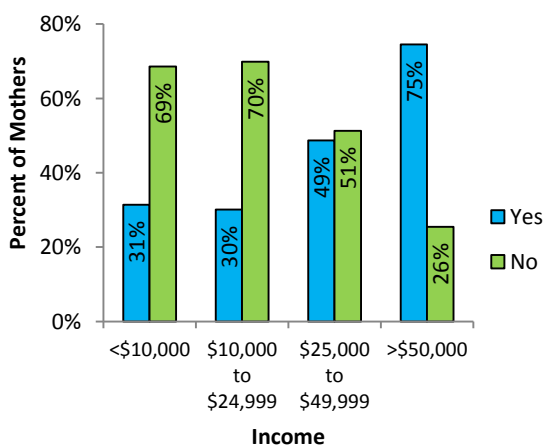
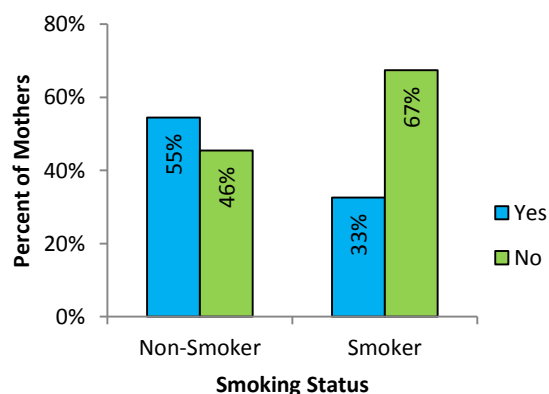


Figure 19. Percentage of Mothers with Pre-Pregnancy Teeth Cleaning by Smoking Status, West Virginia, 2009-2011



Source: PRAMS, 2009-2011

West Virginia currently provides preventive perinatal oral health services through the Helping Appalachian Parents and Infants (HAPI) Project. This project works collaboratively with existing systems to provide comprehensive services to high risk women, infants and families within eight counties. Oral health-related services provided by HAPI include oral health education, dental cleaning and screening, supplies for the expecting mother and other members of the household and an initial and six month follow-up periodontal screening and cleaning. Participants are referred to a local dentist for further and future care. Primarily focusing on behavior modification, mothers are encouraged to utilize the provided oral health supplies and education. During the course of the project, 68.2% of women reported an improvement concerning their oral health status, with 21.6% reporting no clear change and 10.2% reporting regression.

Screening for Oral Cancers

Oral cancer detection is 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. Although the sensitivity and specificity of the oral cancer examination have not been established in clinical studies, most experts consider early detection and treatment of precancerous lesions and diagnosis of oral cancer at localized stages to be the major approaches for secondary prevention of these cancers.^{27;39;60} If suspicious tissues are detected during an examination, definitive diagnostic tests, such as biopsies, are necessary in order for a confirmed diagnosis.

Oral cancer is more common after the age of 60 years. Known risk factors include use of tobacco products and alcohol. The risk of oral cancer is increased 6 to 28 times in current smokers. Alcohol consumption is an independent risk factor and when combined with the use of tobacco products, accounts for most cases of oral cancer in the U.S. and elsewhere.⁴⁹ Individuals should be advised to avoid other potential carcinogens, such as exposure to sunlight (a risk factor for lip cancer) without protection (use of lip sunscreen and hats are recommended).

Recognizing the need for dental and medical providers to examine adults for oral and pharyngeal cancer, *Healthy People 2020* objective OH-14 (developmental) is to “Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers.” In the U.S., few adults aged 40+ years (13%) reported receiving an examination for oral and pharyngeal cancer, although the proportion varies by race/ethnicity. 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. More than 400,000 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 \$150 billion in annual health-related economic losses.¹⁴ The use of any form of tobacco (including cigarettes, cigars, pipes and smokeless tobacco) has been established as a major cause of oral and pharyngeal cancer.⁴⁹ The evidence is sufficient to consider smoking a causal factor for adult periodontitis;⁴⁹ one-half of the cases of periodontal disease in this country may be attributable to cigarette smoking.⁴¹ 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.^{2;18}

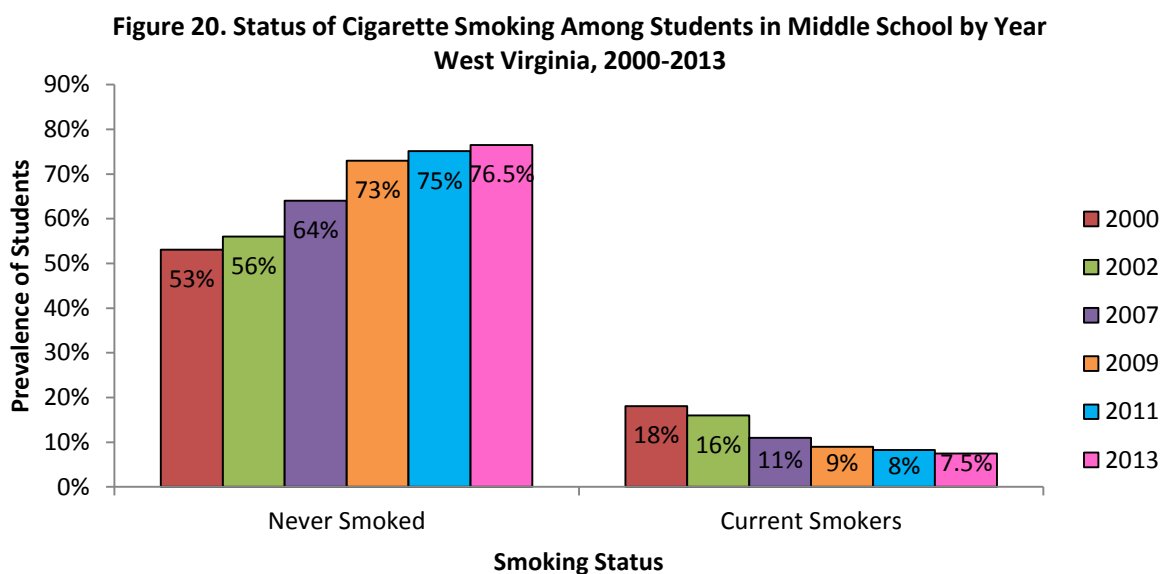
Comprehensive tobacco control would also have a large impact on oral health status. The goal of these programs is to reduce disease, disability and death related to tobacco use by:

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

Tobacco is the leading cause of death in West Virginia, with high prevalence for both smoking and spit tobacco. Both tobacco and secondhand smoke exposure kill almost 4,000 West Virginians every year.⁵⁸ The State is aggressively addressing the problem via implementation of evidence-based, comprehensive tobacco control programs throughout the Bureau for Public Health, Division of Tobacco Prevention (DTP). This Division funds prevention activities through three programs: Youth Prevention, Clean Indoor Air and Cessation. Furthermore, 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

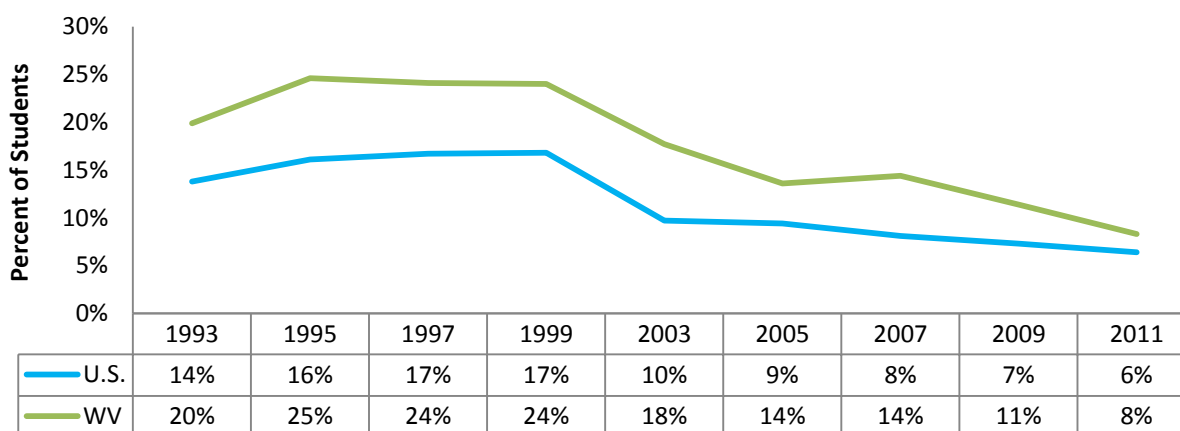
The prevalence of adolescent tobacco use in West Virginia has declined significantly over the past decade, but still remains a major public health challenge. Between 2000 and 2013, the percentage of West Virginia middle school students who have ever used any form of tobacco has decreased by 45% (24.8% in 2000 to 13.6% in 2013). Similarly, a 47% decrease among these students was observed concerning having ever smoked a cigarette (even one or two puffs).⁵⁷ Furthermore, the prevalence of cigarette smokers continues to decrease gradually, while the prevalence of those who have never smoked increases. From 2000-2013, the prevalence of currently smoking middle school students has decreased by more than half (Figure 20).



Note: 2005 Youth Tobacco Survey (YTS) was not conducted among WV Middle Schools
Source: WV Health Statistics Center: WV YTS, 2013

Significant improvements concerning tobacco use were observed among the high school population; prevalence for both tobacco use and cigarette smoking decreased by about 67% between 1999 and 2011. The nation is experiencing similar trends. However, cigarette smoking and tobacco use among the high school population in West Virginia remain higher as compared to the national average (Figure 21).

Figure 21. Annual Percentage of Students in High School Who Are Frequent Cigarette Smokers,* U.S. and West Virginia, 1993-2011



*Smoked cigarettes on 20 or more days during the 30 days before the Youth Risk Behavior Survey (YRBS)

--YRBS not conducted in 2001

Source: Youth Online - High School YRBS, 1993-2011

Table 3 presents trends in tobacco use among high school students by gender and grade. As previously stated, West Virginia students have a higher prevalence of chewing tobacco and cigarette use as the national average. In 2011, incidence rates for cigarettes were higher than rates for chewing tobacco as students progressed through high school, both nationally and in the State. Almost half of the national (44.7%) and state (47.1%) student population had smoked cigarettes, even if it was just a puff or two. Male students in West Virginia had higher chewing tobacco rates, whereas female students preferred cigarettes.

Table 3. Percentage of Students in High School Who Smoked Cigarettes or Used Chewing Tobacco/Snuff/Dip by Selected Characteristics, U.S. and West Virginia, 2011

	Chewing Tobacco, Snuff and/or Dip		Cigarettes					
	Ever Used in Past 30 Days		Ever Smoked		Smoked Before Age 13 Years		Ever Smoked in Past 30 Days	
	U.S.	WV	U.S.	WV	U.S.	WV	U.S.	WV
Total	7.7	14.4	44.7	47.1	10.3	13.1	18.1	19.1
Gender								
Male	12.8	25.5	46.3	48.0	12.0	14.3	19.9	21.8
Female	2.2	2.8	42.9	46.2	8.4	11.9	16.1	16.3
Grade								
9 th	5.9	16.2	37.6	40.8	12.1	15.1	13.0	17.7
10 th	7.4	11.8	41.0	43.0	10.1	14.9	15.6	16.2
11 th	8.6	15.2	47.1	53.2	9.8	12.5	19.3	21.5
12 th	8.8	14.5	54.5	53.3	8.2	9.4	25.1	21.8

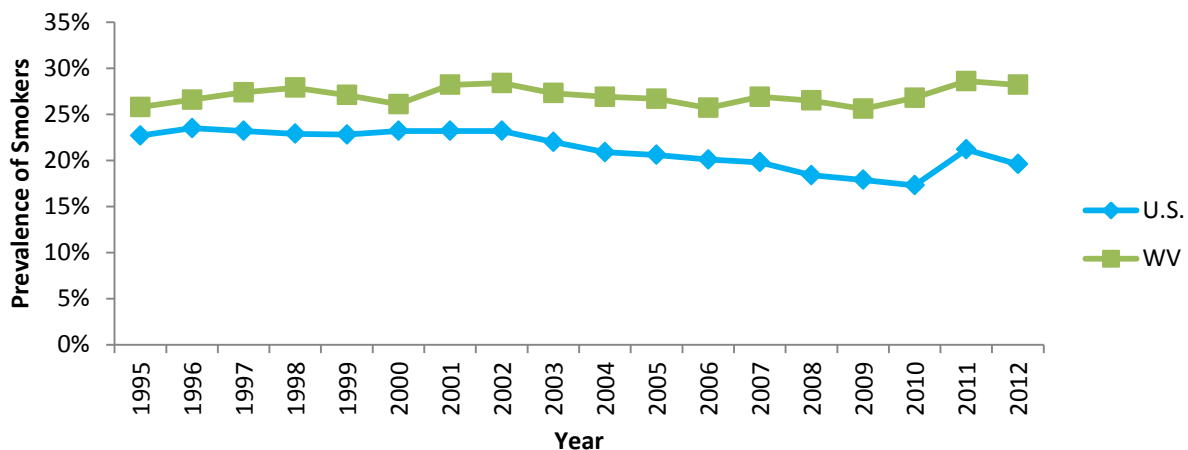
Source: Youth Online – WV High School YRBS, 2011

The goal of the West Virginia Youth Tobacco Prevention Program is to prevent the State's youth from using, or even trying, tobacco products and assisting youth in reducing the amount of usage and/or quitting for those who are currently using tobacco products. The program works closely with the American Lung Association of West Virginia to address the community needs of the State and to provide programs such as Not-On-Tobacco (N-O-T) and Teens Against Tobacco Use (TATU) for both schools and communities.⁵⁸

Adults

In 1995, 1 in 4 West Virginia adults (25.8%) was a current smoker. Smoking has declined nationally, yet remains somewhat stagnant in the State. In 2012, West Virginia's current smoking prevalence was 28.2%, whereas the U.S. prevalence has decreased to 19.6% (22.7% in 1995). Figure 22 shows the prevalence of current smokers from 1995-2012, comparing national rates to the State.

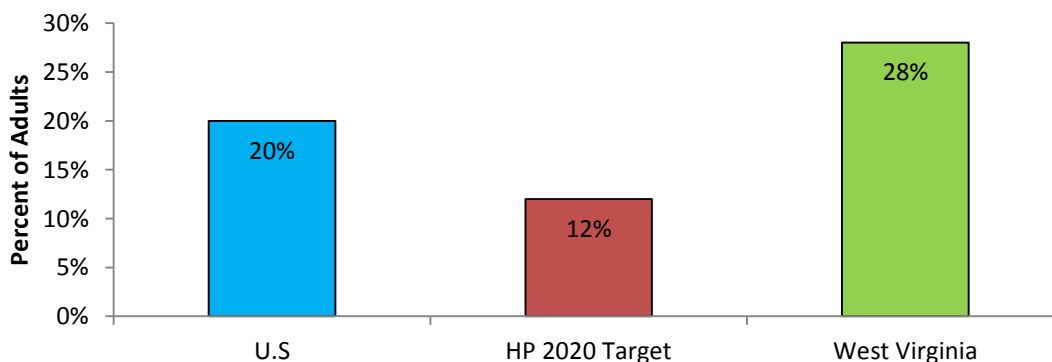
**Figure 22. Prevalence of Current Smokers
U.S. and West Virginia, 1995-2012**



Source: BRFSS, 1995-2012

Similar to 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 *Healthy People* 2020 target with a significant difference of 16% (Figure 23).

**Figure 23. Percentage of Current Smokers Among Adults Aged 18+ Years
U.S., *Healthy People* 2020 and West Virginia, 2012**



Source: BRFSS, 2012

The prevalence of smoking is significantly higher among younger adults. In 2012, the current smoking rate for those aged 18-44 years was around 33%, in comparison to 20% of those aged 45+ years. The prevalence of current smoking is highest in lower education groups and declines with increasing education. The current smoking prevalence was 28.3% among adults with less than a high school education and 18.7% among those with an education higher than high school. A similar gradient is seen between income and smoking. These trends are also observed at the national level. Table 4 below summarizes the results.

Table 4. Adult Smoking Prevalence by Selected Demographics, U.S. and West Virginia, 2012.

	United States %	West Virginia %	Estimated West Virginians
Overall	19.6	28.2	1,287
Gender			
Female	17.4	27.6	720
Male	21.6	28.8	567
Age Group*			
18 – 24	21.3	33.2	97
25 – 44	24.0	33.5	394
45+	16.4	20.3	796
Education			
High school or less	28.5	28.3	827
Greater than high school	13.9	18.7	460
Race/Ethnicity			
White, non-Hispanic	19.2	27.7	1,180
Racial/Ethnic Minority	23.3	30.1	99
Income			
<\$25,000	30.0	33.7	598
\$25,000+	18.7	18.4	520

*All percentages, with the exception of age group categories, are age-adjusted to the standard U.S. 2000 population according to the *Healthy People 2020* guidelines.

Source: BRFSS, 2012

The goal of West Virginia's Cessation Program is to educate users on the dangers of all forms of tobacco and provide successful ways to quit through the following programs:⁵⁸

- West Virginia Tobacco Quitline
 - One of the busiest quit lines (per capita) in the U.S. and free to all residents of West Virginia over the age of 18. The Quitline offers four reactive coaching calls and unlimited reactive calls. Participants are eligible for eight weeks of free nicotine replacement therapy (patches, gum or lozenges).
- Tobacco-Free Pregnancy Initiative
 - Educates pregnant women, as well as women of child-bearing age, on the dangers of using tobacco.
 - Educates health care providers about the urgent need for face-to-face tobacco cessation counseling.

- Save Face – Stop Spit Tobacco
 - Educational program overseen by the West Virginia University School of Dentistry which addresses the high rate of spit tobacco use in the State.
 - ABOUT FACE – Stop Spit Tobacco is geared towards the military and their families.
- Tobacco Cessation Training
 - Assist health care providers in advising patients on the dangers of tobacco use.

Oral Health Education

Oral health education for the community is a process that informs, motivates and assists 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.²⁸ 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.

A network of Regional Oral Health Educators provides oral health education to children and families in all 55 counties through schools, early childhood programs and community health fairs. According to the West Virginia Dental Assessment Report for FY 2013, the State has 3,148 local (community and school-based) programs that serve over 58,000 children. During FY 2012-2013, the OHP contracted with Marshall University to develop a standardized oral health curriculum. Three oral health resource guides (Pre-K/Headstart, Kindergarten-5th and 6th-12th grades) were developed to coincide with the West Virginia Department of Education Content Standards and Objectives and promote effortless classroom adaption by school personnel. Services may include providing residents with education materials, dental screenings, oral hygiene education (ensuring adequate brushing and flossing practices), nutrition education, tobacco and drug prevention and the importance of establishing a dental home.

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 U.S. Effective health policies intended to expand access, improve quality, or constrain costs must take into consideration the supply, distribution, preparation and utilization of the health workforce.

Distribution of Dental Workforce in West Virginia

Treatment of oral disease begins with availability to oral health professionals. According to the OHP's Dental and Dental Hygiene Workforce Survey, as of May 2012, there were 873 practicing dentists and 1,080 dental hygienists licensed by West Virginia and residing within the State. The majority of dentists (70%) practice primary care dentistry, which consists of 585 general and 26 pediatric dentists; 183 dentists or 21% provide specialty care which include orthodontics (52), oral/maxillofacial surgery (52), endodontics (26), periodontics (17), prosthodontics (9) and unknown specialties (27); 34 dentists (4%) work in academia as public health dentists and educators; and 61 dentists did not respond. However, recent reports from the Board of Dentistry have shown an increase in licensed and active dentists in the State, whereas the number of dental hygienists has decreased (Table 5).

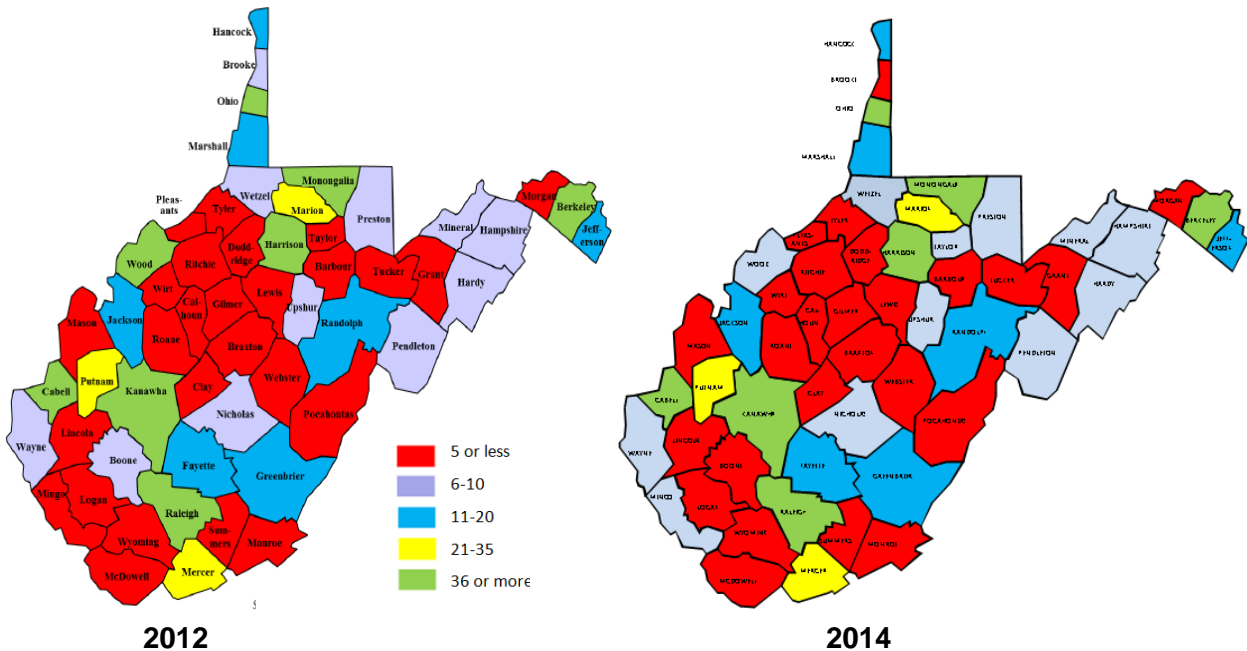
Table 5. Number of Licensed and Practicing Dental Health Professionals, West Virginia, 2012 and 2014

Practice	2012	2014
Dentists	873	899
Dental Hygienists	1,080	922
Total Dental Professionals	1,953	1,821

Sources: WV OHP Dentist and Dental Hygienist Survey, 2011-2012
WV Board of Dentists and Dental Hygienists, 2014

With a population of 1.8 million, the distribution of these dental professionals is essential. Shown below is the distribution of practicing dentists practicing in the State from 2012 and 2014 (Figure 24). In 2012, almost half (26) of the State's 55 counties had five providers or less. Additionally, these areas generally corresponded with higher rates of chronic disease and poor health. In 2014, the number of dentists in Mingo and Taylor counties increased; whereas the number of dentists in Brooke, Wood and Boone counties decreased.

Figure 24. Number of Dentists Per County, West Virginia, 2012 and 2014

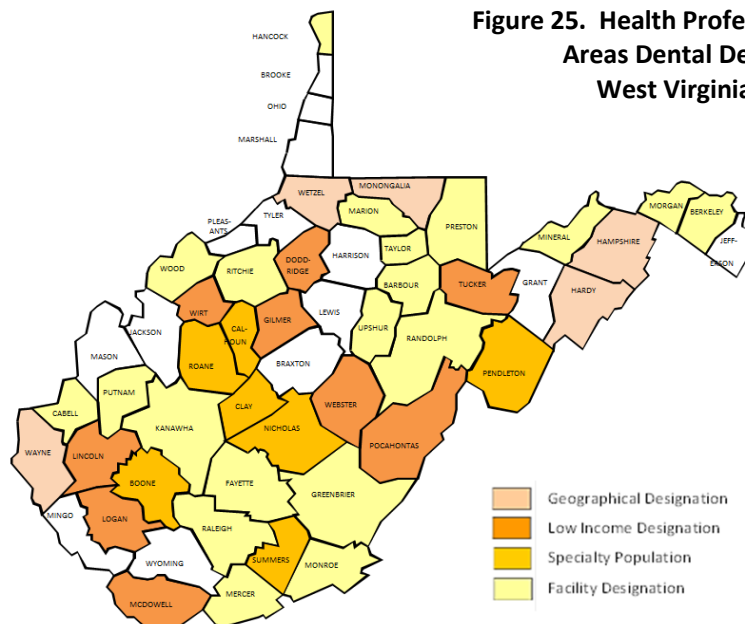


Source: WV Board of Dental Examiners, 2012 and 2014

Increasing Access to Dental Services

In 2010, West Virginia invested in community health centers to purchase equipment for dental operatories; 20 received new equipment and 15 new operatories were made available in local communities. As a result, over 8,000 additional patients received services. However, some centers reported difficulties in recruiting dentists to provide services, leaving new operatories unused. Figure 25 depicts health professional shortage areas for dental care.

**Figure 25. Health Professionals Shortage Areas Dental Designation
West Virginia, 2010**



Source: WV OHP, 2011

West Virginia is taking steps to increase access to dental services in the State, especially in the designated dental HPSAs. The OHP, with aid from the Health Resources and Services Administration (HRSA), is in the process of developing a Workforce Program targeting the state dental workforce crisis. This program will focus on increasing dental student retention rates, identifying communities experiencing dental professional shortages, providing support for teledentistry services and offering complex technical assistance to practices located in dental HPSAs to increase productivity and financial viability of these practices.

Growth in the Demand of Dental Professionals in West Virginia

With constant fluctuations in dental student retention rates over the past few years, it has become increasingly clear that West Virginia is facing issues regarding dentist retention. According to the March 2012 Dental Census Survey, 81% of West Virginia's practicing dentists were educated at West Virginia University and 37% of practicing dentists planned to retire in the next ten years, meaning that as many as 320 dentists may retire. If trends are not reversed, there may be as few as 200 graduating dentists to replace them during this same ten year time frame. There had been a steady decline in the number of dental school graduates practicing in West Virginia against the total number of West Virginia University graduates from 2009 to 2011 (Figure 26 and Table 6). Recent oral health workforce improvement efforts in the State have been targeting dentistry student retention via placement and loan reimbursement programs, as well as offering other opportunities upon graduation. These efforts may have contributed to the increase in the retention rate in 2012.

Figure 26. Trend of West Virginia University Dental Student Retention, 2007-2012

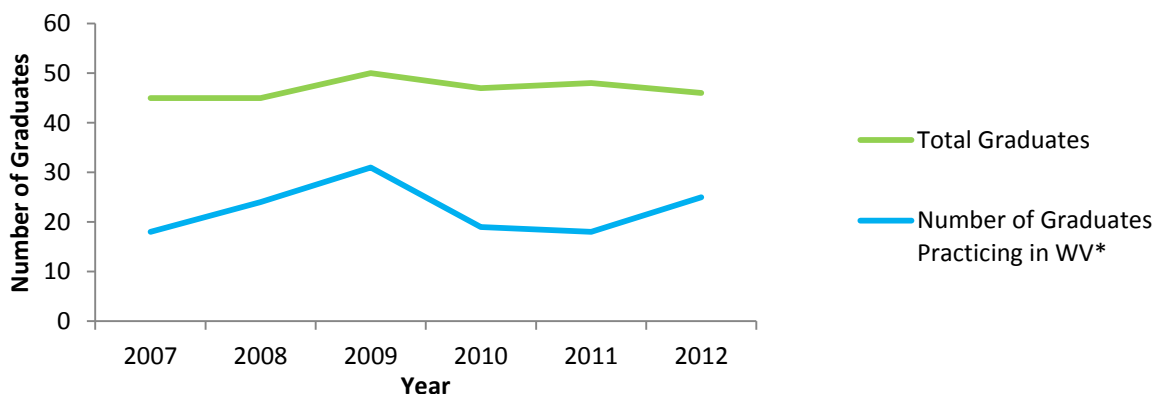


Table 6. Trend in West Virginia University Dental Student Retention, 2007-2012

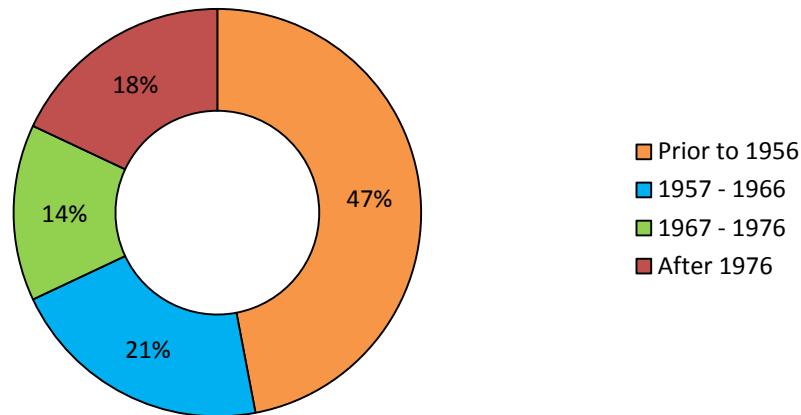
	2007	2008	2009	2010	2011	2012
Total Graduates	45	45	50	47	48	46
Number of Graduates Practicing in WV*	18	24	31	19	18	25
Percent of Graduates Practicing in WV	40%	51%	62%	40%	38%	54%

*Due to logistics involved in establishing a practice, it may take a dentist several months to establish a practice. Therefore the number of dentistry graduates practicing in West Virginia may increase over time as more graduates establish practices and/or complete residency.

Source: West Virginia University School of Dentistry, 2007-2012

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 quickly, the number of practicing dentists available to West Virginia will begin to decline. Most of the current practicing dentists (43%) have been active for over 20 years, with the average age of a dentist in West Virginia at 56 years, as compared with the national average of 51 years. With nearly half of the State's licensed dentists being over the age of 56 years (Figure 27), future plans of the current dental practices play an essential role in workforce planning.

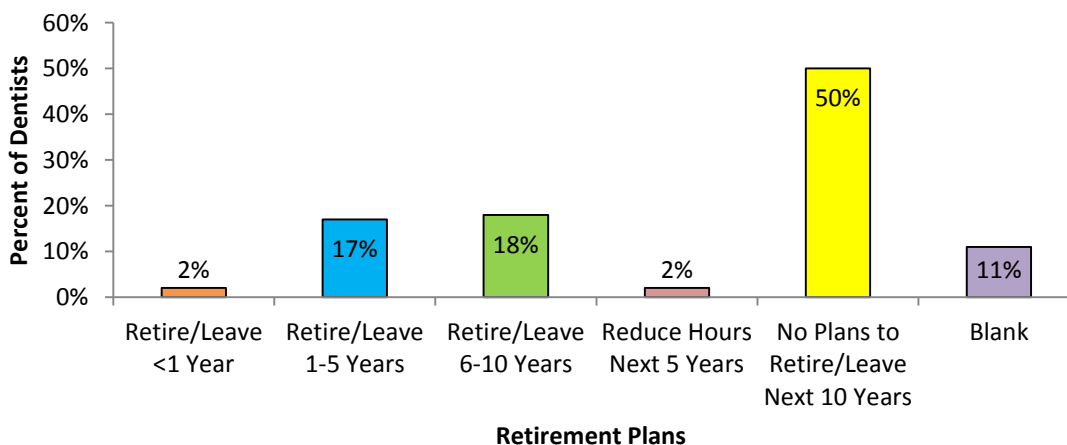
Figure 27. Year of Birth for Licensed Dentists Practicing in West Virginia, 2012



Source: WV OHP Dentist and Dental Hygienist Survey, 2011-2012

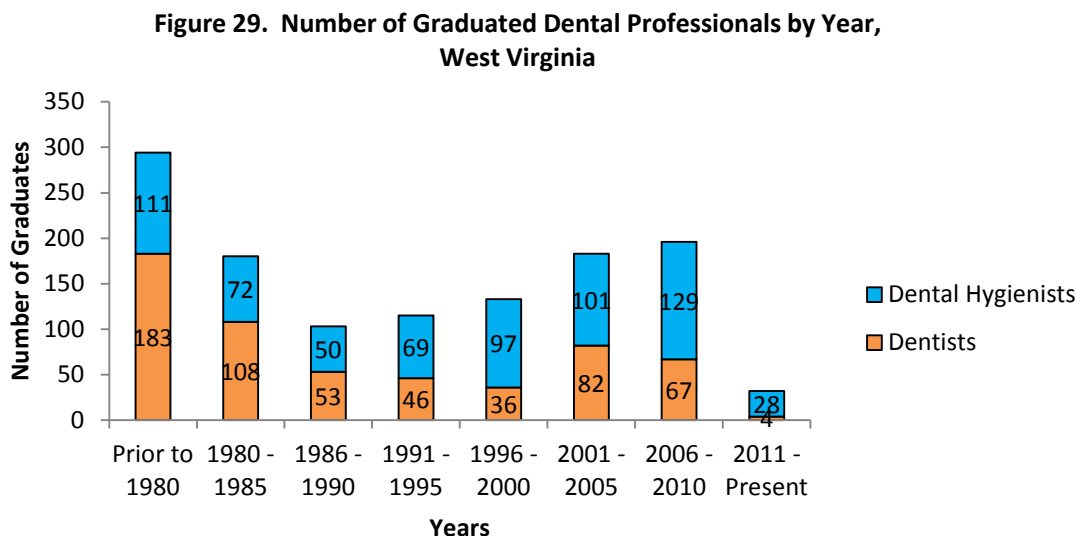
According to the West Virginia OHP Dentist and Dental Hygienist Survey, 37% of current practicing dentists plan to retire within the next ten years (Figure 28). Furthermore, 58% of those dentists retiring in the next ten years were not interested in recruiting other dentists to replace them, 12% had searched and found success in recruiting a dentist, 6% searched but were not successful and 11% made no effort to search, but indicated they were not against the idea of recruitment.

Figure 28. Retirement Plans of Dentists, West Virginia, 2012



Source: WV OHP Dentist and Dental Hygienist Survey, 2011-2012

Whereas the number of graduating dentists is decreasing, the number of dental hygienists is increasing. Among the current licensed hygienists in West Virginia, 36% were awarded degrees after 2001, as compared to 22% of current licensed dentists (Figure 29). In addition, 33% of all practicing dental hygienists in the State were born prior to 1965, greatly contrasting the 70% of the State's practicing dentists. Although an average age for dental hygienists within the State is not available, it can be assumed that it is much lower than dentists.



Source: WV OHP Dentist and Dental Hygienist Survey, 2011-2012

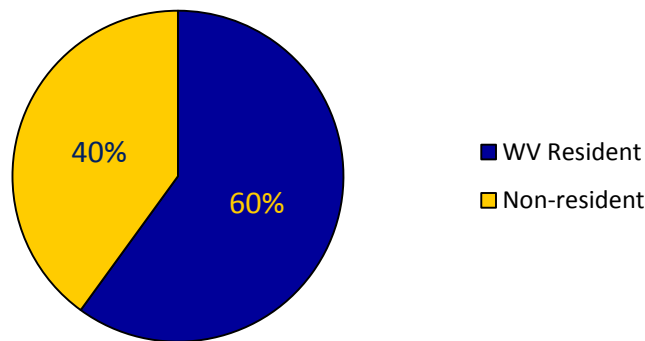
The Workforce Project will also increase retention rates among graduating dentists in West Virginia by 2015. The current project objective is to increase this rate by 18%. Barriers preventing retention will be identified and resolved. Furthermore, loan repayments and reimbursements will be provided for participating graduates that meet the specified criteria.

Dental Education Institutions

West Virginia's only dental school, West Virginia University School of Dentistry, is located in Morgantown, West Virginia. The school offers programs such as the Doctor of Dental Surgery (D.D.S.), General Practice Residency Program and the Advanced Educational Program in Oral and Maxillofacial Surgery. Masters programs in endodontics, orthodontics and prosthodontics are provided as specializations.

Since 2004, the number of first-year students enrolled in the school remained stagnant at around 50 enrollees, with the number of applications received consistently increasing. In 2013, although the number of first year enrollees in the dental school increased to 60, the number of applications received showed a downward trend. Among the enrollees, 36 students were from West Virginia (Figure 30).

**Figure 30. West Virginia University
School of Dentistry Enrollment by Residency, 2013**



Source: West Virginia University School of Dentistry, 2013

According to a survey conducted by the American Dental Association on dental education, during the 2010-2011 school year, West Virginia University School of Dentistry accounted for 1% of the total number of first-year dental school enrollees. About 14% (714) of first-year students reported the East North Central region (Wisconsin, Illinois, Michigan, Indiana and West Virginia) of the U.S. as their region of residence making it the 3rd largest (of 10) region of first-year dental student representation. Every first-year student from West Virginia remained within the State.⁴⁵

In addition to West Virginia's dental school, the State has four dental hygiene schools: West Virginia University, West Liberty University, Bridgemont Community & Technical College, and Southern West Virginia Community & Technical College. In 2012, West Liberty University and West Virginia University accounted for half of the dental hygiene graduates among the State.

Continuing Education Credits (CEs)

According to the West Virginia Dental Board, continuing education (CE) credits for dentists and dental hygienists are required biennially (every two years). Each licensed dentist must complete 35 CE hours, with only 17 hours being permitted to be taken online or through correspondence. Regarding dental hygienists, 20 CE hours are required with only 10 hours being permitted to be taken online or through correspondence.⁵³

Financing Dental Education in West Virginia

According to the Allied Dental Education Association (ADEA) Institute for Policy and Advocacy, in 2003, nearly 65% of all graduates from dental schools nationwide owed between \$100,000 and \$350,000 for the cost of dental education. The average debt of all students upon graduation from all types of dental schools was \$118,750. In the past decade, this average has more than doubled (\$241,097 in 2013). For dental hygiene programs, the average cost for resident tuition and fees during the 2003-2004 academic year was \$11,104 nationally.⁵

West Virginia offers two financial incentive programs for dental professionals who are interested in practicing in one of the State's underserved communities: State Loan Repayment Program (SLRP) and Recruitment and Retention Community Project (RRCP). SLRP is funded through the Federal Bureau of Health Professionals and the state and is solely for the purpose of health educational loan repayment.⁵⁹ 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 a non-profit.

The RRCP is funded through the state and community and can be used for dental educational loan repayment, residency stipend, retention, sign-on bonus or other incentives based on the community's need to attract or keep the dental professional. However, it cannot be used for salary supplementation. 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 three one-year extensions that may be awarded.⁵⁹

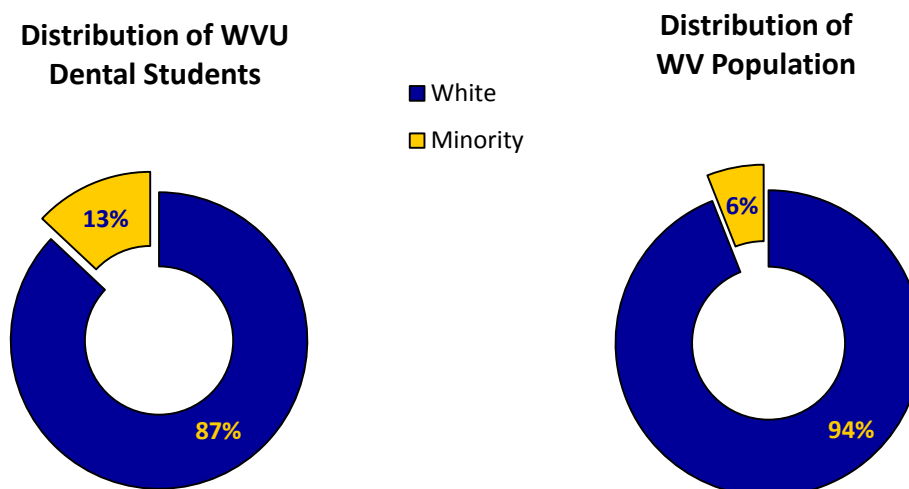
The Oral Health Workforce Program plans to work with both students and communities to increase retention of dental school graduates. Students participating in this program will be matched with a community that exhibits dental professional shortages. Program and community leaders will then work with the student to develop a personalized recruitment package that may include ready-to-go operatories, loan repayment, appropriate housing, assistance with spousal job placement, teledentistry support and other practice management technical assistance.

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.⁴⁷ Data on the race/ethnicity of dental care providers were derived from surveys of professionally active dentists conducted by the American Dental Association.³ In 1997, 1.9% of active dentists in the U.S. identified themselves as Black/African American, yet that group comprised 12.1% of the U.S. population. Hispanic/Latino dentists comprised 2.7% of U.S. dentists, as compared to 10.9% of the population that was Hispanic/Latino.

Since West Virginia is predominantly White (94.1%), there is limited data concerning race/ethnicity for many topics and information on West Virginia University School of Dentistry's first-time enrollees is no different. Enrollment of under-represented minority students of the 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). Additionally, the race/ethnic distribution of first-year West Virginia University dental students mirrored the race/ethnic distribution of the State population (Figure 31).

Figure 31. 2013 First-Year Enrollees in West Virginia University (WVU) Dental School and 2012 West Virginia State Population by Race/Ethnicity



Sources: West Virginia University School of Dentistry, 2013 and U.S. Census, 2012

Use of Dental Services

General Population

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 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 currently available data from the 2008 and 2010 BRFSS, disparities were found in the proportion of West Virginia adults aged 18+ years visiting the dentist within the previous 12 months based on the gender, age, education and income level of survey respondents (Table 7). Men, individuals with less education, and more limited income were less likely to have visited a dentist or dental clinic within the last year. Similar trends in the utilization of dental services were found nationally for similar populations. Both nationally and in the state, adults categorized as having less than a high school education and with annual incomes of under \$15,000 were found to be the least likely to have been to a dentist or dental clinic in that past 12 months.

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. A greater proportion of West Virginians between age 18-24 years reported receiving dental services within the prior year, as compared to their national counterparts; West Virginians aged 65+ years (50.4%) were less likely to have seen a dentist during the previous year compared to other 65+ year olds nationally (67.1%).

Table 7. Proportion of Persons Aged 18+ Years Who Visited a Dentist in the Previous 12 Months, U.S. (2008) and West Virginia (2010)

	United States (2008) %	West Virginia (2010) %
Total	67.0	60.5
Gender		
Male	66.3	57.5
Female	70.5	63.4
Age		
18 – 24	67.0	69.0
25 – 34	63.8	62.9
35 – 44	69.5	62.2
45 – 54	71.0	62.8
55 – 64	72.2	60.4
65+	67.1	50.4
Education		
Less than High School	46.1	33.2
High School Graduate	61.9	55.5
College/Technical School	69.3	66.3
College/Technical School Graduate	81.0	83.3
Income		
<\$15,000	45.8	33.8
\$15,000 - \$24,999	51.0	41.9
\$25,000 - \$34,999	59.5	52.1
\$35,000 - \$49,999	67.7	67.7
\$50,000+	80.9	74.8

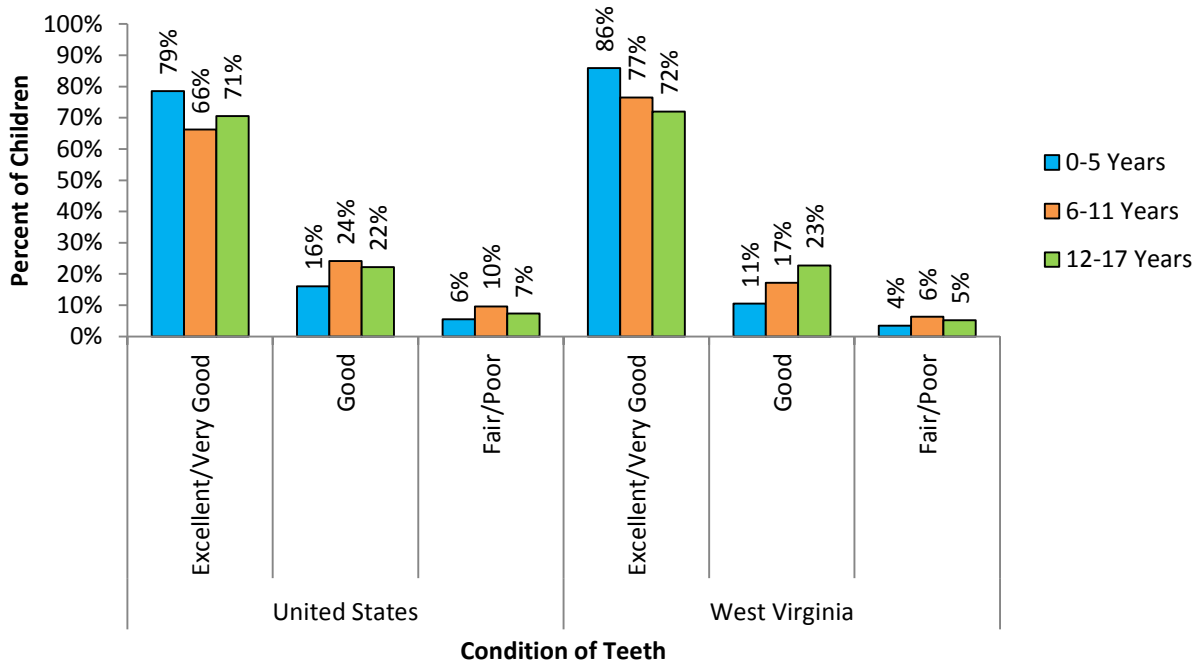
Source: BRFSS, 2008 and 2010

Special Populations

School Children

The NSCH collects national and state level data on many child health indicators, including oral health on children ages 0-17 years. From 2011-2012, 80.7% of West Virginia parents reported their child had one or more preventive dental care visits during the previous 12 months, compared to 77.2% nationwide. Additionally, over 70% of parents believed their children's teeth were in very good or excellent condition (Figure 32). However, 16.6%, or an estimated population of 59,692, reported they had one or more oral health problems during the previous 12 months: toothache, decayed teeth, or unfilled cavities.

Figure 32. Condition of Teeth for Children Aged 0-17 by Age, United States and West Virginia, 2011-2012



Source: NSCH, 2011-2012

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 are able to visit the clinic and often return to classes the same day, thereby reducing absenteeism. The location of dental clinics on school property is seen as a way of addressing dental issues in a more timely and collaborative manner as a result of facilitated communication between education and clinic staff.

During FY 2012-2013, 14,251 of West Virginia children participated in dental screening programs. About 2,834 3rd graders were assessed for sealants, with 1,061 who had dental sealants applied on one or more molars. 9,634 children participated in the fluoride mouth rinse program and 228 children received fluoride supplements (tablets or drops).

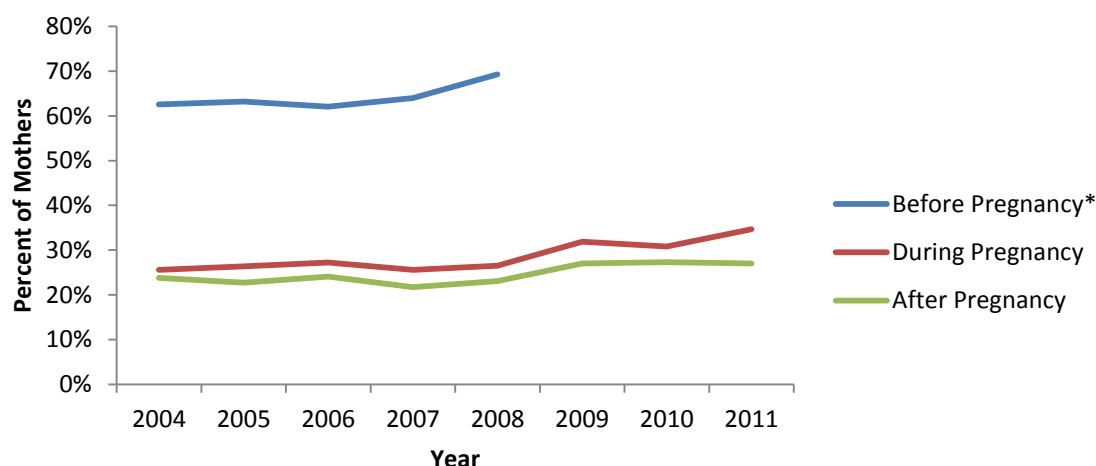
Pregnant Women

Studies documenting the effects of hormones on the oral health of pregnant women suggest that over 25% of these women experience gingivitis and up to 10% may develop more serious oral infections.^{1;31} Recent evidence suggests that oral infections, such as periodontitis, during pregnancy may increase the risk for pre-term or low birth weight deliveries.⁵² 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.²³

Between 2007 and 2011, there were 106,210 births in West Virginia, of which about 60% were funded by Medicaid. Currently, adults between age 18-20 years may access dental services via their Early Periodic Screening, Diagnosis and Treatment (EPSDT) benefit under Medicaid. However, adults aged 21 and over are not covered for any preventative oral health services

under Medicaid, so many pregnant women often go 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 25.6% in 2004 to 34.7% in 2011 (Figure 33 and Table 8), less than one-third of all women received care during or after their pregnancy.

Figure 33. Percentage of Mothers Who Had Their Teeth Cleaned, West Virginia, 2004-2011



*Data not collected after 2008

Source: PRAMS, 2004-2011

Table 8. Percentage of Mothers Who Had Their Teeth Cleaned, West Virginia, 2004-2011

	2004	2005	2006	2007	2008	2009	2010	2011
Before Pregnancy*	62.6	63.2	62.1	64.0	69.3	N/A	N/A	N/A
During Pregnancy	25.6	26.4	27.2	25.6	26.5	31.9	30.8	34.7
After Pregnancy	23.8	22.7	24.1	21.7	23.1	27.0	27.3	27.0

*Data not collected after 2008

Source: PRAMS, 2004-2011

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

Medicaid is the primary source of health care for low-income families, elderly and disabled people in the U.S. This program became law in 1965 and is jointly funded by the federal and state governments (including the District of Columbia and the Territories) to assist states in providing medical, dental and long term care assistance to people who meet certain eligibility criteria. People who are not U.S. citizens can only get Medicaid to treat a life-threatening medical emergency. Eligibility is determined based on state and national criteria. Dental services are a required service for most Medicaid-eligible individuals under the age of 21, as a required component of the EPSDT benefit. At a minimum, services must include relief of pain

and infections, restoration of teeth, and maintenance of dental health. Dental services may not be limited to emergency services for EPSDT recipients.

Nationally, federal Medicaid expenditures for dental services totaled \$4.9 billion in 2010, or about 5% of the \$104.8 billion spent on dental services nationally.⁴² West Virginia spent \$2.5 billion for Medicaid in 2010, of which \$46 million or 1.8% was for dental services.⁵⁶

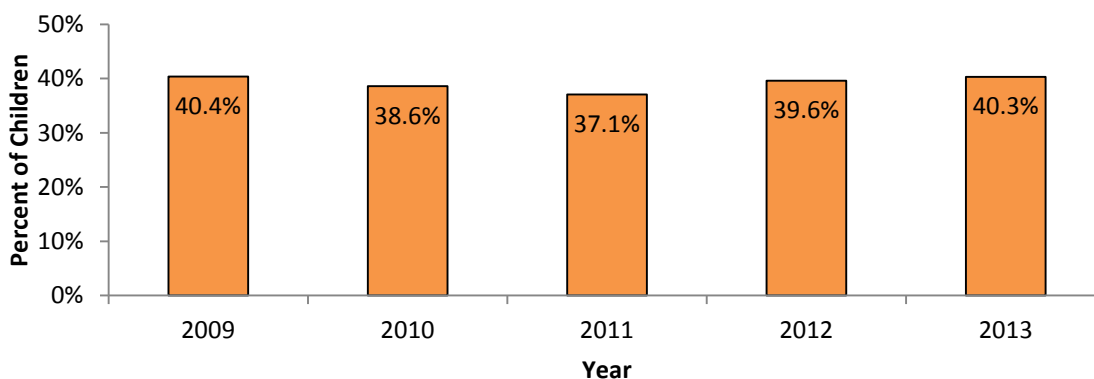
West Virginia Medicaid

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. Adults aged 21+ years, however, are limited to emergent procedures to treat fractures, reduce pain or eliminate infection.⁵⁶

In FY 2011, about 20% of Medicaid-eligible adults 21+ years and 48% of Medicaid-eligible children utilized dental services. Because Medicaid does not cover preventative care for adult patients, there were a higher number of visits for restorative care than for preventive care; whereas children's visits were mostly for preventive care (41.8%). Figure 34 illustrates a five-year trend in the percentage of West Virginia's children under age 18 who are Medicaid beneficiaries that have received at least one preventive dental service in a 12 month period.

The average number of Medicaid dental claims from 2003-2013 was 280,257 claims per year; while the cost of these claims averaged about \$156 per claim. In the past decade (2003-2013), West Virginia has spent an estimated \$395 million for dental services through Medicaid. During FY 2013, Medicaid dental expenditures for the State were approximately \$57.5 million, making up about 15% of the total state dental expenditures through Medicaid in the past decade. Furthermore, there was 25% increase in Medicaid dental costs for the State from 2010-2013 (\$46 million to \$57.5 million).

**Figure 34. Percentage of Medicaid Children <18 years With At Least One Preventive Dental Visit in the Past 12 Months
West Virginia, 2009-2013**



Source: CMS-416, 2014

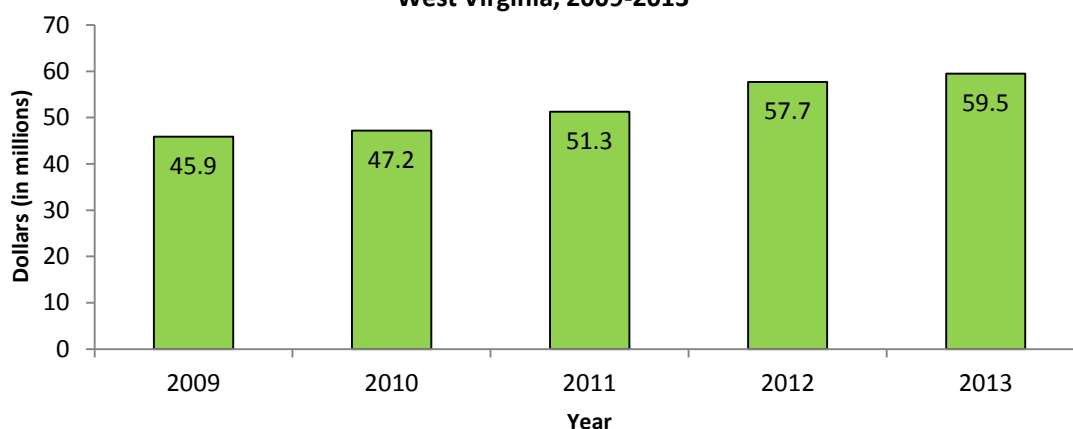
West Virginia Children's Health Insurance Program (WVCHIP)

WVCHIP is limited to children under the age of 19 who are not eligible for West Virginia Medicaid. Services covered under this program include preventive, oral surgery and accident-related services. During FY 2013, 25,045 children were enrolled in WVCHIP (6.5% of the

State's population aged 0-18 years), an increase by about 245 children as compared to enrollment from the previous year (FY 2012: 24,800 children).

As a result, health expenditures for WVCHIP also increased. From 2012-2013, overall health expenditures for the program increased by 3%; 57.7 million in 2012 as compared to 59.5 million in 2013 (Figure 35). Furthermore, in 2013, dental expenditures accounted for 15% of overall health expenditures for the year, an increase of 4% from the previous year (Figure 36).

**Figure 35. Total WVCHIP Expenditures
West Virginia, 2009-2013**



Source: WVCHIP Annual Report, 2013

**Figure 36. WVCHIP Expenditures by Service Type
West Virginia, 2011-2013**



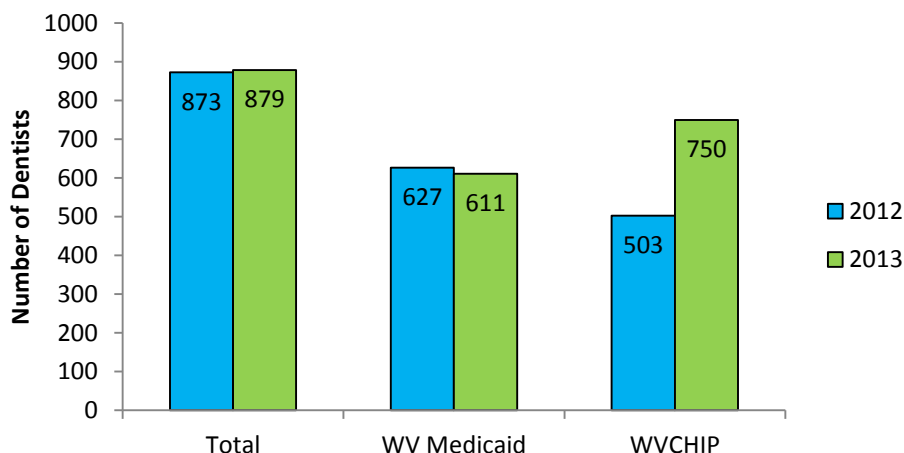
Source: WVCHIP Annual Report, 2011-2013

Dentists Participating in West Virginia Medicaid and WVCHIP

In 2013, of the 879 dentists (general dentists and specialists) licensed to practice in West Virginia, 611 (69.5%) were active in the State's Medicaid program (had at least one paid claim) and 750 (85.3%) actively participated in WVCHIP. These numbers vary from the previous year. Accounting for the slight increase in the number of dentists licensed and actively working in the

State (873 dentists in 2012 to 879 dentists in 2013), WVCHIP observed a 49% increase in actively participating dentists from 2012-2013, whereas WV Medicaid experienced a 2.6% decrease in active dentists (Figure 37).

**Figure 37. Number of Active Dentists Practicing in West Virginia
WV Medicaid and WVCHIP, 2012-2013**



Sources: West Virginia Dental Board, Medicaid and WVCHIP Claims Data, 2012 and 2013

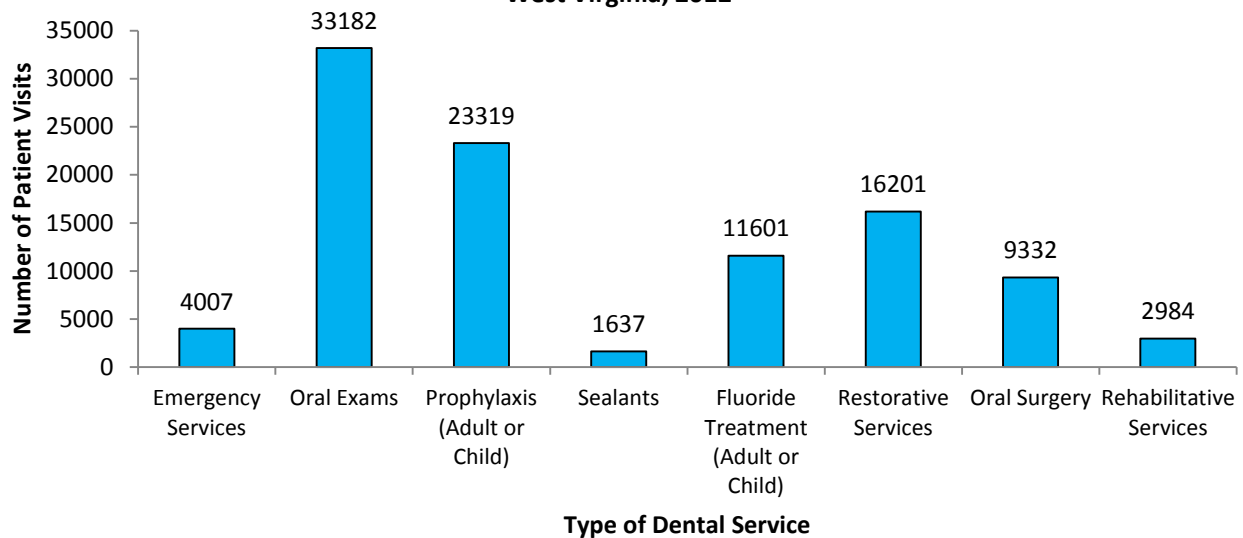
Community & Migrant Health Centers and Other State, County & Local Programs

Community-Based Health Centers

Community-Based Health Centers (CBHCs) provide family-oriented primary and preventive health care services for people living in rural and urban medically underserved communities. CBHCs exist in areas where economic, geographic or cultural barriers limit access to primary health care. The Migrant Health Program (MHP) supports the delivery of migrant health services, serving over 650,000 migrant and seasonal farm workers. Among other services provided, many CBHCs and Migrant Health Centers provide dental care services.

The *Healthy People* 2020 objective OH-10.1 is to “Increase the proportion of FQHCs that have an oral health component.” In the U.S., 75% of FQHCs had an oral health component in 2007; the *Healthy People* 2020 target is 83%. In the U.S., 17.5% of patients at FQHCs received oral health services in 2007; the *Healthy People* 2020 target is 33.3%. In West Virginia, 55.9% (19) of the FQHCs provide an oral health component, providing preventive, emergency and/or restorative care (Figure 38); of the oral health-related visits at FQHCs during 2012, over half (52.9%) of the visits were for preventive care. The State’s FQHCs employ a total of 26.6 full-time equivalent (FTE) dentists.

**Figure 38. Number of Patient Visits per Dental Service Provided by FQHCs
West Virginia, 2012**



Source: HRSA Primary Care: The Health Center Program, 2012

Although the proportion of patients receiving oral health services at FQHCs each year in West Virginia (*Healthy People* 2020 objective OH-11) is not collected, more than 33,000 people received oral exams via FQHCs in 2012, constituting 0.7% of the population receiving oral health services at FQHCs nationally. From 2010-2012, FQHCs in the U.S. have increased their dental patient rates by 18.3%.

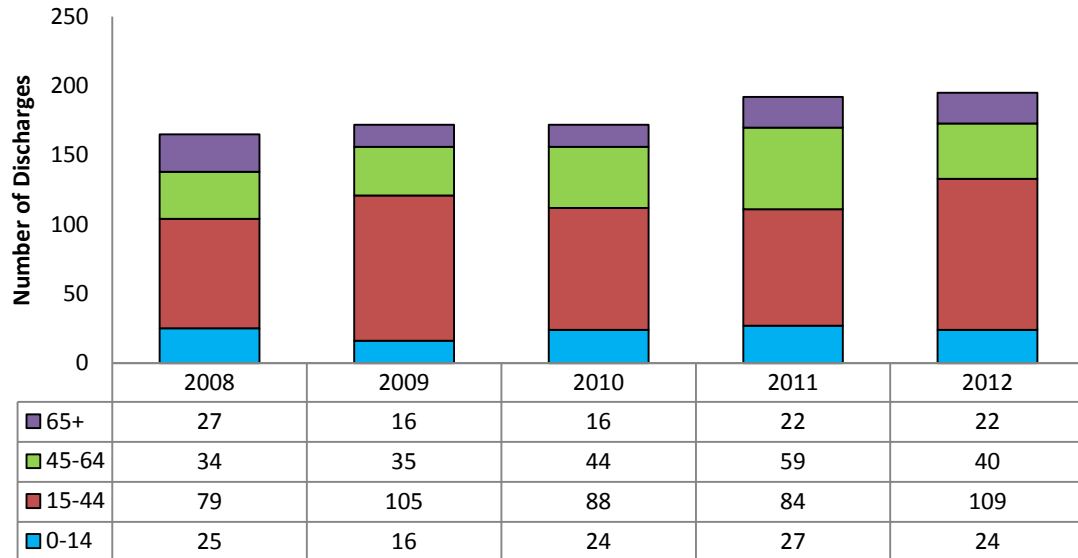
Oral health services may also be provided via local and state health departments. The *Healthy People* 2020 objective OH-10.2 is to “Increase the proportion of local health departments that have oral health prevention or care programs.” In the U.S., 25.8% of local health departments have oral health programs; the *Healthy People* 2020 target is 28.4%. As of 2013, 24.5% of local health departments in West Virginia have some type of oral health program.

Emergency Departments and Hospitalization

Visits to hospital emergency departments for non-traumatic dental complaints have increased over the past several decades throughout the U.S.⁴⁰ Nationally, Medicaid members and uninsured individuals have a more difficult time obtaining dental services compared to medical services.⁹ Many of the individuals unable to obtain dental care end up in emergency departments. Frequent visits to the hospital for non-traumatic cases do not treat the underlying problems. Instead, they provide temporary measures, such as pain relief, antibiotics for infection or corrective surgeries for issues that may have been prevented. Currently, West Virginia does not release emergency department-related data.

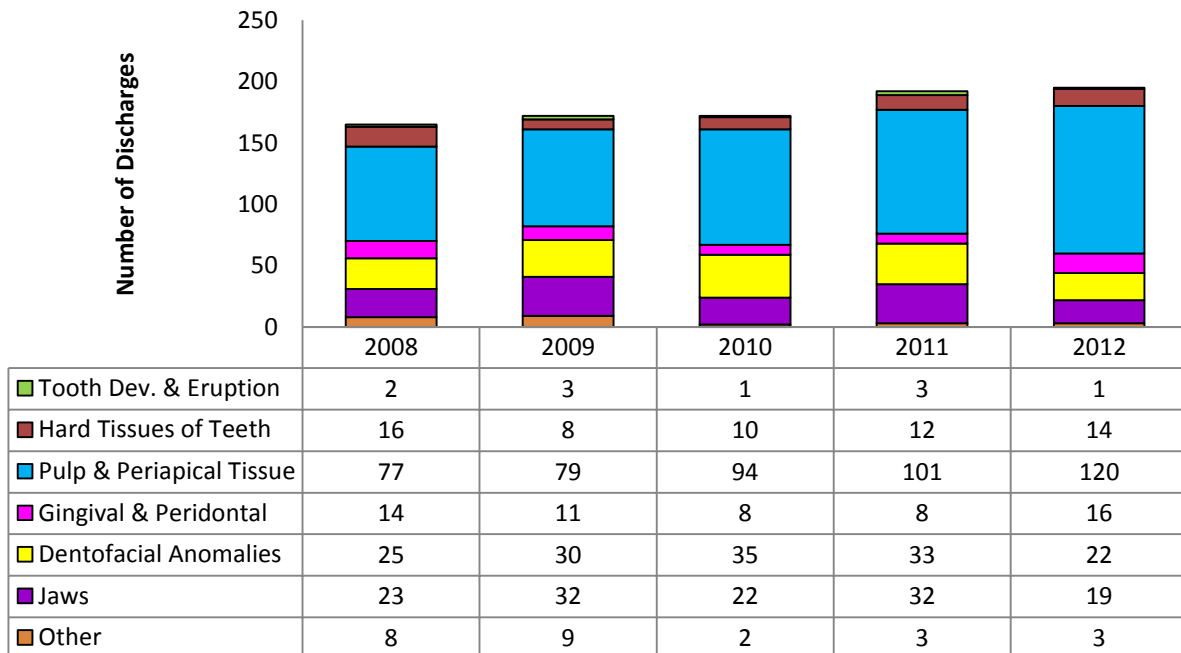
In 2012, there were a total of 195 hospital discharges for disorders of teeth and jaw/dental complaints in West Virginia. Adults between age 15-44 years were the most likely to be admitted to the hospital for non-traumatic dental complaints (Figure 39). Hospital discharges for these cases have increased gradually (by 18.2%) from 2008 (165 cases) to 2012 (195 cases). Furthermore, the number of patients who were admitted for diseases of the pulp and periapical tissue (usually due to bacterial infection in dental caries, tooth fracture, etc.) has increased by 55.8% between 2008 and 2012 (Figure 40).

**Figure 39. Number of Hospital Inpatient Discharges by Age Group
West Virginia, 2008-2012**



Source: West Virginia Healthcare Authority: Hospital Inpatient Uniform Billing Discharge Data, 2008-2012

**Figure 40. Number of Hospital Inpatient Discharges by
Non-Traumatic Dental Complaint, West Virginia, 2008-2012**



Source: West Virginia Healthcare Authority: Hospital Inpatient Uniform Billing Discharge Data, 2008-2012

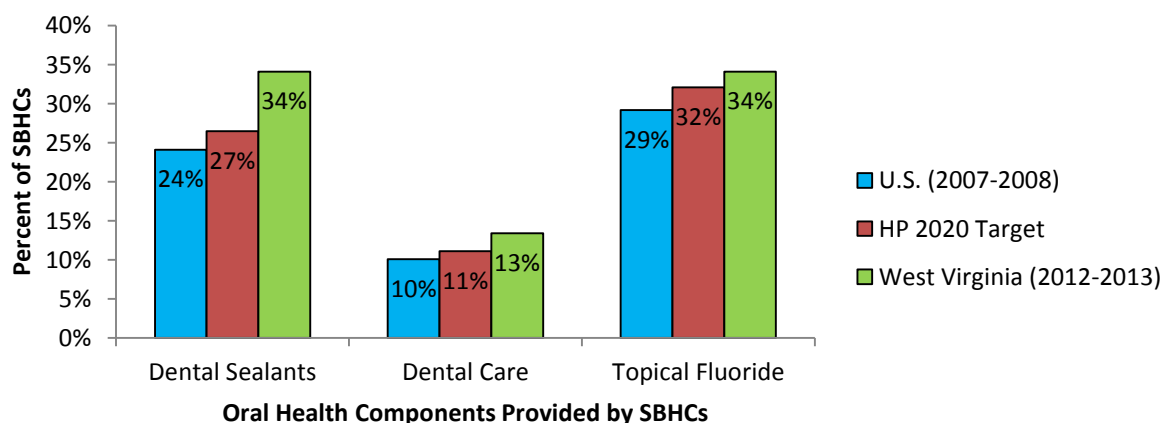
School-Based Health Services

On November 20, 2008, former West Virginia Governor Joe Manchin, III, and the Appalachian Regional Commission (ARC) Federal Co-Chair, Anne B. Pope, announced a major initiative on school-community partnerships to promote children's oral health in West Virginia. The ARC and the Claude Worthington Benedum Foundation collaborated to fund a grant for the program which helped establish school-based dental clinics that are managed by the Robert C. Byrd Center for Rural Health at Marshall University. Clinics in the School-Community Oral Health Partnership Project target school-age youth without access to dental care in economically distressed, at-risk and transitional counties in West Virginia.

As of 2013, West Virginia has 82 school-based health centers (SBHCs) that provide a wide range of health care services to students. Most of these sites offer some level of oral health education and about half (47.6% or 39) of these SBHCs have some oral health assessment component.

Eleven centers offer on-site comprehensive oral health assessments (education, screenings, preventive and restorative care). Some of these centers contract with local dentists in order to provide services, while other centers have a full-time dentist (or two) on staff. Furthermore, some schools have programs focusing on specific oral health practices such as dental sealants, dental care and topical fluorides. Figure 41 provides comparisons between national, state and the *Healthy People 2020* target based on oral health components within SBHCs. West Virginia has already surpassed the *Healthy People 2020* goal.

**Figure 41. Percentage of SBHCs Providing Specific Oral Health Programs
U.S., *Healthy People 2020* and West Virginia**



Sources: School-Based Health Care Census 2007-2008, HP 2020 and WV School-Based Health Assembly 2012-2013

West Virginia Oral Health Program (OHP)

The OHP seeks to improve the oral health of West Virginians through assisting community initiatives to prevent, control and reduce oral diseases. This is done by planning, implementing and evaluating programs for oral health promotion and disease prevention and providing statewide coordination and integration of community-based oral health services through increased access and removal of barriers.

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 and analyze 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 (eventually integrating them into the state program) 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 program 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 in order to assist the State in achieving the goals set forth by *Healthy People 2020*. 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 2nd 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 current 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 OHP, 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.

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Appendix

Data Source	Purpose	Population Sampled	Collection Method	Frequency
Basic Screening Survey (BSS)	Collect information on observed oral health.	Pre-school and school-age	Standardized survey completed by dental professionals	Annual; every other year per population
Behavior Risk Factor Surveillance System (BRFSS)	Collect information on risk behaviors and health conditions among adults and children.	Non-institutionalized WV adults and children	Telephone survey	Survey is annual; oral health questions are usually asked every other year
Children's Health Insurance Program (CHIP)	Track claims to pay providers for medical, dental and pharmacy services.	WV children 0-20 enrolled, and are not eligible for Medicaid	Claims submitted by providers	Annual
Dental Workforce Survey (DWS)	Collect and report issues surround dental workforce and provide information on clinically active dental professionals in WV.	Dentists and dental hygienists who are completing their license renewal in WV	Mailed survey	Every other year; the year opposite when providers have to report continuing education credits
Marshall University School-Community Partnership Database	Collect and provide information on oral health services provided and oral health status of students in low income schools.	Students in low income schools in WV that are participating in the program	Mandated reporting by dental professionals providing services	Annual
Medicaid	Track claims to pay providers for medical, dental and pharmacy services.	WV residents enrolled in Medicaid	Claims submitted by providers	Annual

Data Source	Purpose	Population Sampled	Collection Method	Frequency
National Health and Nutrition Examination Survey (NHANES)	A series of cross-sectional nationally representative health examination surveys conducted in mobile examination units or clinics.	U.S. population (all ages)	In-person interviews in the household or in a private setting in the mobile examination center. Standardized physical examinations and medical tests in mobile examination centers	Continuous (a minimum of two data years is required for analysis)
National Survey of Children's Health (NSCH)	Examine the physical and emotional health of children. Provide a broad range of information about children's health and well-being.	Birth-17 years	Telephone survey completed by parent or guardian	Approximately every four years
National Survey of Children with Special Health Care Needs (CSHCN)	Assess the prevalence and impact of special health care needs.	Children from birth through 17 years who have special health care needs	Telephone survey completed by parent or guardian	Approximately every four years
Pregnancy Risk Assessment Monitoring System (PRAMS)	Collect information on maternal experiences and attitudes before, during and after pregnancy.	Mothers who had a recent live birth	Mailed survey, with telephone follow-up of non-responders, linked to child's birth certificate data	Annual
Uniform Data Systems (UDS)	Collect information on services provided at FQHCs.	Participating community health centers (funded by HRSA)	Required reporting of core set of information directly to HRSA	Annual
Water Fluoridation Reporting System (WFRS)	Collect and report on fluoridation levels from participating public water systems in WV.	Community water systems	Web-based data collection form	Annual
West Virginia Birth Defects Registry (BDR)	Conduct statewide surveillance of select major birth defects.	Newborns	Passive case ascertainment using multiple sources	Annual

Data Source	Purpose	Population Sampled	Collection Method	Frequency
West Virginia Board of Dental Examiners (WVBDE)	Regulates practice of dentistry in WV. Sets and defines standards for safe dental practices. Provides dental professionals with license to practice.	Dental professionals licensed in WV	Recorded during license registration/renewal	Annual
West Virginia Cancer Registry (WVCR)	Conduct statewide surveillance of newly diagnosed and treated cancers, provide data on cancer incidence and mortality.	WV residents	Mandated reporting by hospitals that diagnose/treat a patient with cancer, plus mandated reporting by physicians of newly diagnosed cancer cases when the patient will not be referred to a hospital for diagnosis/treatment	Annual
West Virginia Healthcare Authority	Collects hospital inpatient uniform billing discharge data.	Patients discharged from West Virginia hospitals	Required reporting by health care facilities	Annual
West Virginia Title V Block Grant Application	Collects data on current MCH projects, Title V performance measures and state performance and outcome measures.	Activities covered under the MCH Title V Block Grant	Data compiled from annual reports sent in by MCH programs, Vital Statistics and multiple data sources	Annual
Youth Risk Behavior Surveillance System (YRBSS)	Assess and monitors priority health risk behaviors that contribute markedly to the leading causes of death, disability and social problems among youths and adults.	Youths and adults	School-based survey	Biennial
Youth Tobacco Survey (YTS)	Collect information on tobacco use and tobacco-related behaviors; provides information on asthma among youths.	Students in grades 7-12	School-based survey in conjunction with the YRBS	Biennial