

The Impact of Oral Disease **2020**
Pennsylvania

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Introduction

Poor oral health is a significant public health problem impacting individuals in the United States and across the world. Oral health conditions are tied deeply to inequities in society and disproportionately impact certain populations such as those in poverty, minorities, children, and individuals living in areas that lack adequate access to oral health services and fluoridated water. Across the globe, 3.9 billion people are impacted by oral disease and 35% of the world's population suffers from untreated tooth decay in their permanent teeth (2019). In the United States, 10% of 2-5-year-old children have untreated decay in their primary (baby) teeth and 16% of 6-8-year-old children suffer from untreated decay (2019). Among adolescents aged 6-11 years, 5% have untreated decay in their permanent teeth and 17% of adolescents aged 12-10 years have untreated decay (2019). The prevalence of dental caries, the infectious disease that causes tooth decay, among adults aged 20-64 years is 90% and the prevalence of untreated decay is 26% (2019). These facts illustrate how dental caries impacts people across the lifespan.

A recent report by the Center for Disease Control indicates that 47% of adults over the age of 30 have some form of periodontal (gum) disease and 70% of

adults 65 years and older have periodontal disease (Eke et al., 2013). Poor oral health can also be life threatening. According to the American Cancer Society, about 53,260 people will get oral cavity or oropharyngeal cancer in 2020 and an estimated 10,750 will die of these cancers (2020).

The disease burden from oral conditions begins in early childhood given the wide range of behaviors as to how children are first introduced to oral hygiene routines and foods as well as their ability to access oral health prevention and treatment services. Oral health problems in the early years increase the chance that children will have poor school attendance which has a lasting impact on their academic achievement that follows them throughout their entire educational experience. According to one study published in the American Journal of Public Health, on average, elementary children missed a total of six days per year, of which 2.1 absences were due to dental problems. These children were four times more likely to have a lower grade point average. Additionally, parents missed an average of 25 days of work per year to care for children with dental problems (Jackson et al., 2011).



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This report is designed to present data that will provide a context that oral health stakeholders in Pennsylvania can utilize as they discuss and view the current status of oral health and the impact of oral disease on Pennsylvanian's. The report includes;

- A review of state demographics and a discussion of disparities in oral health that are experienced by individuals of color;
 - Information on the rate of poverty across the state and a discussion of the links between poverty, oral health, and dental caries experience;
 - A summary of the number of children, adolescents, and adults that can be used for examining oral disease prevalence rates and the impact of oral health and related issues as they relate to specific populations;
- Snapshots of data for the state that describe how oral health programs and oral health stakeholders in Pennsylvania are working to positively impact the burden of oral disease in the state.
 - A review of Pennsylvania's progress on meeting the Healthy People 2020 objectives.
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Whenever possible, values for oral health indicators in Pennsylvania are compared to Healthy People objectives for 2020. Healthy People 2020 objectives are national benchmarks, selected by representatives from a large number of federal agencies, to track America’s progress toward achieving improved health outcomes. There are currently over 1,200 objectives organized within 42 topic areas (2020). The topic area of oral health (OH) contains 17 objectives. Other objectives that relate to oral health and access to dental care exist within the topic areas of access to health services (AHS), diabetes (D), cancer (C), and tobacco use (TU).

Healthy People Objectives 2020		US Target HP 2020	US Baseline	Pennsylvania 2019
<i>Dental caries experience</i>				
OH-1	Young children aged 3-5 (primary teeth)	30%	30.0%	No data
OH-1	Children aged 6-9 (primary and permanent teeth)	49%	54.4%	No data
OH-1	Adolescents aged 13-15 (permanent teeth)	48.3%	53.7%	No data
<i>Untreated dental decay in children</i>				
OH-2	Young children aged 3-5 (primary teeth)	21.4%	23.8%	No data
OH-2	Children aged 6-9 (primary and permanent teeth)	25.9%	28.8%	No data
OH-2	Adolescents aged 13-15 (permanent teeth)	15.3%	17%	
<i>Untreated dental decay in adults</i>				
OH-3	Adults aged 35-44 (overall dental decay)	25%	27.8%	
OH-3	Adults aged 65-74 (coronal caries)	15.4%	17.1%	
OH-3	Adults aged 75 and older (root surface)	34.1%	37.9%	
<i>Permanent tooth extraction because of dental caries or periodontal disease</i>				
OH-4	Adults aged 45-64	68.8%	76.4%	37.3%
OH-4	Adults aged 65-74 (lost all-natural teeth)	21.6%	24.0%	72.8%
<i>Moderate or severe periodontitis, adults aged 45-74</i>				
OH-5	Moderate or severe periodontitis, adults aged 45-74	11.5%	47.5%	
<i>Oral and pharyngeal cancers detected at the earliest stage</i>				

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OH-6	Oral and pharyngeal cancers detected at the earliest stage	35.8%	32.6%	4.0 per 100,000
Oral health care system use in the past year by children, adolescents, and adults				
OH-7	Oral health care system use in the past year by children, adolescents, and adults	49%	44.5%	69.0%
Low-income children and adolescents who received any preventive dental service				
OH-8	Low-income children and adolescents who received any preventive dental service during past year	33.2%	30.2%	
School-based health centers (SBHC) with an oral health component				
OH-9	Includes dental sealants	26.5%	17.1%	956 children served
OH-9	Oral health component that includes dental care	11.1%	6.4%	
OH-9	Includes topical fluoride	32.1%	20.6%	
Local health departments (LHDs) and Federally Qualified Health Centers (FQHCs) that have an oral health component				
OH-10	Local health departments (LHDs) and Federally Qualified Health Centers (FQHCs) that have an oral health component	28.4%	25.8%	
OH-10	FQHCs with an oral health component	73.3%	66.6%	
Patients who receive oral health services at FQHCs each year				
OH-11	Patients who receive oral health services at FQHCs each year	33.3%	17.5%	69.0%
Dental sealants				
OH-12	Children aged 3-5 (primary molars)	1.5%	1.4%	
OH-12	Children aged 6-9 (permanent 1 st molars)	28.1%	25.5%	
OH-12	Adolescents aged 13-15 (permanent molars)	21.9%	19.9%	
Population served by optimally fluoridated water systems				
OH-13	Population served by optimally fluoridated water systems	79.6%	72.4%	64%
Adults who received preventive interventions in dental offices				
OH-14	Tobacco and smoking cessation information in past year	13.2%	10.5%	

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OH-14	Oral and pharyngeal cancer screening in past year	28.6%	23.3%	
Cleft lip with & without cleft palate				
OH-15	Newborns			5.0 per 10,000

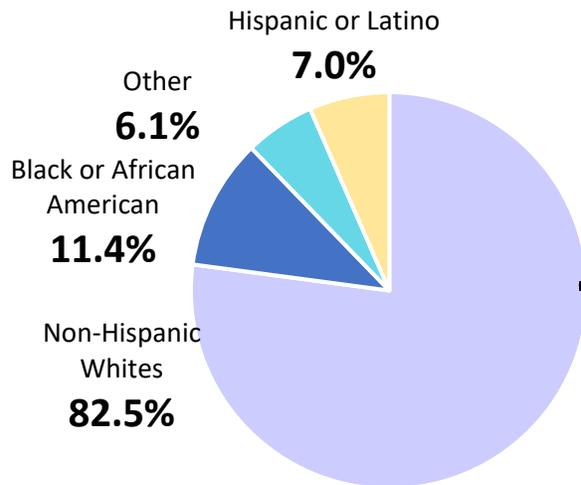
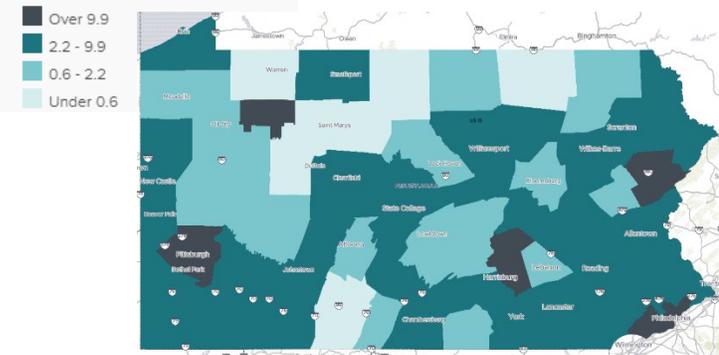
Healthy People Objectives 2030		US Target HP 2030	US Baseline	Pennsylvania Baseline
Dental Decay – Children & Adolescents and Adults				
OH-01	Reduce the proportion of children and adolescents with lifetime tooth decay	42.9%	48.4%	12.3%
OH-02	Reduce the proportion of children/adolescents with active and currently untreated tooth decay in their primary or permanent teeth	10.2%	13.4%	12.3%
OH-08	Increase the proportion of children, adolescents, and adults who use the oral health care system	45%	43.3%	82.1%
Dental Decay – Older Adults				
OH-04	Reduce the proportion of older adults with untreated root surface decay	20.1%	29.1%	
OH-05	Reduce the proportion of adults aged 45 years and over who have lost all of their natural teeth	5.4%	7.9%	16.4%
OH-06	Reduce the proportion of adults aged 45 years and over with moderate and severe periodontitis	39.3%	44.5%	
Oral Conditions				
OH-03	Reduce the proportion of adults with active or currently untreated tooth decay	17.3%	22.8%	
OH-07	Oral and pharyngeal cancers detected at the earliest stage	34.2%	29.5%	4.0 per 100,000
Preventive Care				

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OH-09	Increase the proportion of low-income youth who have a preventive dental visit	82.7%	78.8%	
OH-10	Increase the proportion of children and adolescents who have received dental sealants on 1 or more of their primary or permanent teeth	42.5%	37%	
Health Policy				
OH-11	Increase the proportion of persons served by community systems with optimally fluoridated water systems	77.1%	72.8%	
Health Care Access and Quality				
AHS-02	Increase the proportion of people with dental insurance	59.8%	54.4%	
AHS-05	Reduce the proportion of persons who are unable to obtain or delayed in obtaining necessary dental care	4.1%	4.6%	
Nutrition and Healthy Eating				
NWS-10	Reduce consumption of added sugars by people aged 2 year and over	11.5%	13.5%	
Public Health Infrastructure				
OH-D01	Increase the number of states and DC that have an oral and craniofacial health surveillance system	No Data		

Pennsylvania Demographic Snapshot RACE AND ETHNICITY

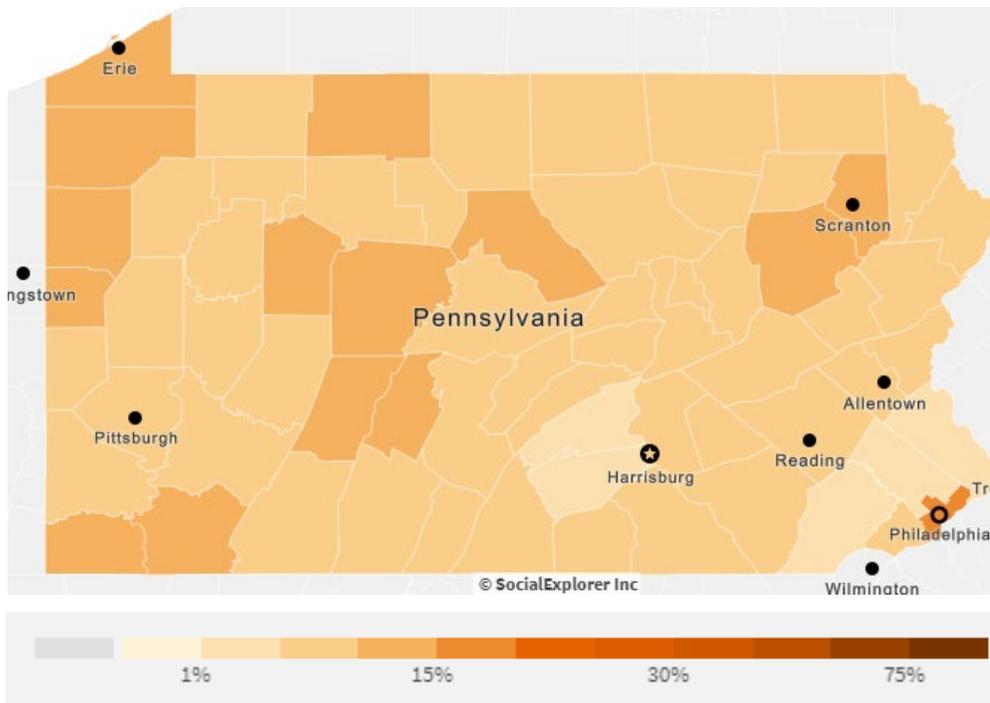
Black, Non-Hispanic (%), ACS 2014-2018 by County



POVERTY

Pennsylvanian's in Poverty

Children - **16.7%** Children 5-17 yrs. - **15.9%** Households - **12.3%**
 Individuals - **12.7%** Seniors - **8.1%**



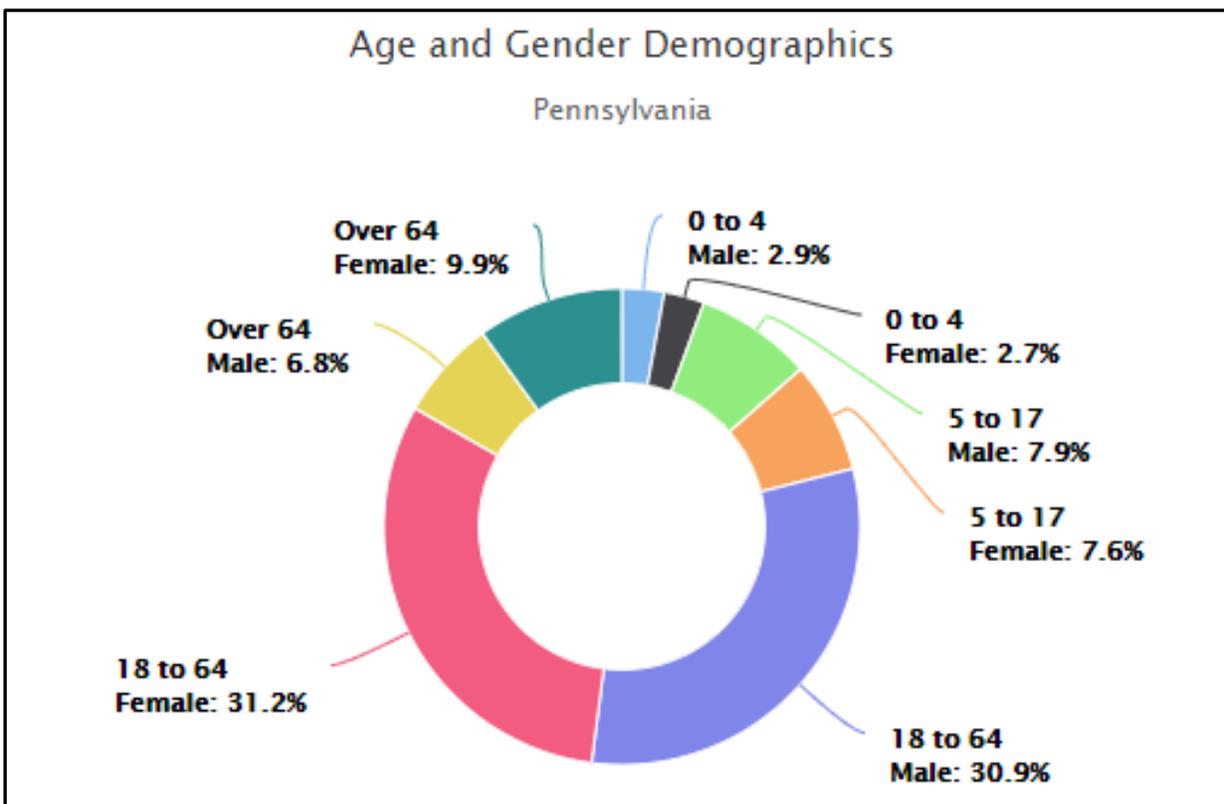
Social Explorer Tables: ACS 2018 (5-Year Estimates) (SE), ACS 2018 (5-Year Estimates), Social Explorer; U.S. Census Bureau

Age and Gender

It is important to examine the population by age and gender to identify patterns related to the prevalence of oral health conditions for children versus adolescent, adult, and senior populations. Additionally, there are gender differences in the prevalence of oral diseases such as dental caries and periodontitis, which are the main causes of tooth loss. Research indicates that oral health differs between men and women, especially at specific life stages. The ability to access oral health care is associated with gender, age, education level, income, race and ethnicity, access to medical insurance and geographic location (2011).

Report Area	0-4 yrs. Male	0-4 yrs. Female	5 to 17 yrs. Male	5 to 17 yrs. Female
Pennsylvania	363,116	346,134	1,006,565	959,515
United States	10,146,960	9,689,890	27,438,613	26,277,777

Report Area	18-16 yrs. Male	18-64 yrs. Female	Over 64 yrs. Male	Over 64 yrs. Female
Pennsylvania	3,925,430	3,960,560	860,415	1,261,783
United States	99,617,317	100,493,892	19,630,586	27,457,281

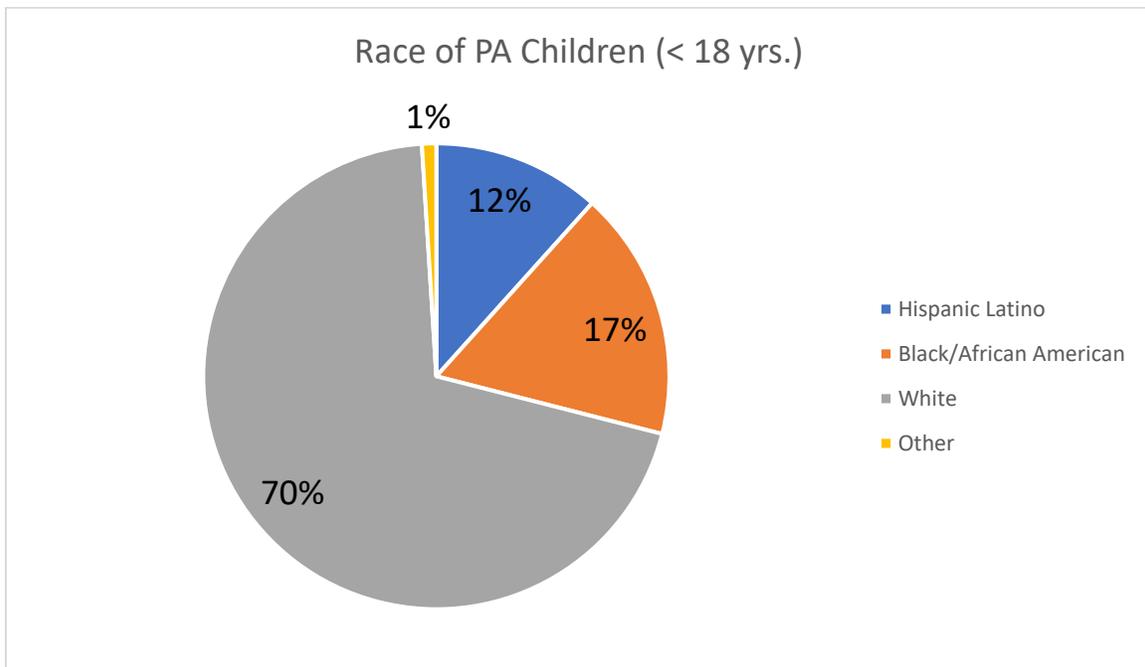


ACS 2018 (5-Year Estimates), U.S. Census Bureau

Race and Ethnicity

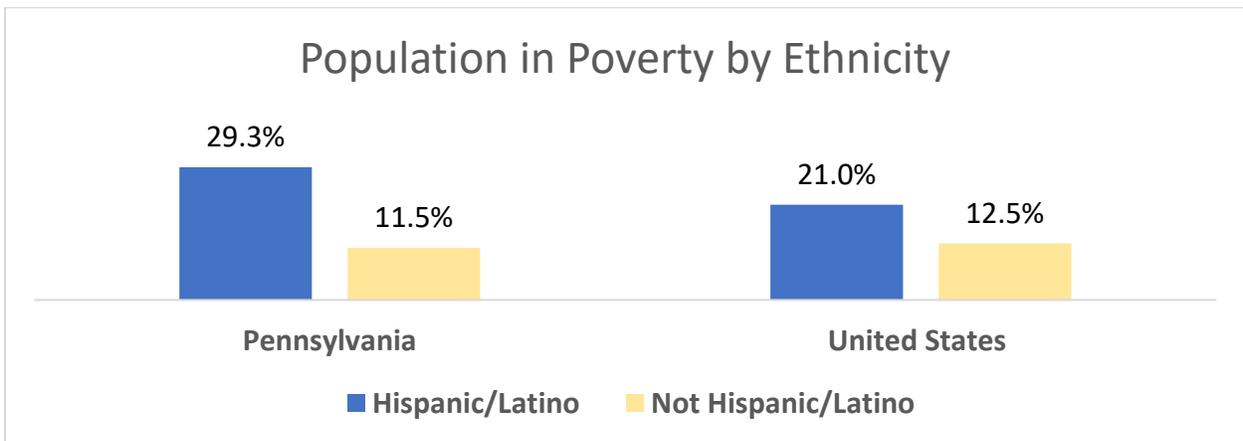
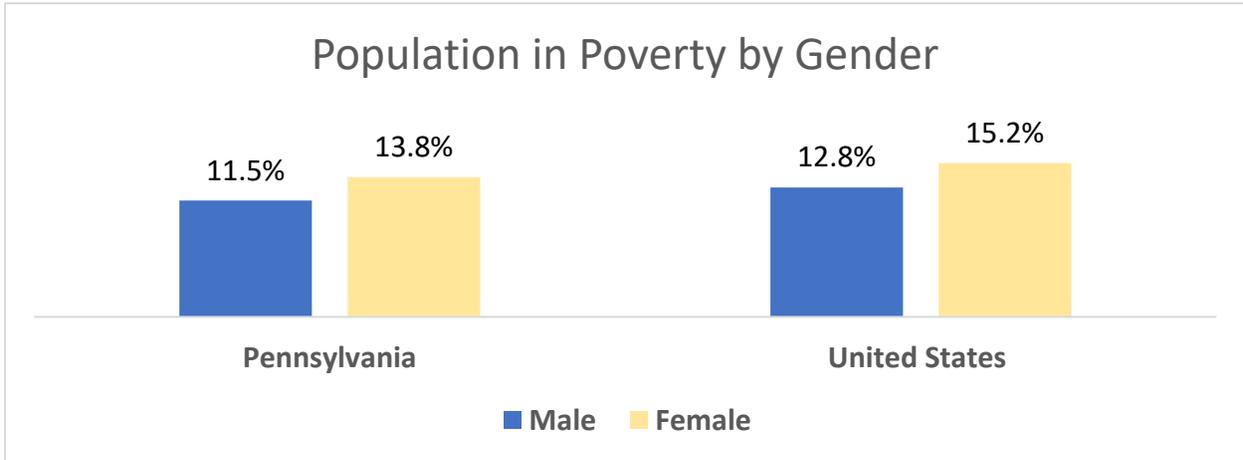
Over time, untreated caries prevalence has decreased overall to 13%. This trend should be considered in relation to race and population trends to uncover disparities in oral health among specific cohorts of the population and to direct services to populations with the greatest need. Pennsylvania is a diverse state home to a significant population of Hispanic/Latinos in addition to Black/African American youth. Other groups such as Asian's and Native Americans are represented but at a very low rate.

The Hispanic/Latino population has been increasing across the United States, albeit less so in Pennsylvania. Over the past several years, the oral health status of has improved, but is still worse than the oral health status found among the general population. According to the Centers for Disease Control and Prevention (CDC), the prevalence of dental caries among youth aged 2-19 years was 45.8%. Hispanic youth have the highest prevalence of total caries and non-Hispanic black youth had the highest prevalence of untreated caries. Among youth aged 2–19 years, the prevalence of total dental caries was highest for Hispanic youth (57.1%) compared with non-Hispanic black (48.1%), non-Hispanic Asian (44.6%), and non-Hispanic white (40.4%) youth. This data indicates that oral health remains a profound problem, particularly when it is viewed in the context of income which further impacts access to oral health care. According to the CDC, the prevalence of total and untreated dental caries decreased as family income levels increased (Fleming E et al. 2018).



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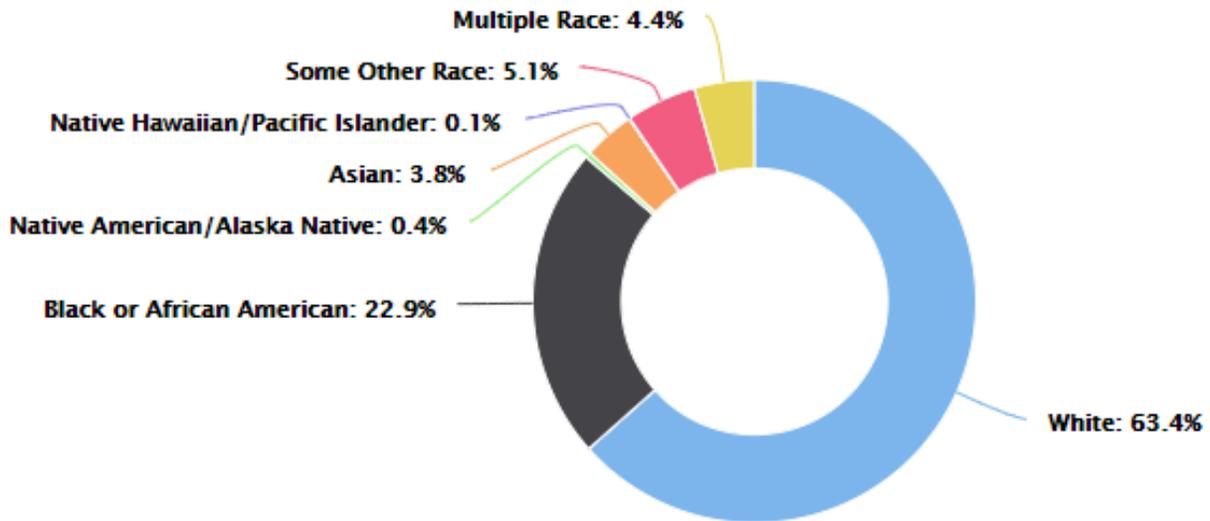
An analysis of the population in poverty by gender shows that women are more likely than men to experience poverty. In regard to race/ethnicity, 29.3% of Hispanic/Latino’s are in poverty representing 255,905 individuals, compared to 11.5% of individuals that are not Hispanic/Latino (1.3 million people) that are not in poverty.



Report Area	Male	Female	Hispanic	Not-Hispanic
Pennsylvania	11.5%	13.8%	29.3%	11.5%
United States	12.8%	15.2%	21.0%	12.5%

ACS 2018 (5-Year Estimates), U.S. Census Bureau

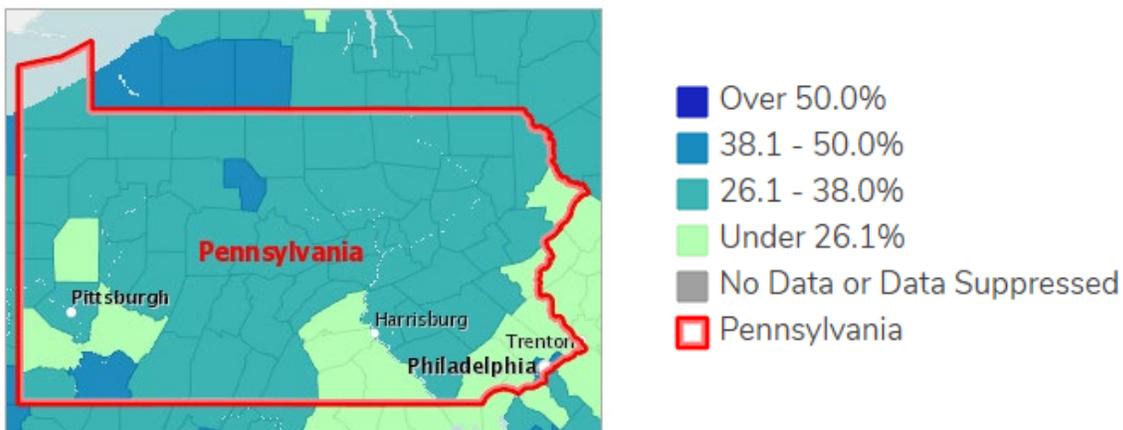
Pennsylvania Population in Poverty by Race



Report Area	Non-Hispanic White	Black or African American	Native American or Alaska Native	Asian
Pennsylvania	1,001,718	360,801	6,221	59,228
United States	26,730,734	9,490,587	673,665	1,989,768

Report Area	Native Hawaiian or Pacific Islander	Other Race	Multiple Races
Pennsylvania	858	81,055	69,068
United States	103,304	3,497,625	1,772,296

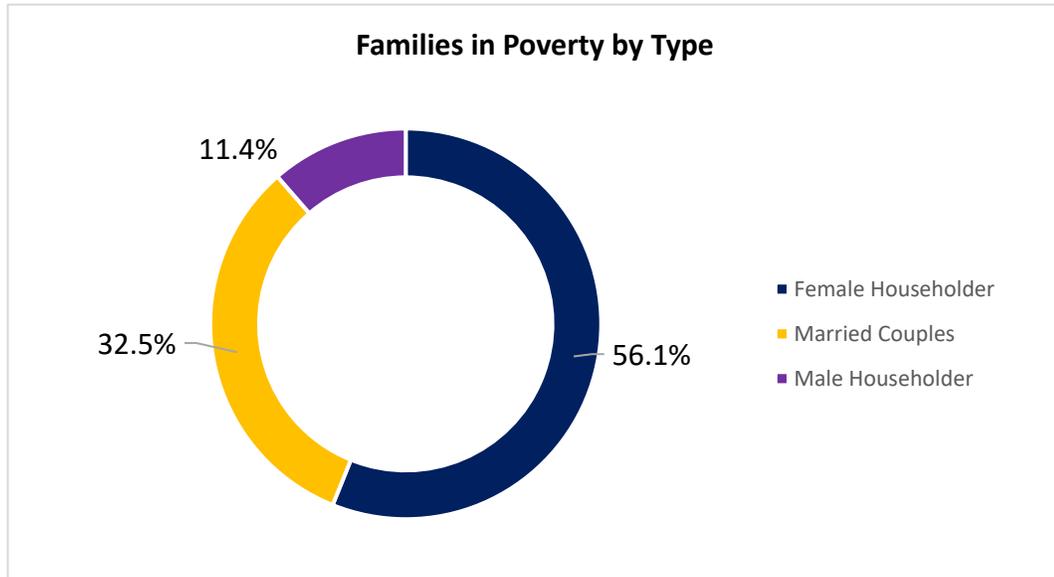
Population with an income below 200% of Poverty Level



ACS 2018 (5-Year Estimates), U.S. Census Bureau

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When poverty is examined by family type, households headed by single females with children are most likely to live in poverty and they comprise a significant percentage of the population in poverty.

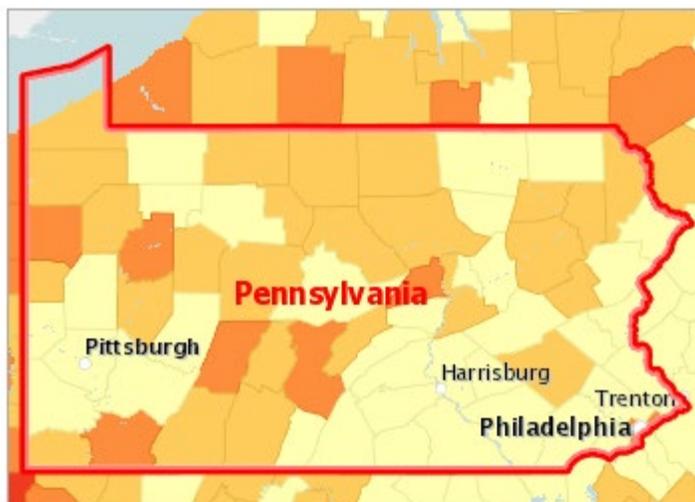


ACS 2018 (5-Year Estimates), U.S. Census Bureau

Report Area	Poverty Rate	% Poverty Married Couples	% Poverty Male Householder	% Poverty Female Householder
Pennsylvania	8.7%	32.5%	11.4%	56.1%
United States	10.1%	36.7%	10.6%	52.7%

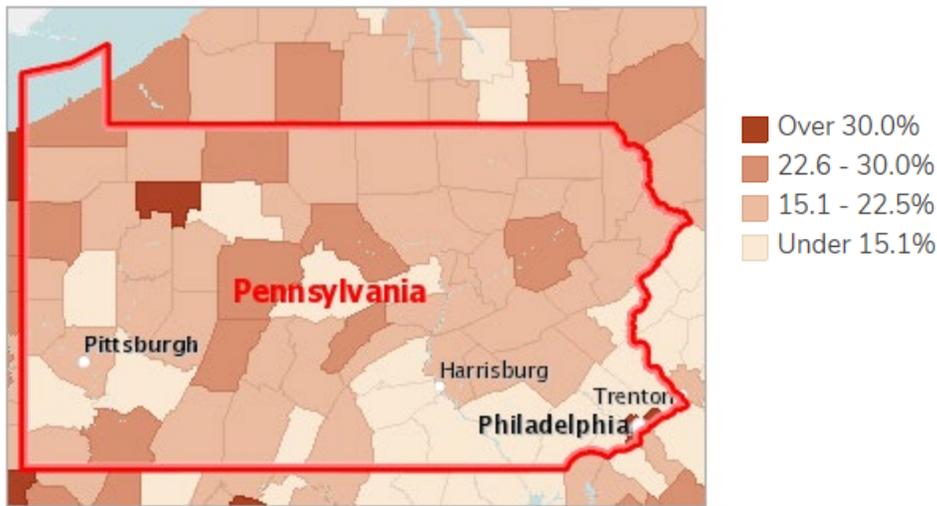
Single parent family households living below the poverty level

- Over 37.0%
- 30.1 - 37.0%
- 23.1 - 30.0%
- Under 23.1%



ACS 2018 (5-Year Estimates), U.S. Census Bureau

Population below poverty aged 0-17 yrs.



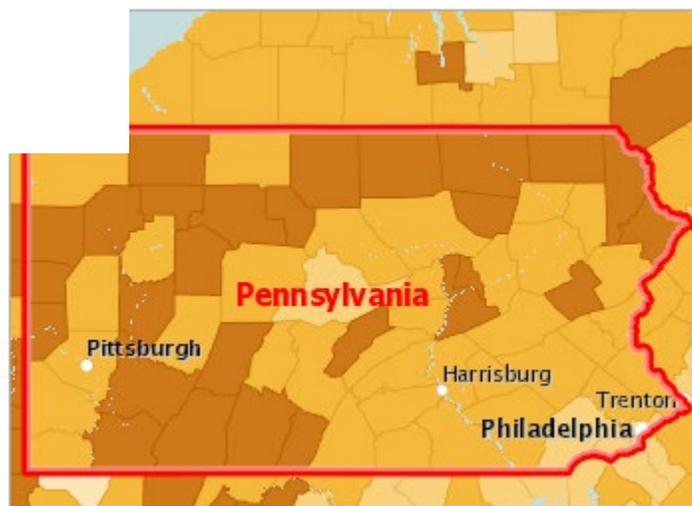
ACS 2018 (5-Year Estimates), U.S. Census Bureau

Report Area	Ages 0-17 yrs. Total Population	Ages 0-17 yrs. in Poverty	Ages 0-17 yrs. Poverty Rate
Pennsylvania	2,628,648	475,463	18.1%
United States	72,382,641	14,117,014	19.5%

Population below poverty aged 65+ yrs.

Report Area	Ages 65+yrs. Total Population	Ages 65+ yrs. in Poverty	Ages 65+yrs. Poverty Rate
Pennsylvania	2,151,556	174,141	8.1%
United States	47,490,937	4,448,892	9.3%

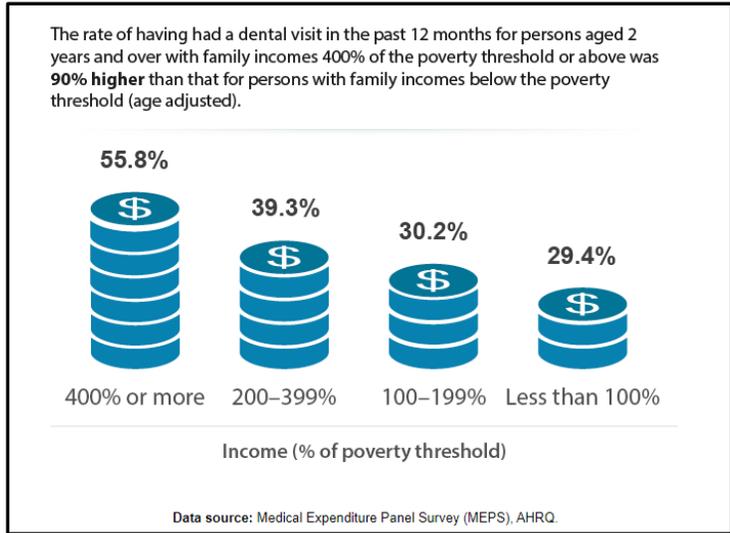
- Over 20.0%
- 16.1 - 20.0%
- 12.1 - 16.0%
- Under 12.1%



ACS 2018 (5-Year Estimates), U.S. Census Bureau

Poverty and Oral Health

Poverty is a significant social determinant for oral health. According to the Medical Expenditure Panel Survey (MEPS, 2016) (2020), among income groups, those aged two years and older living in a family with an income above 400% of the federal poverty level (FPL) had the highest rate of dental visits in the past 12 months. Other data indicators demonstrating a disparity in dental visits among those in poverty included:



- 29.4% of dental visits were among those with a family income below the poverty threshold, compared to a rate of 55.8% for the percent of individuals with a dental visit in the past 12 months among the highest income group (those living in a family with an income above 400% FPL).
- 30.2% of dental visits occurred among those with a family income between 100% and 199% of the FPL.
- 39.3% of dental visits were among those with family incomes between 200% and 399%.

What is Pennsylvania doing about oral health disparities?

Several initiatives operating state-wide and in targeted areas in Pennsylvania are working to assist individuals in overcoming barriers in access to oral health services. Additionally, complimentary programs are being implemented that address structural issues of oral health inequality such as lack of access to fluoridated water.

These programs focus on outcomes such as: improving the percentage of children that have a dental home, expanding access to preventive services, and increasing the awareness of oral health disparities among oral health professionals, students, and in communities. The initiatives and programs related to oral health are provided in elementary schools, Head Start classrooms, Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinics, preschools, and other public health and community-based settings. Examples of initiatives include the Healthy Teeth Healthy Children Medical/Dental Collaboration facilitated by the Pennsylvania American Academy of Pediatrics, the Oral Health in Your Office Training, Age One Connect the Dots training, EPIC Oral Health in the Prenatal Office, teledentistry services in Head Start programs, and the expansion of free and low-cost oral health services through Federally Qualified Health Centers. In 2019, the following was achieved for youth aged 0-20 years of age:

- 49.5% received a dental service
- 45.4% received a preventive service
- 13.3% received a dental sealant
- 3.2% received an oral health service
- 51.4% received a least one dental or oral health service

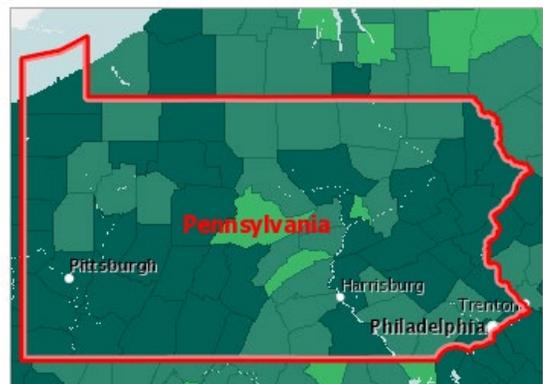
Employment and Oral Health

Untreated oral disease, such as dental caries, worsens over time and eventually requires more expensive and serious treatment. Individuals without a dentist often seek emergency care at a hospital. The widely regarded U.S. Surgeon General’s report, “Oral Health in America (2000),” highlighted the fact that due to dental needs there are annually over 164 million lost work hours and students miss more than 51 hours of school each year (2000). While this trend is most pronounced among the poor and near-poor, it is important to recognize that adults at all income levels experience oral health issues that impact their ability to maintain or gain employment.

Dental benefits associated with work activities have a profound effect on the ability and likelihood that an individual will seek dental care (both preventive and in response to oral health needs). According to the CDC Behavioral Risk Factor Surveillance System (BRFSS), 67.6% of adults reported visiting the dentist in the past year compared to 69.5% of residents in Pennsylvania. Additionally, the Medical Expenditure Panel Survey (MEPS) notes that 49.2% of people with private dental insurance had a least one dental visit; 33.5% of those with public coverage saw a dentist; and 15% of the population with no dental coverage had a dental visit (2018). This data shows that individuals with dental insurance are much more likely to access preventive and treatment oral health services, which underscores the importance of public health insurance programs. However,

insurance is just one component of improving access. For example, an expansion of individuals seeking care must be coupled with workforce programs that address dental health professional shortages. Additionally, since insurance is connected to employment, when unemployment fluctuates, the likelihood that someone will visit a dentist will also change.

Pennsylvania Unemployment Rates



- Over 12.0%
- 9.1 - 12.0%
- 6.1 - 9.0%
- 3.1 - 6.0%

Unemployment and labor force data in Pennsylvania

Report Area	Labor Force	Number Employed	Number Unemployed	Unemployment Rate
Pennsylvania	6,462,626	5,628,068	834,558	12.9%
United States	157,974,686	137,461,048	20,513,638	13.0%

US Department of Labor, [Bureau of Labor Statistics](#). 2020 - May.

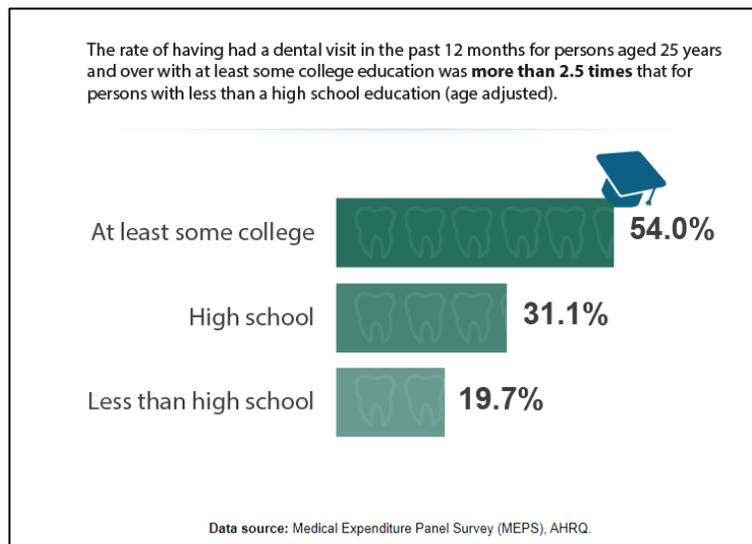
Unemployment rate change

Report Area	Unemployment May 2019	Unemployment May 2020	Unemployment Rate May 2019	Unemployment May 2020	Change
Pennsylvania	258,627	834,558	4.01%	12.9%	+8.9%
United States	5,573,115	20,513,638	3.41%	12.9%	+9.5%

US Department of Labor, Bureau of Labor Statistics, 2019 and 2020, May

Education and Oral Health

Educational attainment is related to the ability of individuals to earn a living wage, obtain employment, and oral health literacy levels. According to the CDC, adults in the U.S. aged 35–44 years with less than a high school education experience untreated tooth decay at a rate nearly three times that of adults with at least some college education. In addition, adults aged 35–44 years with less than a high school education experience destructive periodontal disease at a rate nearly three times that of adults with a least some college education. Although the last National Adult Literacy Survey was conducted in 2003, its data provides insight into the literacy levels of Pennsylvania adults, which impact the effectiveness of oral health education efforts. According to the data, 13% of adults in the state lack functional literacy skills.



A review of educational attainment rates in the population shows the distribution of the highest level of education achieved for the state. This information can help oral health literacy providers and oral health professionals understand the needs of adults and the extent to which issues related to educational attainment and oral health will be prevalent in the population. In Pennsylvania, 18.6% of adults have at least a college bachelor’s degree, while 35.1% stopped their education after high school. Data on educational attainment does indicate that counties that have a higher percentage of the population living in poverty also have a lower rate of educational attainment among the general population. Additionally, individuals of color and individuals in poverty also demonstrate lower rates of educational attainment than the population as a whole.

Report Area	No High School Diploma	High School Only	Some College
Pennsylvania	9.8%	35.1%	16%
United States	12.3%	27.1%	20.6%

Report Area	Associates Degree	Bachelor's Degree	Graduate or Professional Degree
Pennsylvania	8.3%	18.6%	12.2%
United States	8.4%	19.4%	12.1%

ACS 2018 (5-Year Estimates), U.S. Census Bureau

Oral Health and Disabilities

Despite some progress, a significant disparity still exists in oral health care access between individuals with intellectual or developmental disabilities and the general population. Barriers experienced by this population include financial

4,941 children < 5 yrs. in PA have a disability

barriers, a lack of appropriately trained dental providers, and patient dispositions such as fear of the dentist that impact the ability of those with disabilities to receive oral health services. These issues frequently compound resulting in significant challenges to providing and receiving dental care. The US Surgeon General's report notes the prevalence of significant disparities. Other studies also note that the disparity in access to oral health care begins early in life for children with disabilities. According to the data, children with disabilities were 30% more likely to have their first dental visit delayed (Chi et al., 2011). Additional research indicates these children are less likely to receive preventive care than their counterparts without disabilities (Chi et al., 2010). Unmet oral health needs frequently result in poorer oral health for individuals with disabilities that cross all parameters including oral hygiene, untreated decay, and oral health diseases that emerge later in life.



Report Area	Adults with Disabilities	Children with Disabilities	% Child Pop with a Disability	Total Population with Disabilities
Pennsylvania	1,610,333	141,251	7.7%	13.9%
United States	32,904,487	3,065,179	6.1%	12.6%

Oral Health and Geography

Geography matters; where an individual lives plays a significant role in their ability to access oral health care and in their oral health status. Geographic variation in health-care delivery and various health outcomes has been discussed in the medical literature for almost 30 years for both children and adults. Studies consistently show regional variations in access, even after adjusting for child, family, and state variables. In the body of work examining geographic factors that impact access to medical and dental care, particular attention has been paid to differences seen in urban versus rural locales. The Agency for Healthcare Research and Quality (AHRQ) National Healthcare Disparities Report considers residents of rural areas to be a “priority population due to a significant lack of access and a tendency of the population to experience worse oral health than their urban counter-parts (Fischer-Owens et al., 2016).

An understanding and consideration of the role that contextual variables such as geography play in explaining variation in oral health outcomes can inform the development of state policies that will improve health. For example, a population's access to fluoridated water significantly improves oral health status. Additionally, there are geographic factors associated with the timely receipt of preventive oral health care, such as access rates for the population living in areas underserved by dentists and higher state Medicaid payment levels in certain areas, that may be correlated with lower rates of access to care, despite high rates of insurance.

Sealant programs can also be informed by a review of geographic access factors. An important consideration in the discussion of geography and access is the notion that all of these factors are mutable and can be addressed through state health policies. Thus, there is potential for reducing the observed disparities in oral health outcomes across the state by affecting change in state policies. Examples of ways that Pennsylvania is utilizing geographic data to direct services include programs aimed at reducing the percent of populations that live in Dental Health Professional Shortage Areas (DHPSAs) by implementing workforce development initiatives, expanding publicly financed school-based sealant programs for low-income children, increasing Medicaid reimbursement levels for sealants and other preventive services, and providing and encouraging the consumption of fluoridated water. The Pennsylvania Department of Health and other stakeholders are actively engaged in these efforts through two different federal grant projects and an array of local, regional, and state programs.

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In 2018, there were 9,245 Dentists practicing in Pennsylvania. The population to dentist ratio for the state in 2018 was 1450:1. In 2019, there were approximately 8,868 Dental Hygienists practicing, 2,552 Expanded Function Dental Hygienists, and 809 Public Health Dental Health Practitioners working across Pennsylvania. However, of the state's 67 counties, 9 had less than 10 dentists.

Dentists are also not evenly distributed. The population to dentist ratio across counties ranges from 8,230:1 in Juniata County to 870:1 in Montour County. In 2018, 5 counties had a ratio of population to dentists greater than 5000:1. This uneven distribution has resulted in certain areas being designated as a DHPSA. In total, the state has 149 DHPSAs, meeting only 48% of the oral health needs of the population.

Dental Health Professional Shortage Areas



Source: data.hrsa.gov, October 2019.

Pennsylvania's safety net system for oral health care consists of options such as Federally Qualified Health Centers (FQHCs), Rural Health Clinics (RHCs), and free and charitable clinics. In 2020, nearly 90% of FQHC dental sites were providing dental services in just over half the counties in PA (2020). Sixteen of the state's 70 RHCs offer some type of oral health education, oral health services, and/or a dental referral system. Rural Health Clinics serve the 48 rural counties with county-wide dental professional shortage designations. Out of the 63 free and charitable clinics in the state, nearly 20 sites offer dental services (2020).

What is Pennsylvania doing to support the oral health workforce?

The Pennsylvania Coalition for Oral Health (PCOH) and other entities such as dental health training programs and professional associations have been working collaboratively to not only develop the workforce but also to track changes in the workforce as it relates to the number of distributions of oral health professionals. Since 2014 key accomplishments in this area include:

- Implementing a SCOPE program in which dental students provided oral services in rural health clinics as part of their course of study, reaching more than 2,500 individuals.
- Creating a Dental Navigator position and dental hub sites that enabled oral health professionals to reach isolated and high need populations.
- Developed practice resources and oral health practice models that have been utilized to expand the range of occupations for oral health professionals. For example, the state has a Certified Expanded Function Dental Health Professional certification.
- Through ongoing training and efforts, the Pennsylvania American Academy of Pediatrics has provided Healthy Teeth Healthy Children training which promotes integrated oral health services.
- The PCOH has provided training using a proprietary TEETH curriculum in dental professional training school throughout the state.

Pennsylvania has:

3 Dental Schools

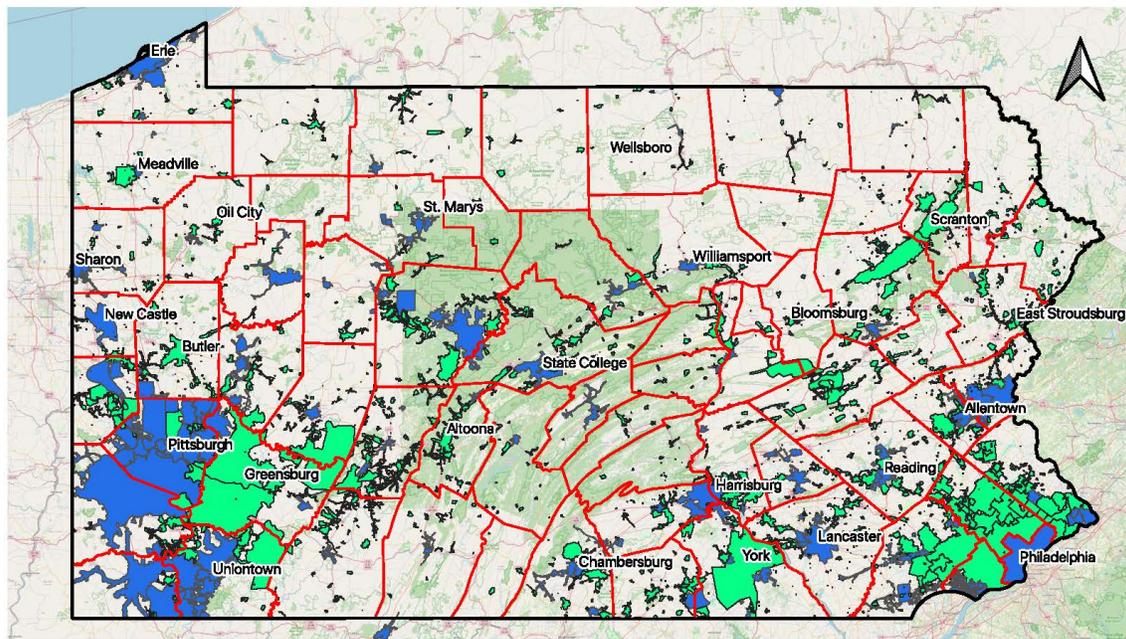
12 Dental Hygiene Training programs at technical schools, community colleges and universities.



Water Fluoridation

As of March 2019, 64% of Pennsylvanians (compared to 73% nationally) were connected to community water systems that provide them drinking water with the optimal level of 0.7 mg/L of fluoride or 0.7 parts per million. Among all state residents, including those who receive their water from private wells, 57% are reached by optimally fluoridated water compared to the national average of 62%. According to the PA Department of Environmental Protection (PADEP), Bureau of Safe Drinking Water, just 193 of the state’s more than 2,000 public water systems adjust the fluoride concentration to reach the optimal level (2020) (Gupta et al., 2017).

Fluoridation Status of Community Water Systems in Pennsylvania
Featuring County Lines



Map by Emma Mader
06/18/2020

DISCLAIMER: The data displayed on this map is as accurate as possible to our knowledge. If you have any discrepancies, please contact us at info@paoralhealth.org.

Fluoridation Status
 Non-Fluoridated ■
 Fluoridated ■
 County Outline

What is Pennsylvania doing to support increased access to fluoridated water?

To increase access to fluoridated water the PA Department of Health in collaboration with the PA Coalition for Oral Health has implemented new partnerships with water authorities, implemented a mini-grant program that provides funding to purchase the equipment needed to upgrade and fluoridate water systems, and promoted the importance of fluoridated water through an ongoing multi-channel strategic outreach and education campaign.

Oral Disease in Early Childhood

Children can begin experiencing oral disease as soon as their first tooth erupts (2000). It is vital to link children and pregnant women to early oral health care in order to support them in maintaining optimal health and wellbeing. Many professional organizations, including the American Dental Association and the American Academy of Pediatrics, also recommend that a child see a dentist by his or her first birthday or approximately six months after the eruption of the first tooth.



Early oral health care is particularly important for the prevention or detection and intervention of early childhood caries (ECC). Early childhood caries is a condition in which a child ages 0-5 years has one or more decayed, missing, or filled tooth surfaces present in a primary tooth. It is estimated that 23% of children aged 2-5 years have dental caries in their primary teeth (Dye et al., 2015).

Early childhood caries is the most common chronic disease of young children (Douglass et al., 2004). In addition to causing pain and difficulties eating, learning, and playing, ECC can create long-lasting negative health effects. Many children with ECC suffer from malnutrition and this can slow growth and development. Children with ECC can also develop iron deficiency anemia and are at a greater risk for developing future caries (Foster et al., 2006). Without proper intervention, ECC can permanently damage teeth.

Risk and Protective Factors for Oral Disease in Early Childhood

Infants and young children often receive contagious decay-causing bacteria from their parents early in life through saliva-sharing activities. In turn, they are at an increased risk for oral disease, depending on the extent to which the parent has tooth decay or consumes a diet high in sugar. Additionally, children who frequently consume sugary foods and beverages have an increased risk of oral disease. Other risk factors for early oral disease in children include poor home dental care, exposure to second-hand smoke, and living in a family of low socioeconomic status (2020).

Several dietary and hygiene practices implemented in the home are effective measures for protecting young children from the early onset of oral disease. Parents can avoid sharing utensils, avoid the urge to orally clean pacifiers or bottle nipples, and can avoid providing infants and children with sugary beverages such as juice, especially in bottles and lidded sippy cups. Other effective practices for reducing oral health disease is to wipe the gums for infants prior to their having teeth and, for older children, to brush their teeth twice daily and after feeding or consumption of beverages using a pea size smear of fluoridated toothpaste. Children can also be protected from early oral disease by drinking fluoridated water (Kawashita et al., 2011). It is also vital that families are assisted in establishing a dental home for their child during the first year of life so that the child can receive comprehensive oral health care and regular screenings.

- Increase in 0-5 population with dental visits use Medicaid Data; Helen will run the numbers
- Medicaid post-partum coverage for 60 – days post – parum

How is Pennsylvania doing?

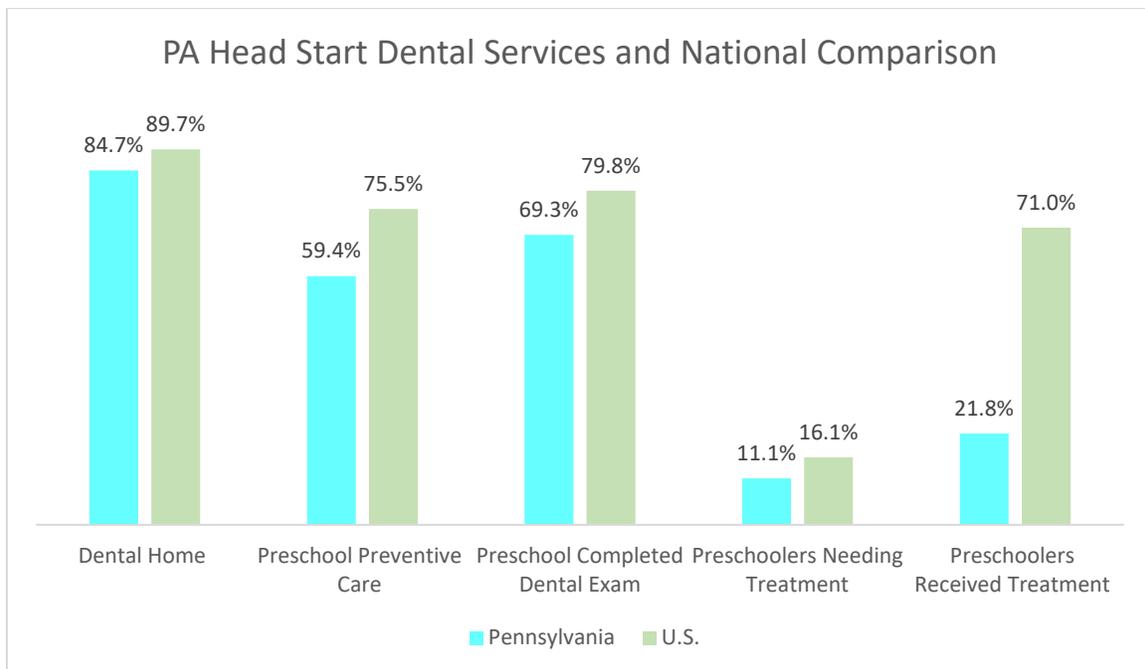
Pennsylvania requires that all children receive a dental screening upon entry into kindergarten or first grade (if the child did not attend kindergarten) and in grades three and seven.

- Sealants – only one of two evidence-based areas and access.

the condition of oral health in Pennsylvania

- Only 12 states require as a screening
- We need to do better at follow-up on screening (barriers – lack of centralized data source and method for collecting data; only 30 of 500 school districts have a certified school dental hygienist;)
- Work around school sealant programs; work with more community partners; this has led to data collected more and more
- During the COVID-19 pandemic, PCOH has taken the necessary precautions to ensure the safety and well-being of all staff and program participants in accordance with CDC guidelines.

Pennsylvania Head Start programs are also providing oral health services to children that increase access to treatment and ensure that children have a dental home. The following data shows how the state compares nationally among all Head Start programs. In regard to all indicators, Pennsylvania fares worse than Head Start programs across the nation. This is likely due to several factors such as the large percentage of children in poverty, the state's rural geography, and the severe shortage of dental health professionals.



What is Pennsylvania doing?

The Pennsylvania Head Start Association and other state oral health programs operated by the Pennsylvania Chapter of the American Academy of Pediatrics and the Pennsylvania Coalition for Oral Health also address the oral health needs of young children and the oral health literacy needs of families.

Oral Disease in Adolescents

Adolescence is a very important time in life to consider oral health. Adolescents frequently suffer from dental caries (tooth decay), especially if proper oral health care was not received throughout childhood (2010). Nationwide, it is estimated that 50% of 12- to 15-year-olds and 67% of 16- to 19-year-olds have had caries experience and 5% have untreated decay. Additionally, 17% of adolescents aged 10-12 years have untreated decay (Warren et al., 2017). If left untreated, caries can lead to pain, infection, and a decreased quality of life.

Adolescence is also a time when periodontal disease can begin. Hormonal changes, along with a lack of good oral hygiene habits, can result in gingivitis. Gingivitis is inflammation of the gums, causing redness and bleeding. Periodontitis, a serious condition in which bone around teeth is lost and ultimately may result in tooth loss, can also begin in late adolescence (2013).

Risk and Protective Factors for Oral Disease in Adolescents

There are many new risk factors for oral disease that are introduced in adolescence. One of these risk factors relates to dietary practices. Frequent consumption of sugary snacks and beverages, especially between meals, can increase an individual's risk for dental caries (2007). According to the Behavior Risk Factor Surveillance Survey, 18% of adolescents have been found to consume five or more glasses of sugary drinks a day (Skinner et al., 2014).

Many adolescents may also begin experimenting with tobacco products. Tobacco use increases the risk for oral cancers and periodontitis. In 2017, 4.7% of people in Pennsylvania, including adolescents, smoked an e-cigarette at least once a week, while, in 2018, 13% smoked a tobacco product every day (2017). Additionally, smokeless tobacco use can increase the risk for oral lesions and cancers of the lip, cheek, and tongue (2012). A smaller proportion of the Pennsylvania population use smokeless tobacco with 2% using it at least once a week and 2.7% using it daily (2017).

Finally, adolescents may be at risk for oral disease as a result of participating in risky sexual activity (2012). In 2017, 38% of Pennsylvania high school students reported being sexually active, while only 59% of those used a condom (2019). Oral human papillomavirus (HPV), which can be acquired by participating in high risk sexual activity, is a risk factor for oropharyngeal cancers (2012).

While many risk factors are present at this time in life, there are also many ways to prevent oral disease. Limiting sugar consumption, especially in beverages such as 100% juice, soda and sports drinks reduces decay risk for this age group. As is consistent across the lifespan, adolescents can also receive protection from tooth decay through fluoride. This can be achieved through drinking fluoridated water, using fluoridated toothpaste, and receiving fluoride varnish application(s) by a dental provider.

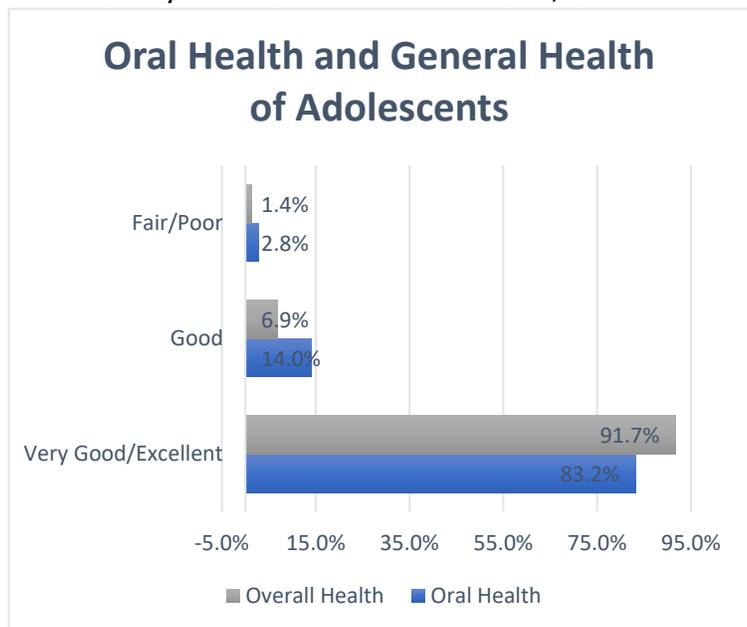
It is also important that adolescents receive routine dental care and practice proper oral hygiene techniques such as daily brushing and flossing. Additionally, adolescents with a high caries risk may benefit from the placement of sealants.

How is Pennsylvania Doing? (Adolescents)

According to the Pennsylvania Department of Health, during the 2017-2018 school year only 10,510 adolescents (grades 8+) were examined by a school dentist. In 2017, 53.5% of children insured by Medical Assistance (MA) saw a dentist, however, the number of unique dentists serving MA-insured children increased 14.6 percent between 2014 and 2017 (Davis et al., 2019).

The National Survey of Children's Health (NSCH) found that of all children and adolescents in Pennsylvania, 11.5% had dental decay or cavities in 2018, while there were 13.4% in 2016 which demonstrates the state is making progress in meeting the oral health needs of adolescents (2020). The NSCH also records data on

Pennsylvania adolescents in regard to dental condition. According to this survey, 83.2% of adolescents had teeth that were in excellent or very good condition, 14% had teeth that were in good condition and 2.8% that were in fair or poor condition (2020). Despite some improvement in adolescent oral health, there is still work to be done to ensure that Pennsylvania adolescents achieve excellent oral health. It should be noted that this is self-reported data which may increase the percent of those who rate their teeth as in good condition.



What is Pennsylvania doing?

Pennsylvania law states "Dental examinations shall be required on original entry into school and in grades three and seven." Schools have two options for fulfilling this requirement, a mandated dental program or a dental hygiene services program.

Article XIV of the Pennsylvania Public School Code requires that public school entities hire school dentists to fulfill these requirements. Additionally, there is a growing effort to incorporate school sealant programs into schools with high rates of children that receive free or reduced-priced lunches. In 2020, the state implemented an effort to increase the number of school sealant programs from 43 to 46 by the end of 2020.

Oral Disease in Adults

The oral health of adults is very important to overall health and quality of life. For adults ages 18+, 41.1% have had at least one permanent tooth removed (2017). Dental caries is one of the more prominent types of oral disease in adulthood. In the United States, 31.6% of adults aged 20-44 have untreated dental caries (2020). Differences exist on this measure in relation to socioeconomic status. For adults that live at income levels below 100% of the federal poverty level, 49.5% have untreated tooth decay, while for adults in households with incomes at 200% or more of the federal poverty level, only 44.3% have untreated dental decay (2018).

Periodontal disease is another oral health concern for many adults. The less severe stages of the disease, gingivitis and mild periodontitis, are common. For adults over the age of 30, 47.2% have some form of periodontal disease. Severe periodontitis affects 8.5% of adults (Eke et al., 2012). The proportion of individuals suffering from periodontal disease increases with age and the condition is more common in men than in women.

Oral cancer is also a concern for some adults. While oral and oropharyngeal cancers are more common in older adults, they can occur in adults of all ages. Adults who frequently use tobacco or alcohol products are particularly at risk. Additionally, the oral health of adults can have direct ties to other chronic conditions. Individuals with diabetes are more susceptible to periodontal disease, and periodontitis may be a risk factor for diabetes, cardiovascular disease, and stroke.

Gingivitis means inflammation of the gums, or gingiva. It commonly occurs because a film of plaque, or bacteria, accumulates on the teeth. Gingivitis is a non-destructive type of periodontal disease, but untreated gingivitis can progress to periodontitis. This is more serious and can eventually lead to loss of teeth

Periodontal (gum) disease is an infection of the tissues that hold your teeth in place. It's typically caused by poor brushing and flossing habits that allow plaque—a sticky film of bacteria—to build up on the teeth

Pregnant women also have specific concerns in regard to oral health. Pregnancy makes women more prone to periodontal (gum) disease and cavities, largely due to their changing eating habits. Nearly 60 to 75% of pregnant women have gingivitis, an early stage of periodontal disease that occurs when the gums become red and swollen from inflammation that may be aggravated by changing hormones during pregnancy. Pregnant women's poor oral health can also lead to poor oral health for the baby later in life. Children of mothers who have high levels of untreated cavities or tooth loss are more than 3 times more likely to have cavities as a child (2019).

Through a cooperative agreement with the Centers for Disease Control and Prevention, the American Academy of Pediatrics worked to create "Protect Tiny Teeth," an oral health communications resource designed to make conversations easier between pregnant women, moms and her healthcare providers. Protect Tiny Teeth includes a mix of attention-grabbing materials to spark awareness that oral health should be part of prenatal care and

tips on how to protect the oral health of their infants. In Pennsylvania, pregnant women are served through the Maternal Infant and Child Home Visiting program and Early Head Start services in which home visitors link pregnant women to a dental home and oral health care. The Pennsylvania Chapter of the American Academy of Pediatrics is a champion for oral health in the state and is currently implementing the Protect Tiny Teeth program in addition to other education programs that increase the awareness of the oral health issues faced by pregnant women.

Risk and Protective Factors for Oral Disease in Adults

Tobacco use is a major risk factor for oral disease in adults. According to the 2018 Behavioral Risk Factor Surveillance System (BRFSS), 17% of Pennsylvania adults are current smokers and 4.7% currently use smokeless tobacco products, such as snuff or chewing tobacco. Tobacco use increases the risk for oral and pharyngeal cancers and periodontitis. Additionally, smokeless tobacco use can increase the risk for oral lesions and cancers of the lip, cheek, and tongue (2000).

Adults can protect themselves from tooth decay and periodontal disease by adopting proper oral hygiene practices. These include daily brushing with fluoridated toothpaste, flossing, and drinking fluoridated water. Adults should also limit their intake of sugary foods and beverages. If practiced consistently, these habits can reduce the risk for dental caries.

It is also important that adults receive routine professional dental cleanings and exams. Regular dental visits are crucial for preventing dental disease, identifying issues to prevent them from worsening, and detecting the first signs of oral and pharyngeal cancer. Adults are less likely than children to receive routine dental care and this limits an adult's ability to benefit from this key prevention activity.

How is Pennsylvania Doing? (Adults)

One of the goals of Healthy People 2020 is to increase the proportion of children, adolescents, and adults who use the oral health care system in the past year to 49%. According to BRFSS (2018), 69.5% of Pennsylvania adults visited the dentist or a dental clinic within the past year compared to the national rate of 67.6% (2017). Healthy People 2020 set the objective to decrease the number of 45-64-year-old adults who have had a permanent tooth extracted due to dental caries or periodontal disease to 68.8%. For Pennsylvania adults of this same age range, only 45.5% have had at least one permanent tooth extracted, meaning Pennsylvania has met this Healthy People objective (2017). The Healthy People 2030 objective has changed to focus efforts on reducing the proportion of adults aged 45 years and over who have lost all of their natural teeth.

Healthy People 2020 has also made oral cancer a priority. They set the goal to reduce the oropharyngeal cancer death rate to 2.3 deaths per 100,000 population. Pennsylvania has met this goal, with an annual death rate of 2.3 per 100,000 population over the 2013-2017

time period. This translates to an average of 399 Pennsylvanians dying each year from a cancer of the oral cavity or pharynx. While the state will still collect data on the Healthy People 2020 objective related to this indicator, the Healthy People 2030 objective now addresses early detection and will aim to increase the percent of adults who receive an oral and pharyngeal cancer screening.

Oral Disease in Older Adults

Many oral health issues become common as adults age. Complete tooth loss (edentulism) is most common in older adults and is of particular concern for individuals of low socioeconomic status. Periodontal disease is also more common in older adults, primarily due to the disease progressing throughout life, with 17% of adults in the U.S. aged 65+ having periodontal disease (2018). Oropharyngeal cancers are most commonly diagnosed in adults over the age of 65 (Vargas et al., 2001). One concerning trend is that there is an increasing rate of oropharyngeal cancers in younger cohorts due to increases in HPV.

The oral health of older adults has many implications for overall health and wellbeing. Tooth loss can reduce chewing ability which can decrease diet quality and possibly lead to weight loss or obesity. Additionally, poor oral health can increase the risk for respiratory infections and pneumonia in older adults. Periodontal disease has also been shown to have a negative effect on older adults with diabetes and maintaining good oral hygiene could help prevent cardiovascular disease (Griffin et al., 2011).

Risk and Protective Factors for Oral Disease in Older Adults

Many older adults take multiple medications to manage chronic diseases. These medications often cause side-effects such as dry mouth, resulting in an increased risk for dental caries. Adults can protect themselves from decay through the use of fluoride, either applied by health care professionals or consumed through fluoridated water systems. Risk factors for oral cancer include tobacco use and excessive alcohol consumption. In adults aged 65+, 13.8% are current smokers and 9.2% are former smokers (2018). Older adults can reduce their risk by avoiding cigarettes, cigars, and smokeless tobacco.

According to surveillance indicator data for the state of Pennsylvania, older adults have a high rate of permanent tooth loss (35% of adults age 65 and older have lost 1-5 permanent teeth) and there is an incidence rate of oral cavity and pharyngeal cancers of 12.2 per 100,000 adults. Dental care also has a relationship with hospitalization for pneumonia, which more common in older adults.

How is Pennsylvania Doing? (Older Adults)

In 2018, 17.0% of Pennsylvania adults aged 65 and over reported that they have had all of their natural teeth removed. This is worse than the national average of 13.6%. However, Pennsylvania has met the Healthy People 2020 goal to reduce the proportion of adults aged 65-74 years who have lost all of their natural teeth to 21.6%. In 2018, only 15.2% of



the condition of oral health in Pennsylvania

Pennsylvanians aged 65-74 years reported that they were without any of their natural teeth. The new objective set forth in the Healthy People 3030 goals is to reduce the proportion of adults aged 45 years and older that have lost all their natural teeth.



Healthy People 2020 has also made oral cancer a priority. They set the goal to reduce the oropharyngeal cancer death rate to 2.3 deaths per 100,000 population. Pennsylvania has met this goal, with an annual death rate of 2.3 per 100,000 population over the 2013-2017 time period. The death rate for adults aged 65 years and older for this same time period was 66.7 deaths per 100,000 population. This results in an average of 6,265 oropharyngeal cancer deaths per year for this age group (2020).

What is Pennsylvania Doing?

Through a state legislative special appropriation, the National Foundation of Dentistry for the Handicapped receives funding to administer the Donated Dental Services program in Pennsylvania to provide dental services for indigent residents who are either over age 65, or who have physical or mental disabilities, or who are otherwise medically compromised.

Reference List

1. Facts, Figures and Stats. FDI World Dental Federation. <https://www.fdiworlddental.org/oral-health/ask-the-dentist/facts-figures-and-stats>. Published April 25, 2019. Accessed October 23, 2020.
2. Dental Caries in Primary Teeth. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/publications/OHSR-2019-dental-caries-primary-teeth.html>. Published September 10, 2019. Accessed October 23, 2020.
3. Dental Caries in Permanent Teeth of Children and Adolescents. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/publications/OHSR-2019-dental-caries-permanent-teeth.html>. Published September 10, 2019. Accessed October 23, 2020.
4. Dental Caries Among Adults and Older Adults. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/publications/OHSR-2019-dental-carries-adults.html>. Published June 28, 2019. Accessed October 23, 2020.
5. Eke PI, Dye B, Wei L, Thornton-Evans G, Genco R. Periodontal Disease. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html>. Published July 10, 2013. Accessed October 23, 2020.
6. Key Statistics for Oral Cavity and Oropharyngeal Cancers. American Cancer Society. <https://www.cancer.org/cancer/oral-cavity-and-oropharyngeal-cancer/about/key-statistics.html>. Published 2020. Accessed October 23, 2020.
7. Jackson SL, Vann WF, Kotch JB, Pahel BT, Lee JY. Impact of Poor Oral Health on Children's School Attendance and Performance. *American Journal of Public Health*. 2011;101(10):1900-1906. doi:10.2105/ajph.2010.200915
8. Association of State and Territorial Dental Directors. 2020 Synopses of State Dental Public Health Programs. Data for FY 2018-2019. <https://www.astdd.org/docs/2020-synopses-report.pdf>. Published May 2020. Accessed October 23, 2020.
9. National Center for Chronic Disease Prevention and Health Promotion, Centers for Disease Control and Prevention. Preventing Cavities, Gum Disease, Tooth Loss, and Oral Cancers: At a Glance 2011. <http://stacks.cdc.gov/view/cdc/11862>. Published 2011. Accessed October 23, 2020.
10. Fleming E, Afful J. Prevalence of total and untreated dental caries among youth: United States, 2015–2016. NCHS Data Brief, no 307. Hyattsville, MD: National Center for Health Statistics. <https://www.cdc.gov/nchs/products/databriefs/db307.html>. Published 2018. Accessed October 23, 2020.
11. Oral Health. Healthy People 2020. <https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Oral-Health/data>. Published 2020. Accessed October 23, 2020.
12. Surgeon General's Report on Oral Health in America. National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/research/data-statistics/surgeon-general>. Published 2000. Accessed October 23, 2020.
13. Use, expenditures and population. Agency for Healthcare, Research and Quality. https://meps.ahrq.gov/mepstrends/hc_use/. Published 2018. Accessed October 26, 2020.
14. Chi DL, Momany ET, Jones MP, Damiano PC. Timing of first dental visits for newly Medicaid-enrolled children with an intellectual or developmental disability in Iowa, 2005-2007. *American Journal of Public Health*. 2011;101(5):922-929.

15. Chi DL, Momany ET, Kuthy RA. Preventive dental utilization for Medicaid-enrolled children in Iowa identified with intellectual and/or developmental disabilities. *Journal of Public Health Dentistry*. 2010; 70:35-44.
16. Fisher-Owens SA, Soobader MJ, Gansky SA, et al. Geography matters: state-level variation in children's oral health care access and oral health status. *Public Health*. 2016; 134:54-63. doi: 10.1016/j.puhe.2015.04.024
17. Providing Our Communities with Oral Health Care. Pennsylvania Association of Community Health Centers. <http://www.pachc.org/Clinical-Quality/Oral-Health>. Published 2020. Accessed October 26, 2020.
18. Free Clinics in PA. Free Clinic Association of Pennsylvania (FCAP). <https://freeclinicspa.org/free-charitable-clinics/free-clinics-in-pa/>. Published 2020. Accessed October 26, 2020.
19. Water Fluoridation Basics. Centers for Disease Control and Prevention. <https://www.cdc.gov/fluoridation/basics/index.htm>. Published January 24, 2020. Accessed October 26, 2020.
20. Gupta N, Yarbrough C, Vujicic M, Blatz A, Harrison B. Medicaid Fee-For-Service Reimbursement Rates for Child and Adult Dental Care Services for all States, 2016. American Dental Association; 2017.
21. Surgeon General's Report on Oral Health in America 2000. National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/research/data-statistics/surgeon-general>. Published 2000. Accessed October 26, 2020.
22. Oral Health Initiative. American Academy of Pediatrics. <https://www.aap.org/en-us/advocacy-and-policy/aap-health-initiatives/Oral-Health/Pages/Oral-Health.aspx>. Published 2020. Accessed October 26, 2020.
23. Dye BA, Thornton-Evans G, Li X, Lafolla TJ. Dental Caries and Sealant Prevalence in Children and Adolescents in the United States, 2011–2012. Centers for Disease Control and Prevention. <https://www.cdc.gov/nchs/products/databriefs/db191.htm>. Published November 6, 2015. Accessed October 26, 2020.
24. Douglass JM, Douglass AB, Silk HJ. A practical guide to infant oral health. *American Family Physician*. 2004; 70(11):2113-2120.
25. Foster T, Perinpanayagam H, Pfaffenback A, Certo M. Recurrence of early childhood caries after comprehensive treatment with general anesthesia and follow-up. *Journal of Dentistry for Children*. 2006;73(1):25-30.
26. Kawashita Y, Kitamura M, Saito T. Early Childhood Caries. *International Journal of Dentistry*. 2011; 1-7. doi:10.1155/2011/725320
27. Adolescent Oral Health Care. American Academy of Pediatric Dentistry. https://www.aapd.org/globalassets/media/policies_guidelines/bp_adoleshealth.pdf. Published 2010. Accessed October 26, 2020.
28. Warren JJ, Van Buren JM, Levy SM, et al. Dental caries clusters among adolescents. *Community Dentistry and Oral Epidemiology*. 2017;45(6):538-544.
29. Periodontal Disease. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/conditions/periodontal-disease.html>. Published July 10, 2013. Accessed October 26, 2020.
30. American Dental Hygienists' Association. Want Some Life Saving Advice: Ask Your Dental Hygienist about Proper Oral Health Care for Adolescents. Published 2007. Accessed on October 26, 2020.

31. Skinner J, Johnson G, Blinkhorn A, Byun R. Factors associated with dental caries experience and oral health status among New South Wales adolescents. *Austral New Zealand Journal of Public Health*. 2014; 38:485-489.
32. BRFSS Prevalence & Trends Data. Centers for Disease Control and Prevention. <https://www.cdc.gov/brfss/brfssprevalence/>. Published September 13, 2017. Accessed October 26, 2020.
33. Barzel, R. & Holt, K. Child and Adolescent Oral Health Issue. National Maternal and Child Oral Health Resource Center, Georgetown University; 2012.
34. BRFSS Prevalence & Trends Data. Centers for Disease Control and Prevention. <https://www.cdc.gov/brfss/brfssprevalence/>. Published September 13, 2017. Accessed October 26, 2020.
35. Barzel, R. & Holt, K. Child and Adolescent Oral Health Issue. National Maternal and Child Oral Health Resource Center, Georgetown University; 2012.
36. Adolescent Health. Office of Population Affairs. <https://opa.hhs.gov/adolescent-health?facts-and-stats%2Fnational-and-state-data-sheets%2Fadolescent-reproductive-health%2Fpennsylvania%2Findex.html>. Published 2019. Accessed October 26, 2020.
37. Barzel, R. & Holt, K. Child and Adolescent Oral Health Issue. National Maternal and Child Oral Health Resource Center, Georgetown University; 2012.
38. Davis, Braun, K. & Schwartz, M. *Oral Health Status of Low-Income Children in Pennsylvania: A Rural-Urban Comparison*. 2019.
39. 2017-2018 National Survey of Children's Health. Data Resource Center for Child and Adolescent Health. <https://www.childhealthdata.org/browse/survey/results?q=6849&r=1>. Published 2020. Accessed October 26, 2020.
40. 2017-2018 National Survey of Children's Health. Data Resource Center for Child and Adolescent Health. <https://www.childhealthdata.org/browse/survey/results?q=6849&r=1>. Published 2020. Accessed October 26, 2020.
41. BRFSS Prevalence & Trends Data. Centers for Disease Control and Prevention. <https://www.cdc.gov/brfss/brfssprevalence/>. Published September 13, 2017. Accessed October 26, 2020.
42. Oral and Dental Health. Centers for Disease Control and Prevention. <https://www.cdc.gov/nchs/fastats/dental.htm>. Published October 19, 2020. Accessed October 26, 2020.
43. Untreated dental caries, by selected characteristics: United States, selected years 1988–1994 through 2013–2016. Centers for Disease Control and Prevention. 2018.
44. Eke PI, Dye B, Thornton-Evans G, Genco R, Wei L. Prevalence of Periodontitis in Adults in the United States: 2009 and 2010. *Journal of Dental Research*. 2012:1-7.
45. Pregnancy and Oral Health Feature. Centers for Disease Control and Prevention. <https://www.cdc.gov/oralhealth/publications/features/pregnancy-and-oral-health.html>. Published February 19, 2019. Accessed October 27, 2020.
46. Surgeon General's Report on Oral Health in America. National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/research/data-statistics/surgeon-general>. Published 2000. Accessed October 23, 2020.

47. BRFSS Prevalence & Trends Data. Centers for Disease Control and Prevention. <https://www.cdc.gov/brfss/brfssprevalence/>. Published September 13, 2017. Accessed October 26, 2020.
48. BRFSS Prevalence & Trends Data. Centers for Disease Control and Prevention. <https://www.cdc.gov/brfss/brfssprevalence/>. Published September 13, 2017. Accessed October 26, 2020.
49. Periodontal Disease in Seniors (Age 65 and Over). National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/research/data-statistics/periodontal-disease/seniors>. Published 2018. Accessed October 26, 2020.
50. Vargas CM, Kramarow EA, Yellowitz JA. The oral health of older Americans. *Aging Trends*. 2001; 3:1-8.
51. Griffin SO, Jones JA, Brunson D, Griffin PM, Bailey WD. Burden of oral disease among older adults and implications for public health priorities. *American Journal of Public Health*. 2011;102(3):411-418.
52. Periodontal Disease in Seniors (Age 65 and Over). National Institute of Dental and Craniofacial Research. <https://www.nidcr.nih.gov/research/data-statistics/periodontal-disease/seniors>. Published 2018. Accessed October 26, 2020.
53. State Cancer Profiles. <http://statecancerprofiles.cancer.gov/cgi-bin/deathrates/deathrates.pl?19>. Published 2020. Accessed October 26, 2020.