the burden of oral disease
2016

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Iowa Department of Public Health | Bureau of Oral and Health Delivery Systems | December 2016

the burden of oral disease

Introduction

Oral disease creates a significant burden in the United States and across the world. Worldwide, 3.9 billion people are impacted by oral disease, and 35% of the world's population suffers from untreated decay in their permanent teeth.[1] In the United States, 14% of 2-8 year old children have untreated decay in their primary (baby) teeth and 8% of 9-11 year old children suffer from untreated decay in their permanent teeth.[2] American adults are also affected by untreated decay, with 24% of those 20-64 years suffering from the condition.[3] Additionally, almost 46% of adults over the age of 30 have some form of periodontal disease[4] and an average of over 8,000 Americans die each year from oropharyngeal cancers.[5] The disease burden from oral conditions leads to American children missing approximately 50 million hours of school, and American adults missing approximately 164 million hours of work each year.[6]

In the pages that follow, the burden of oral disease in Iowa is presented through a series of seven factsheets. These factsheets were created to deliver snapshots of the current status of oral health and oral disease for each stage of life. Factsheets have been created for:

- Very young children,
- Children,
- Children and youth with special healthcare needs,
- Adolescents,
- Adults, and
- Older adults.

One additional factsheet discusses access to oral health services in Iowa.

Each factsheet provides an introduction to common oral conditions for the given stage of life. This is followed by a section describing both risk factors that increase the likelihood of developing oral diseases and protective factors that work to prevent them. Iowa-specific oral health data and a description of Iowa oral health programs are described in the remaining two sections.

These factsheets use the most current data available to describe the burden of oral disease in Iowa. Whenever possible, these values for Iowa 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.[7] 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). Of the 22 oral health-related objectives, Iowa routinely collects and reports data related to 14 of them. A complete table comparing Iowa data to these objectives has been included on the following page.

Healthy People 2020 Objective		2020 Target	U.S.	Iowa	Objective Met
OH-1	Dental caries experience				
	• Children, 3-5 years	30.0%	27.9%[1]	43.3%[16]	No
	• Children, 6-9 years	49.0%	57.7%[1]	53.6% [17]	No
	• Adolescents, 13-15 years	48.3%	53.4%[1]	DNC	DNC
OH-2	Untreated dental decay				
	• Children, 3-5 years	21.4%	11.7%[1]	17.2%[16]	Yes
	• Children, 6-9 years	25.9%	21.5%[1]	16.0% [17]	Yes
	• Adolescents, 13-15 years	15.3%	11.4%[1]	DNC	DNC
OH-3	Untreated dental decay				
	• Adults, 35-44 years (dental decay)	25.0%	24.9%[1]	DNC	DNC
	• Adults, 65-74 years (coronal caries)	15.4%	14.8%[1]	DNC	DNC
	• Adults, 75+ years (root surface caries)	34.1%	37.9%[2]	DNC	DNC
OH-4	Permanent tooth loss				
	• Adults, 45-64 years (at least one)	68.8%	69.8%[1]	49.7%[18]	Yes
	• Adults, 65-74 years (lost all teeth)	21.6%	12.9%[1]	13.0%[19]	Yes
OH-5	Moderate or severe periodontitis				
	• Adults, 45-74 years	40.8%	47.3%[1]	DNC	DNC
OH-6	Oral and pharyngeal cancers detected at earliest stage (Stage 1)	35.8%	30.9%[3]	DNC	DNC
OH-7	Used oral health care system in past year (all ages)	49.0%	42.1%[4]	DNC	DNC
OH-8	Any preventive dental service for low-income children and adolescents	33.2%	34.6%[4]	49.9%[20]	Yes
OH-9	School-based health centers with oral health components				
	• Includes dental sealants	18.8%	24.4%[5]	DNC	DNC
	• Includes fillings and extractions	7.0%	9.1%[5]	DNC	DNC
	• Includes topical fluoride	22.7%	33.1%[5]	DNC	DNC
OH-10	Health centers with oral health programs				
	• FQHCs with oral health programs	83.0%	71.4%[6]	85.7% [6]	Yes
	• Local health departments with oral health programs	28.4%	25.8%[7]	DNC*	DNC
OH-11	FQHC patients that receive oral health services (at FQHCs)	33.0%	20.9%[6]	33.1% [6]	No
OH-12	Dental sealants on molar teeth (at least one)				
	• Children, 3 to 5 years	1.5%	4.3%[1]	DNC	DNC
	• Children, 6 to 9 years	28.1%	37.6%[1]	59.4%[17]	Yes
	• Adolescents, 13 to 15 years	21.9%	22.2%[1]	DNC	DNC
OH-13	Population served by community water systems with optimally fluoridated water	79.6%	74.7%[8]	90.8%[21]	Yes

DNC: Data Not Collected

**Iowa has 23 I-Smile™ Coordinators that provide oral health program services in all 99 counties.*

Healthy People 2020 Objective		2020 Target	U.S.	Iowa	Objective Met
OH-14	Increase the proportion of adults who receive preventive interventions in dental offices				
	• Increase the proportion of adults who received information from a dentist or a dental hygienist focusing on reducing tobacco use or on smoking cessation in the past year	13.2[1]	10.5[1]		
	• Increase the proportion of adults who received an oral and pharyngeal cancer screening from a dentist or dental hygienist in the past year	28.6[1]	23.3[1]	DNC	DNC
	• Increase the proportion of adults who were tested or referred for glycemic control from a dentist or a dental hygienist in the past year	7.3[1]	5.7[1]		
OH-15	Increase the number of States and the District of Columbia that have a system for recording and referring infants and children with cleft lips and cleft palates to craniofacial anomaly rehabilitative teams				
	• Increase the number of states and the District of Columbia that have a system for recording cleft lips and cleft palates	39	39[9]	DNC	DNC
	• Increase the number of States and the District of Columbia that have a system for referral for cleft lips and cleft palates to rehabilitative teams	34	36[9]		
OH-16	States with an oral and craniofacial health surveillance system	50+ District of Columbia	32[10]	Yes	Yes
OH-17	Dental public health program directed by dental professional with public health training	25.7%	23.4%[7]	Yes	Yes
C-6	Reduce oropharyngeal cancer death rate (per 100,000 population)	2.3	2.4[11]	2.2[22]	Yes
AHS-6.3	Persons unable to obtain or delay in obtaining necessary dental care	5.0%	5.7%[12]	DNC	DNC
D-8	Persons with diabetes with at least an annual dental exam	61.2%	54.5%[13]	66.9%[23]	Yes
TU-1	Reduce tobacco use by adults				
	• Reduce use of cigarettes	12.0%	17.0%[13]	18.5%[19]	No
	• Reduce use of smokeless tobacco	0.3%	2.7%[14]	5.1%[19]	No
TU-2	Reduce tobacco use by adolescents (past month)				
	• Reduce use of tobacco products	21.0%	22.4%[15]	25.3% [24]	No
	• Reduce use of cigarettes	16.0%	15.7%[15]	18.1% [24]	No
	• Reduce use of smokeless tobacco	6.9%	8.8%[15]	10.4% [24]	No

DNC: Data Not Collected

Sources for Healthy People 2020 Objective Table

1. 2011-2012 National Health and Nutrition Examination Survey (NHANES)
2. 1999-2004 National Health and Nutrition Examination Survey (NHANES)
3. 2011 data from Surveillance, Epidemiology, and End Results Program (SEER) and National Program of Cancer Registries (NPCR)
4. 2012 Medical Expenditure Panel Survey (MEPS)
5. 2010-2011 School-Based Health Care Census (SBHCC)
6. 2014 Uniform Data System (UDS)
7. 2008 Association of State and Territorial Dental Directors (ASTDD) Annual Synopsis
8. 2014 Water Fluoridation Reporting System (WFRS)
9. 2014 Association of State and Territorial Dental Directors (ASTDD) Annual Synopsis
10. 2009 Association of State and Territorial Dental Directors (ASTDD) Annual Synopsis
11. 2013 National Vital Statistics System - Mortality
12. 2012 Medical Expenditure Panel Survey (MEPS)
13. 2014 National Health Interview Survey (NHIS)
14. 2010 National Health Interview Survey (NHIS)
15. 2013 Youth Risk Behavior Surveillance System (YRBSS)
16. 2015 Iowa Department of Public Health Head Start Survey (Children 3-6 Years)
17. 2016 Iowa Department of Public Health 3rd Grade Oral Health Survey
18. Calculated from 2014 Behavioral Risk Factor Surveillance System (BRFSS)
19. 2014 Behavioral Risk Factor Surveillance System (BRFSS)
20. 2015 Iowa Department of Public Health EPSDT Report, for Medicaid-enrolled children and adolescents aged 1-20 years with a preventive service by a dentist
21. 2016 Iowa Water Fluoridation Reporting System (WFRS)
22. 2008-2012 Iowa Cancer Registry
23. 2012 Behavioral Risk Factor Surveillance System (BRFSS)
24. 2011 Youth Risk Behavior Surveillance System (YRBSS)

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Early Childhood

Oral Disease in Early Childhood

Children can begin experiencing oral disease as soon as their first tooth erupts.[1-2] Because of this, early oral health care is necessary to maintain optimal health and wellbeing. Many professional organizations, including the American Dental Association and the American Academy of Pediatrics, recommend that a child see a dentist by his or her first birthday or approximately six months after the eruption of the first tooth.[2-4]

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.[5,6] It has been estimated that 23% of children in the United States suffer from ECC.[7] Early childhood caries is the most common chronic disease of young children.[8] In addition to causing pain and difficulties eating, learning, and playing, ECC can create long-lasting negative health effects.[1] Many children with ECC suffer from malnutrition and this can slow growth and development.[9] Children with ECC can also develop iron deficiency anemia, further hindering growth.[10] Additionally, children with ECC are at great risk for developing future caries.[11] Without proper intervention, ECC can permanently damage teeth.[3]

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 behaviors.[12] Because of this, children are at an increased risk for oral disease if their parents have tooth decay or consume diets high in sugar.[8] Additionally, children who frequently consume sugary foods and beverages have an increased risk of oral disease.[8] Other risk factors for early oral disease in children include poor home dental care, exposure to second-hand smoke, and being from a family of low socioeconomic status.[8]

Various dietary and hygiene practices at home can help protect young children from early oral disease. Parents should avoid sharing utensils or orally cleaning a pacifier or bottle nipple. Parents should also avoid providing sugary beverages to infants and children in bottles or training cups.[8] In addition, parents should wipe off gums or brush the teeth of children with a small amount of fluoridated toothpaste twice daily and after the consumption of food or beverages.[5] Children can also be protected from early oral disease by drinking fluoridated water.[13]

Finally, it is important for children to establish dental homes within the first year of life. A dental home includes a network of providers who can ensure regular and comprehensive oral health care.[14]

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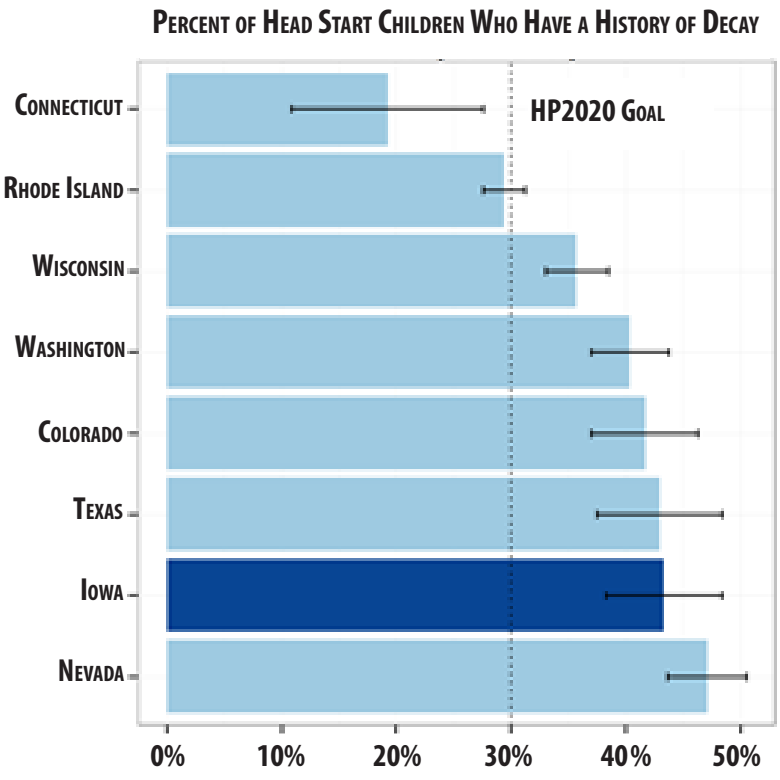
Early Childhood

How is Iowa Doing?

All students entering kindergarten in Iowa are required to have a dental screening. For the 2015-2016 school year, 77.4% of kindergarteners complied with this requirement. Of these children with valid certificates, 14.7% required dental care and 2.5% required urgent dental care.[15]

The Iowa Department of Public Health also conducts open mouth surveys of children in Head Start programs. The majority of these children are 3-5 years. Of those surveyed in 2015, 43.3% had a history of decay (filled tooth and/or untreated decay).[16] Iowa falls short of meeting the Healthy People 2020 goal to have only 30% of 3-5 year olds with caries experience.[17]



Source: www.cdc.gov/oralhealthdata
Includes all states with Head Start Surveys submitted to the Centers for Disease Control and Prevention from 2009-2015.
Horizontal lines indicate 95% Confidence Intervals.

Healthy People 2020 also set a goal to reduce the proportion of 3-5 year old children with untreated decay to 21.4%.[17] Iowa has met this goal, as the Head Start open mouth survey indicated that only 17.2% of these children had untreated decay in 2015.[16]

What is Iowa Doing?

The I-Smile™ dental home initiative, founded in 2006, uses the care coordination skills of dental hygienists to assist infants and young children establish dental homes.[18] These dental hygienists, known as I-Smile™ Coordinators, work in their communities to form partnerships and build dental referral networks. Additionally, Head Start and Early Head Start programs work to ensure that the children they serve have dental homes.[19] In 2016, over 47,000 Medicaid-enrolled children 0-5 years received a dental service from a dentist.[20] Many of these services were made possible through care coordination.

As part of a child's dental home, many public health providers help to ensure Iowa children receive needed oral health services. I-Smile™ Coordinators, public health dental hygienists, and public health nurses provide gap-filling preventive services such as oral screenings and fluoride varnish applications.[20] These services are provided in Head Start classrooms, Supplemental Nutrition Program for Women, Infants, and Children (WIC) clinics, preschools, and other public health settings. In 2016, nearly 26,000 Medicaid-enrolled Iowa children ages 0-5 years received one or more gap-filling preventive services. [20]

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Fact sheet references and additional information can be found at https://idph.iowa.gov/ohds/oral-health-center/reports

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Children

Oral Disease in Children

Dental caries (tooth decay) is the most common chronic disease in American children,[1] and more children lack dental care than any other needed health care service.[2] According to the 2000 Surgeon General's Report on Oral Health, children miss approximately 51 million hours of school annually because of oral health issues in the United States.[1] Lack of optimal oral health can permeate every aspect of a child's life. The pain associated with untreated dental caries can impede a child's ability to eat, talk, sleep, learn, and enjoy playtime activities. Oral health is crucial for the mental, physical, and social well-being of children.[1]

Nationwide, 21.3% of children 6-11 years have caries experience [at least one tooth with either untreated or treated (restored or filled) tooth decay].[3] Within this age division, caries experience is more common in children 9-11 years (28.8%) than children 6-8 years (13.8%).[3] Additionally, 5.6% of 6-11 year old children suffer from untreated dental caries.[3] For the measures of both caries experience and untreated decay, black and Hispanic children disproportionately suffer when compared to non-Hispanic white children.[3]

Risk and Protective Factors for Oral Disease in Children

Children who consume sugary foods and beverages are considered to be at high risk for dental caries.[4] Poor oral hygiene increases this risk further. Additionally, children raised in families of low socioeconomic status are at an increased risk for tooth decay.[1]

One of the primary ways to prevent dental caries in children is through the use of fluoride.[5] A convenient and effective way for children to gain access to fluoride is through optimally fluoridated community water systems. According to a review completed by the Community Preventive Services Task Force, children living in communities with optimally fluoridated water suffer from fewer dental caries than those without access to fluoridated water.[6]

Children can also receive fluoride through varnishes applied by health care providers directly to the teeth. Numerous peer-reviewed research articles have found that fluoride varnish can prevent 43% of caries in the permanent teeth of children and 37% of caries in primary (baby) teeth.[7] Children can also receive protection through the daily use of fluoridated toothpaste.[5]

Another effective way to prevent tooth decay in children is to use dental sealants. Dental sealants are a protective coating placed on the chewing surface of molar teeth. They can reduce dental caries by over 70%.[1]

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Children

How is Iowa Doing?

Healthy People 2020 has set goals to reduce the proportion of children with dental caries experience and untreated dental decay. By 2020, Healthy People's goal is to reduce the proportion of 6-9 year old children with caries experience to 49%.[10] In 2016, Iowa conducted an open mouth survey of third grade students across the state. This survey found that 53.6% of these students had caries experience, resulting in Iowa falling short of meeting this Healthy People objective.[11] Additionally, Healthy People set the goal to reduce the proportion of 6-9 year old children with untreated decay to 25.9%.[10] Only 16% of Iowa third graders were suffering from untreated decay at the time of this 2016 survey.[11] Iowa has met this Healthy People objective.

Healthy People 2020 also set the goal to increase the number of 6-9 year old children with dental sealants on one or more permanent first molar teeth to 28.1%.[10] The 2016 Iowa open mouth survey found that 59.4% of third graders had at least one sealant, resulting in Iowa meeting this Healthy People objective.[11]

In 2010, the Iowa Child and Family Household Health Survey asked parents of children ages 5-9 years about the physical and oral health of their children. Just over 37% reported the overall oral health of their children to be excellent. This number was much higher (65.4%) for overall physical health.[12]

What is Iowa Doing?

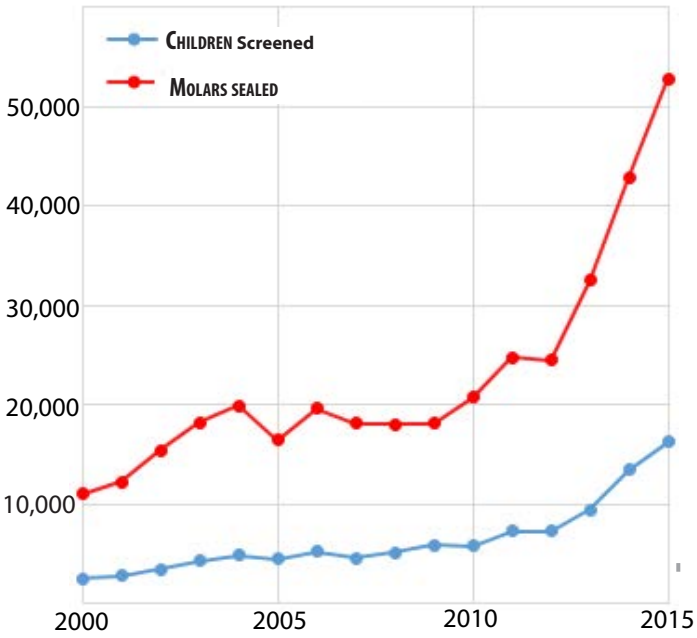
Iowa has been providing gap-filling preventive services and care coordination through the I-Smile™ dental home initiative since 2006. Twenty-three I-Smile™ Coordinators work to ensure at-risk and low income children in all 99 of Iowa's counties are able to receive oral health services and establish dental homes. In 2015, more than 86,000 out of the total 143,000 Medicaid-enrolled Iowa children ages 6-14 years received an oral health service.[13]

In Iowa, many children receive access to preventive dental services through I-Smile™ @ School (school-based sealant) programs. These programs provide dental screenings, dental sealants, fluoride varnish, oral health education, and referrals to dentists.

School-based sealant programs (SBSPs) are considered a best practice by the Association of State and Territorial Dental Directors and recommended by the Community Preventive Services Task Force.[8-9]

Iowa children have benefited from SBSPs for many years. In the 2012-2013 school year, seven contracted SBSPs provided services to just over 7,000 children in 26 counties.[14] Enhanced funding for the next three school years allowed the program to expand. For the 2015-2016 school year, 18 contractors provided services to over 16,000 children in 78 counties.[15]

IDPH School-Based Sealant Programs



Source: Routine IDPH program data
Includes children screened and molars sealed for IDPH school-based sealant programs

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Children and Youth with Special Health Care Needs

Oral Disease in Children and Youth with Special Health Care Needs

Children and youth with special health care needs (CYSHCN) are defined by the Health Resources and Services Administration's Maternal and Child Health Bureau as children and youth with at least one chronic physical, developmental, behavioral, or emotional condition who also require health services beyond those generally needed. It is estimated that 15% of children and youth in Iowa have a special health care need.[1] This translates to over 105,000 children and youth with special health care needs living in Iowa.[1]

CYSHCN have more unmet oral health needs than children without special health care needs.[2] According to the 2009/2010 National Survey of Children with Special Health Care Needs, 10% of CYSHCN aged 0-17 years did not get all needed preventive dental care in the past year.[3] The percent of CYSHCN that did not receive all needed non-preventive (restorative) dental care was even higher at 20.2%.[3] These unmet oral health needs are most prevalent in older children, those in families of low socioeconomic status, and those without insurance.[4]

Many CYSHCN suffer from dental caries (tooth decay). Untreated tooth decay can result in infections, pain, and a lower quality of life.[5] In addition to tooth decay, some CYSHCN may have periodontal disease. This can result in painfully swollen and bleeding gums and can lead to tooth loss in the most severe cases.[6]

Risk and Protective Factors for Oral Disease in Children and Youth with Special Health Care Needs

CYSHCN may be at an increased risk for tooth decay due to the need for specialized medications and diets. Medications that contain sugar or cause dry mouth can lead to caries. Diets that require frequent meals, high calorie intake, or exclusively soft foods can also cause decay.[5]

To prevent oral disease, parents and health care providers should work together to establish dental homes for CYSHCN. Children that receive regular preventive oral health care from dental professionals familiar with the needs of CYSHCN can have a decreased risk for disease.[7]

Additionally, daily oral hygiene practices at home are critical to maintaining oral health. Special home care aids such as toothbrushes with large or extended handles can help children and youth with physical limitations. Parents should provide assistance with these tasks if self-care abilities of the child are limited.[8] Parents can also help maintain oral health by limiting sugary foods and beverages whenever possible.[7]

Finally, fluoride is especially beneficial for disease prevention in CYSHCN. This includes using fluoridated toothpastes and rinses at home, having fluoride varnish applied topically by a health care provider, and drinking fluoridated water throughout the day. Fluoride supplements prescribed by a dentist or physician might also be considered.

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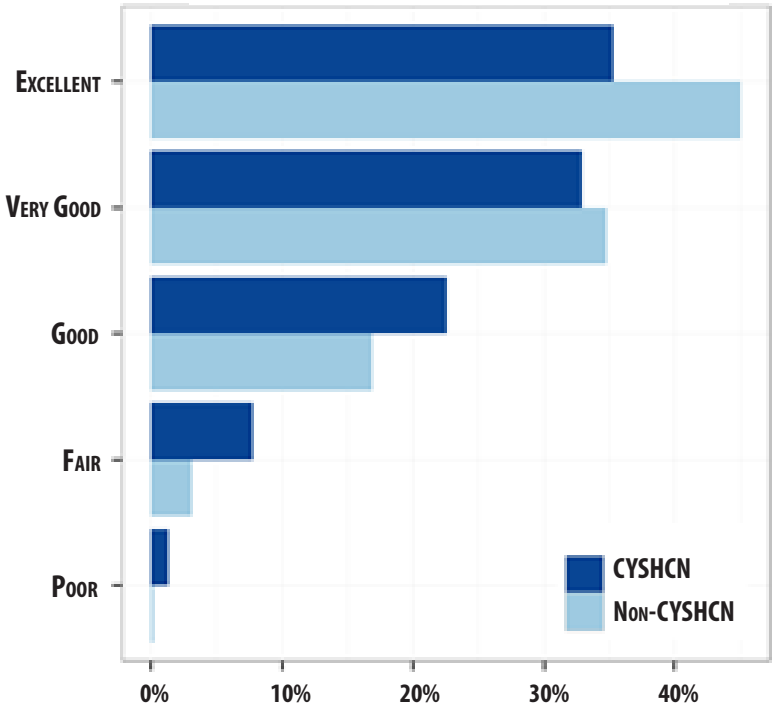
Children and Youth with Special Health Care Needs

How is Iowa Doing?

According to the 2010 Iowa Child and Family Household Health Survey, 5.4% of parents of CYSHCN reported that there was a time in the past year when their child needed dental care but could not get it.[9] This number was lower (3.8%) for children without special health care needs.[9]

Oral Health Status of CYSHCN and Non-CYSHCN



Source: Iowa Child and Family Household Health Survey 2010
Includes parent rating of the oral health status of their children.

Of the parents that reported their child could not receive needed dental care, 34.3% reported that their insurance/ health maintenance organization coverage was inadequate, 32.7% reported that they could not afford the care or had no insurance, 3.5% reported that they had trouble getting an appointment, and 2.5% reported that they were uncomfortable with the providers available at the time.[9] More work must be done to ensure that all CYSHCN are able to access oral health services.

What is Iowa Doing?

The University of Iowa College of Dentistry and Dental Clinics, with funding assistance from the Iowa Department of Public Health, coordinates the Children's Oral Health for Underserved Populations project. This project works to provide comprehensive dental services to uninsured or underinsured children under age 21. CYSHCN without adequate dental insurance coverage and whose families' incomes are less than 300% of the federal poverty level are eligible to receive services through this program.

Additionally, CYSHCN are served through the I-Smile™ dental home initiative. Twenty-three dental hygienists, serving as I-Smile™ Coordinators, facilitate access to dentists and assure that gap-filling preventive services are provided to all at-risk and low income Iowa children, including CYSHCN. The Children's Oral Health for Underserved Populations project works with the I-Smile™ Coordinators to assist CYSHCN with accessing dental care.

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Adolescents

Oral Disease in Adolescents

Adolescence is a time in life that is full of changes. It is also a very important time to consider oral health. Adolescents frequently suffer from dental caries (tooth decay), especially if proper oral health care was not received throughout childhood.[1-2] Nationwide, 58.2% of 12-19 year olds have caries experience in their permanent teeth.[3] If left untreated, caries can lead to pain, infection, and a decreased quality of life.[4]

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.[2] Gingivitis is inflammation of the gums, causing redness and bleeding.[1] Periodontitis, a serious condition in which bone around teeth is lost and ultimately may result in tooth loss, can also begin in late adolescence.[1,5]

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.[6] In 2011, 80.3% of Iowa high school students reported drinking at least one soda in the past week and 28.1% reported drinking at least one soda every day.[7]

Adolescence is also a time when some may begin experimenting with tobacco products. According to the 2011 Youth Risk Behavior Survey, 18.1% of Iowa high school students reported smoking and 6.1% reported using chewing tobacco, snuff, or dip.[7] Tobacco use increases the risk for oral cancers and periodontitis.[1] Additionally, smokeless tobacco use can increase the risk for oral lesions and cancers of the lip, cheek, and tongue.[8] The oral health of adolescents can also be impacted by injuries from participating in sports or other athletic activities.[1-2] Oral-facial injuries can be avoided by wearing helmets, mouth guards, and other personal protective equipment.[1]

Finally, adolescents may be at risk for oral disease as a result of participating in risky sexual activity.[8] In 2011, 33% of Iowa high school students reported being sexually active.[7] Oral human papillomavirus (HPV), which can be acquired by participating in high risk sexual activity, is a risk factor for oropharyngeal cancers.[1,8]

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 soda pop 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 a fluoride varnish application by a dental provider.[2]

It is also important that adolescents receive routine dental care and practice proper oral hygiene techniques such as daily brushing and flossing.[2] Additionally, adolescents with a high caries risk may benefit from the placement of sealants.[2]

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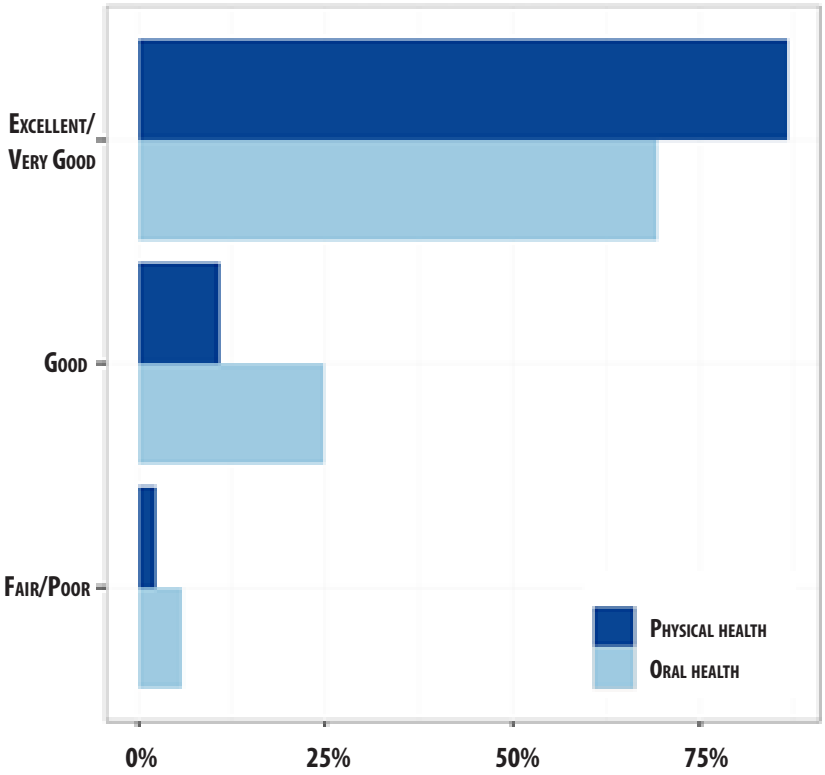
Adolescents

How is Iowa Doing?

The 2010 Iowa Child and Family Household Health Survey asked parents to report when their children were last seen by a dentist. For parents of 14-17 year olds, 90.2% reported that their adolescent had a dentist visit in the past year. Despite this high number, 5.8% reported that there was a time in the last year when their adolescent needed dental care, but could not get it. The most commonly cited reasons for this were that they could not afford the care, had no insurance, or insurance coverage was inadequate.[9]

The National Survey of Children's Health also records information on Iowa adolescents. According to this survey, 69.3% of Iowa adolescents (12-17 years) have teeth that are in excellent or very good condition, 24.8% in good condition, and 5.9% in fair or poor condition. This survey found that although many Iowa adolescents have excellent or very good oral health, a much higher percentage reported having excellent or very good physical health (86.7 %).[10] There is still work to be done to ensure that Iowa adolescents achieve excellent oral health.

Adolescent's Oral Health and General Health



Source: National Survey of Children's Health 2011-2012
Includes parent rating of their adolescent's (ages 12-17) general health and oral health status.

What is Iowa Doing?

In 2007, a bill was passed by the Iowa legislature that requires all students entering kindergarten and ninth grade to have a dental screening. Including ninth graders in this requirement provides an important opportunity for oral health intervention during this time of increased risk. It can also facilitate the development of proper oral health habits prior to adulthood. For the 2015-2016 school year, 61.9% of ninth graders complied with this requirement. Of these adolescents who provided valid certificates of dental screening to their schools, 13.1% required dental care and 1.2% required urgent dental care.[11]

Healthy People 2020 has set a goal to increase the proportion of low income children and adolescents that receive preventive dental care. In Iowa, the Early Periodic, Screening, Diagnosis, and Treatment (EPSDT) program helps assure that Medicaid-enrolled children from birth to age 21 have access to comprehensive health services (including dental care). In 2015, 21,404 adolescents 15-18 years received a preventive oral health service through this program.[12]

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the burden of oral disease

Adults

Oral Disease in Adults

The oral health of adults is very important to overall health and quality of life. For adults ages 20-64, 84.3% have had some form of dental restoration.[1] It is estimated that American adults lose at least 164 million hours of work each year due to dental issues and visits.[2]

In adulthood, dental caries (tooth decay) is a prominent source of oral disease. In the United States, 23.7% of adults aged 20-64 have untreated tooth decay.[1] Drastic differences exist on this measure in relation to socioeconomic status. For adults that live at income levels below 100% of the federal poverty level, 41.9% have untreated tooth decay.[1] For adults in households with incomes at 200% or more of the federal poverty level, only 16.6% have untreated decay.[1]

Periodontal (gum) disease is another oral health concern for many adults. The less severe stages of the disease, gingivitis and mild periodontitis, are common.[2] For American adults over the age of 30, 45.9% have some form of periodontal disease.[3] Severe periodontitis affects 9% of adults.[3] The proportion of individuals suffering from periodontal disease increases with age and the condition is more common in men than in women.[2]

Oral cancer is also a concern for some adults. While 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.[4]

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.[2]

Risk and Protective Factors for Oral Disease in Adults

Tobacco use is a major risk factor for oral disease in adults. According to the 2014 Behavioral Risk Factor Surveillance System, 18.5% of Iowa adults are current smokers and 5.2% currently use chewing tobacco, snuff, or snus.[5] Tobacco use increases the risk for oral cancers and periodontitis.[2] Additionally, smokeless tobacco use can increase the risk for oral lesions and cancers of the lip, cheek, and tongue.[2]

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.[2] Adults should also limit their intake of sugary foods and beverages. As is consistent throughout the lifespan, these practices can reduce the risk for dental caries.[6]

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 cancer.[6] 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.[7]

the burden of oral disease

Adults

How is Iowa Doing?

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 the 2014 Behavioral Risk Factor Surveillance System, 69.4% of Iowa adults visited the dentist or a dental clinic within the past year.[5] This is better than the national rate of 65.3%.[5]

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%.[8] For Iowa adults of this same age range, only 49.7% have had at least one permanent tooth extracted.[5] Iowa has met this Healthy People objective.

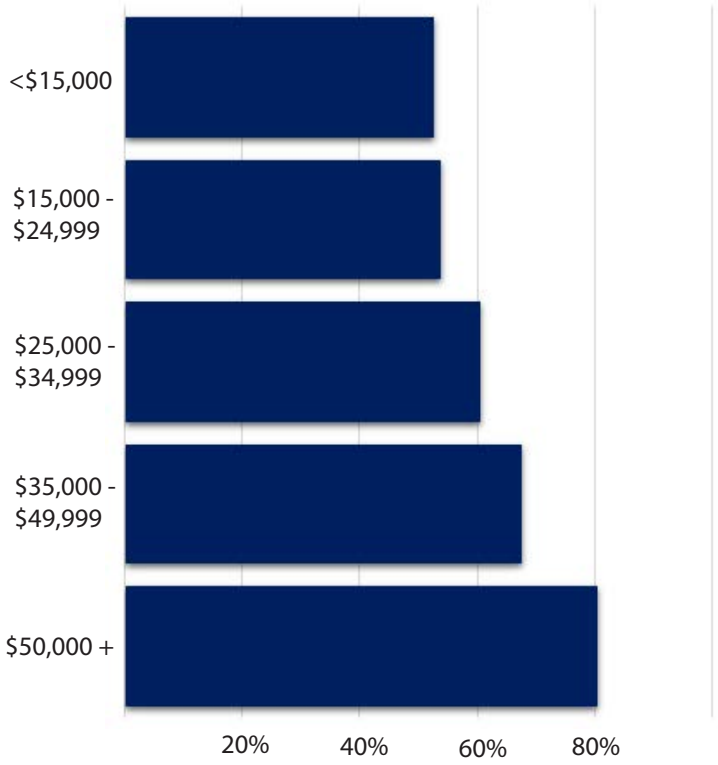
Healthy People 2020 has also made oral cancer a priority. They set the goal to reduce the oropharyngeal cancer death rate to 2.3 deaths per 100,000 population.[8] The state of Iowa has met this goal, with an annual death rate of 2.2 per 100,000 population over the 2008-2012 time period.[9] This translates to an average of 81 Iowans dying each year from a cancer of the oral cavity or pharynx.[9] The death rate for adults under 65 years for this same time period was 1.0 deaths per 100,000 population.[9]

What is Iowa Doing?

On May 1, 2014, Iowa began a new dental insurance program for low-income adults. Titled the Dental Wellness Plan, this insurance option allows adults aged 19-64 and with household incomes between 0 and 133% of the federal poverty level to receive comprehensive dental benefits.[10] This provides many previously uninsured adults access to diagnostic, preventive, and emergency dental care.[10]

The Governor's Healthiest State Initiative has also made an effort to improve the oral health of adults. This initiative's "get your bib on" campaign encourages Iowans to visit the dentist and make oral health a priority.[11]

Percent of Adults Who Have Been to Dentist in Last Year by Income



Source: Behavioral Risk Factor Surveillance Survey 2014
Includes adults 18 and older who answered that they have been to the dentist in the last year in 2014, by self-reported household income.

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the burden of oral disease

Older Adults

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.[1] Periodontal disease is also more common in older adults, primarily due to the disease progressing throughout life.[1] Oropharyngeal cancers are also most commonly diagnosed in adults over the age of 65.[1]

The oral health of older adults has many implications for overall health and wellbeing. Tooth loss can reduce chewing ability and this can decrease diet quality.[2] This can lead to weight loss or obesity.[2] Additionally, poor oral health can increase the risk for respiratory infections and pneumonia in older adults.[2] 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.[2]

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 (tooth decay).[1]

Adults can protect themselves from decay through the use of fluoride, either applied by health care professionals or consumed through fluoridated water systems.[2] Additionally, periodontal disease can be prevented through professional scaling and root planing by a dental hygienist or dentist.[2]

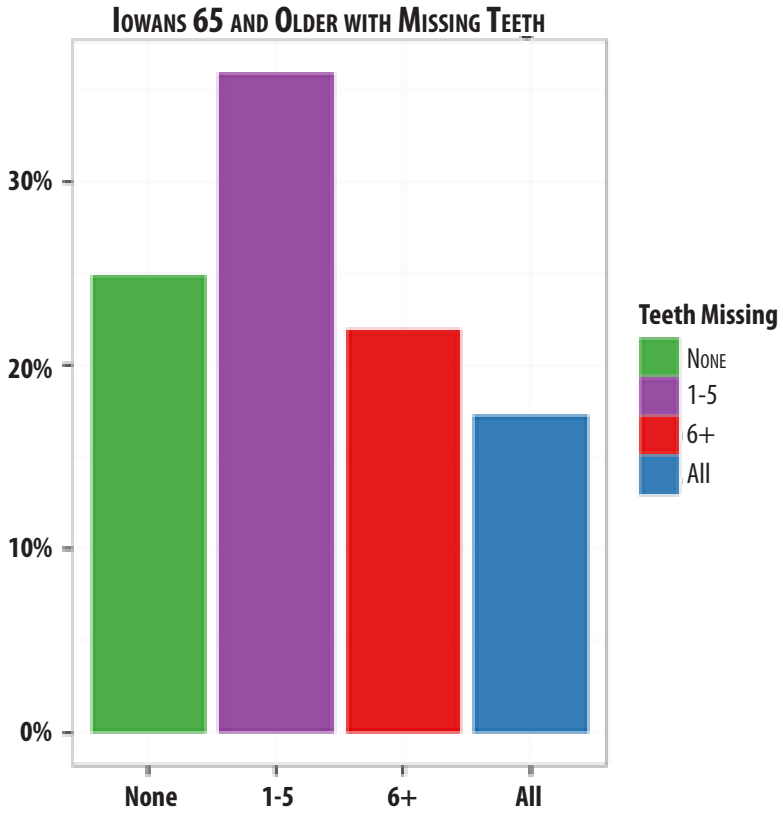
Risk factors for oral cancer include tobacco use and excessive alcohol consumption.[3] Adults can reduce their risk by avoiding cigarettes, cigars, and smokeless tobacco.[3]

the burden of oral disease

Older Adults

How is Iowa Doing?

In 2014, 15.0% of Iowa adults aged 65 and over reported that they have had all of their natural teeth removed.[4] This is slightly better than the national average of 15.1%.[4] However, Iowa 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%.[5] In 2014, only 13.0% of Iowans aged 65-74 years reported that they were without any of their natural teeth.[4]



Source: Behavioral Risk Factor Surveillance Survey 2012
Includes adults 65 and older by self-reported number of teeth that have been removed.

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.[5] The state of Iowa has met this goal, with an annual death rate of 2.2 per 100,000 population over the 2008-2012 time period.[6] The death rate for adults aged 65 years and older for this same time period was 10.6 deaths per 100,000 population.[6] This results in an average of 50 oropharyngeal cancer deaths per year for this age group.[6]

What is Iowa Doing?

In Iowa, a coalition dedicated to the oral health of older adults was started in 2013. The Lifelong Smiles Coalition is working to increase access to oral health care for older adults in Iowa. Strategies of the coalition include increasing care coordination, providing education to direct care workers, and researching potential policy improvements.[7]

The Iowa Department of Public Health, with funding support from the Delta Dental of Iowa Foundation, has recently initiated a pilot project aimed at improving access to oral health care for older Iowans and improving the dental delivery system. This project, titled I-Smile™ Silver, uses care coordinators to enhance dental referral systems, increase access to care for older adults, and form relationships between dentists and others involved in the care and lives of older adults.[8]

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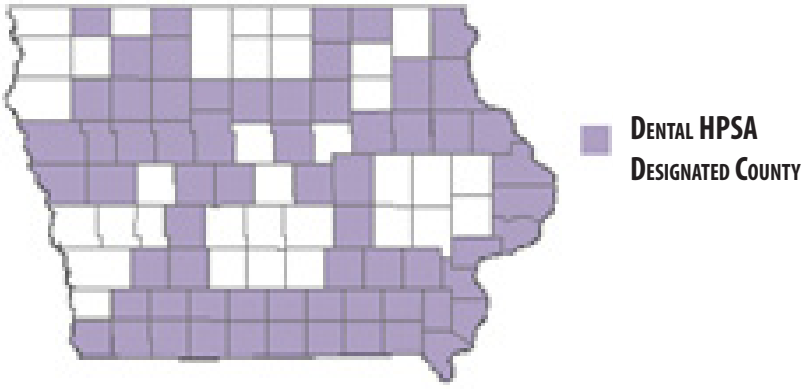
Access to Oral Health Services in Iowa

Dental Professionals in Iowa

In 2015, there were 1,556 dentists practicing in Iowa.[1] The population to dentist ratio for the state in 2015 was 2,007:1.[1] In 2013, there were approximately 1,647 dental hygienists practicing in Iowa.[2] Of the 99 counties in Iowa, 19 counties had two or fewer dentists and 28 counties had two or fewer dental hygienists.[1-2]

Dentists in Iowa are not evenly distributed across the state. The population to dentist ratio in Iowa's counties range from 885:1 in Johnson County to 9133:1 in Palo Alto County. In 2015, a total of 10 Iowa counties had population to dentist ratios greater than 5000:1. This uneven distribution has resulted in certain areas of Iowa being designated as dental Health Professional Shortage Areas (HPSAs).[1]

Dental Health Professional Shortage Areas



Source: Health Resources and Services Administration 2015
Health Professional Shortage Areas are counties with at least one area designated as having an inadequate number of dentists to serve their dental needs.

Loan Repayment Program

Loan repayment programs incentivize dentists to practice in dental HPSAs. The Delta Dental Loan Repayment Program offers an eligible dentist $50,000 over three years to be used for educational debt in exchange for practicing in a dental HPSA and providing 35% of services to underserved populations.[5-6] The Fulfilling Iowa's Need for Dentists (FIND) Loan Repayment Program is a variation of the Delta Dental Loan Repayment Program in which communities that are seeking a dentist also contribute funding. In this program, dentists receive up to $100,000 to be used for education loan debt over a five year period.[5]

The Primary Care Recruitment and Retention Endeavor (PRIMECARRE) program is Iowa's state loan repayment program. It was authorized by the Iowa Legislature in 1994 to improve health care access, and it offers loan repayment assistance to qualified primary care providers. Dentists and dental hygienists are among the professionals eligible for this program. For primary care and dental providers willing to practice for two years in a public or non-profit site designated as a HPSA, grants are available at up to $50,000 per year.[7] Twelve applicants were selected to receive funding in 2017.

Dental Education in Iowa

Iowa has one school that offers a Doctor of Dental Surgery (DDS) degree. The University of Iowa College of Dentistry and Dental Clinics enrolls approximately 80 new students annually.[3] In addition to the DDS degree, this college offers 12 graduate specialty programs.[4] The University of Iowa is a large supplier of Iowa dentists. Of the 1,556 Iowa dentists in 2015, 77.8% were graduates of the University of Iowa College of Dentistry and Dental Clinics.[1]

Iowa also has five schools that award associate degrees in dental hygiene. These schools include Iowa Western Community College, Kirkwood Community College, Iowa Central Community College, Hawkeye Community College, and Des Moines Area Community College. Approximately 91 students graduate from these programs each year.[2] Additionally, Allen College awards a bachelor of health science degree in dental hygiene.

the burden of oral disease

Access to Oral Health Services in Iowa

Public Health Supervision Agreements

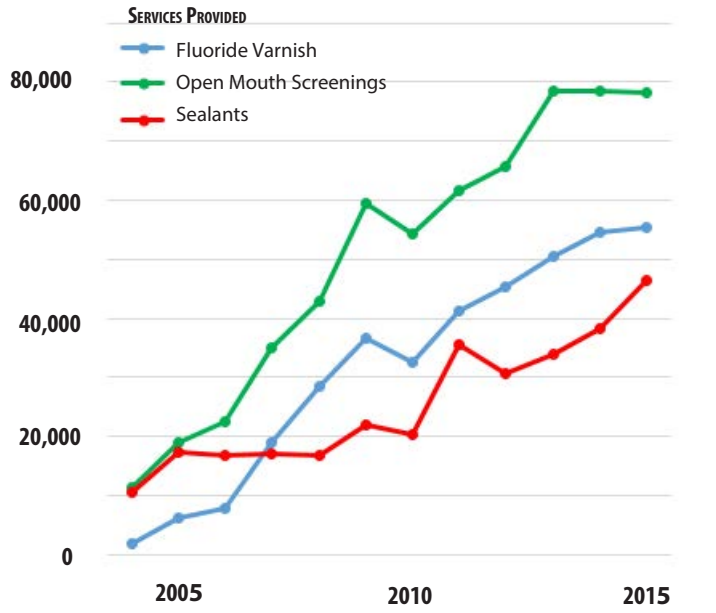
In Iowa, dental hygienists with at least three years of clinical experience can enter into a Public Health Supervision Agreement with a dentist.[8] These agreements allow dental hygienists to provide oral screenings, fluoride varnish and sealant applications, and oral health education to patients in public health settings. The provision of these services includes a referral to a dentist. In 2015, 104 dental hygienists performed services in public health settings under a Public Health Supervision Agreement.[8]

Through public health settings such as school-based programs, Federally Qualified Health Centers, Head Start programs, federal public health programs, and others, dental hygienists under public health supervision provided over 78,000 oral screenings, over 55,000 fluoride varnish applications, over 46,000 sealant applications, and over 58,000 referrals to dentists in 2015. [8]

Dental Insurance in Iowa

Iowa provides dental insurance benefits to low-income children and adolescents under 21 years through the Medicaid program Care for Kids.[9] Children enrolled in Medicaid receive services based on the Early and Periodic Screening, Diagnostic, and Treatment (EPSDT) program guidelines.[9] Dental benefits include routine exams, preventive services such as fluoride varnishes and sealants, and medically necessary diagnostic and treatment services.[9] In 2015, 323,835 Iowa children ages 0-20 years were eligible for Medicaid. Of those, 52% received a dental or oral health service.[10]

Services Provided by Hygienists Under Public Health Supervision



Source: Routine IDPH program data
Includes services provided under public health supervision of a dentist, as reported by Registered Dental Hygienists.

Iowa also provides insurance coverage through the Children's Health Insurance Program (CHIP).[12] Iowa's CHIP program is titled Healthy and Well Kids in Iowa (***hawk-i***), and it provides dental benefits to qualifying children aged 0-20 years.[11] In Iowa, children without private dental insurance and from families with incomes too high for Medicaid eligibility have the opportunity to enroll in the dental-only option of ***hawk-i***.[11]

On May 1, 2014, Iowa began a new dental insurance program for low-income adults as part of Medicaid expansion. Titled the Dental Wellness Plan, this insurance option allows adults aged 19-64 and with household incomes between 0 and 133% of the federal poverty level to receive comprehensive dental benefits.[13] This provided many previously uninsured adults access to diagnostic, preventive, and emergency dental care.[13]

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