

WISCONSIN — DEPARTMENT OF HEALTH SERVICES

2010 — Burden of Oral Disease in Wisconsin



► ACKNOWLEDGEMENTS

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► I. INTRODUCTION



The mouth is our primary connection to the world: it is how we take in water and nutrients to sustain life, our primary means of communication, the most visible sign of our mood, and a major part of how we appear to others. Oral health is an essential and integral component of overall health throughout life and is much more than just healthy teeth. Oral refers to the whole mouth: the teeth, gums, hard and

soft palate, linings of the mouth and throat, tongue, lips, salivary glands, chewing muscles, and upper and lower jaws. Not only does good oral health mean being free of tooth decay and gum disease, but it also means being free of chronic oral pain conditions, oral cancer, birth defects such as cleft lip and palate, and other conditions that affect the mouth and throat. Good oral health also includes the ability to carry on the most basic human functions such as chewing, swallowing, speaking, smiling, kissing, and singing.

The mouth is an integral part of human anatomy and plays a major role in our overall physiology. Thus, oral health is intimately related to the health of the rest of the body. For example, mounting evidence suggests that infections in the mouth such as periodontal (gum) diseases may increase the risk of heart disease, may put pregnant women at greater risk of premature delivery, and may complicate control of blood sugar for people living with diabetes. Conversely, changes in the mouth often are the first signs of problems elsewhere in the body, such as infectious diseases, immune disorders, nutritional deficiencies, and cancer.

This report summarizes the most current information available on the oral disease burden of people in Wisconsin. It also highlights groups and regions in the state that are at highest risk for oral health problems and discusses strategies to prevent these conditions and to provide access to dental care. Comparisons are made with national data whenever possible and to the *Healthy People 2010* goals when appropriate. For some conditions, national data, but not state data, are available at this time. It is hoped that this information will help raise awareness of the need for monitoring the oral disease burden in Wisconsin and guide efforts to prevent and treat oral diseases and enhance the quality of life of Wisconsin's residents.

▶ II. EXECUTIVE SUMMARY

The Burden of Oral Disease in Wisconsin is a comprehensive review of oral health data available in the state, with national and *Healthy People 2010* comparisons when possible. While Wisconsin has made significant progress in improving the oral health status of Wisconsinites, oral disease continues to be a key health concern for the state.

The Burden of Oral Diseases

Wisconsin conducted a statewide Basic Screening Survey of Head Start children during the 2008-09 school year. Wisconsin must make significant progress in order to meet the *Healthy People 2010* objectives for this population. The objective for untreated decay was 9 percent and about 26 percent of Wisconsin's Head Start children have untreated decay, compared to 19 percent nationally.

26% of Wisconsin's Head Start children have untreated decay.

A Basic Screening Survey was also conducted among third grade students in Wisconsin public schools during the 2007-08 school year. While some progress still needs to occur to meet the decay experience objective, Wisconsin has met the 2010 objectives for untreated decay. However, racial/ethnic and socioeconomic disparities exist, where African American, Hispanic, and Asian children are all twice as likely as white children to have untreated decay.

African American, Hispanic, and Asian children are twice as likely as white children to have untreated decay.

Among adults, Wisconsin has also had some success. Wisconsin has met the objectives for adults 35 to 44 with no tooth loss and edentulous older adults. Likewise, Wisconsin has met the objective for oral and pharyngeal cancer death rate, but needs to make progress on meeting the objective for oral and pharyngeal cancers detected at the earliest stages. In addition, racial and ethnic disparities need to be addressed because African Americans are more likely to develop oral and pharyngeal cancers, are less likely to be diagnosed at an early stage, and are more likely to die from oral and pharyngeal cancers.

African Americans are more likely to develop oral and pharyngeal cancers, are less likely to be diagnosed at an early stage and are more likely to die from oral and pharyngeal cancers.

Disparities in oral health status exist throughout Wisconsin by race/ethnicity, gender, and geographic location. In addition, there are many special populations in the state that have an increased disease burden that needs to be addressed including: people with disabilities, long-term care residents, people with HIV/AIDS, and people in the corrections system.

Risk and Protective Factors Affecting Oral Diseases

Community water fluoridation is not only effective in preventing dental caries, but it also generates cost savings. Wisconsin has had great success in the area of community water fluoridation and has surpassed the *Healthy People 2010* objective of 69 percent. In Wisconsin 90 percent of the population on community water systems has access to optimally fluoridated water.

Dental sealants placed on permanent molars in children are an effective way to prevent tooth decay in the pits and fissures of molar teeth. The Wisconsin Seal-A-Smile Program is in its tenth year of operation and in the most recent year of operation almost 6,300 children received dental sealants through the program. Wisconsin has met the *Healthy People 2010* objective for dental sealants, where 51 percent of third grade students have sealants.

Use of tobacco products is a major risk factor for oral disease, including periodontal disease and oral and pharyngeal cancers. Tobacco use is still common in Wisconsin and throughout the United States. Approximately 20 percent of Wisconsin adults are current smokers and 16 percent use chewing tobacco, snuff or snus.

Provision of Dental Services

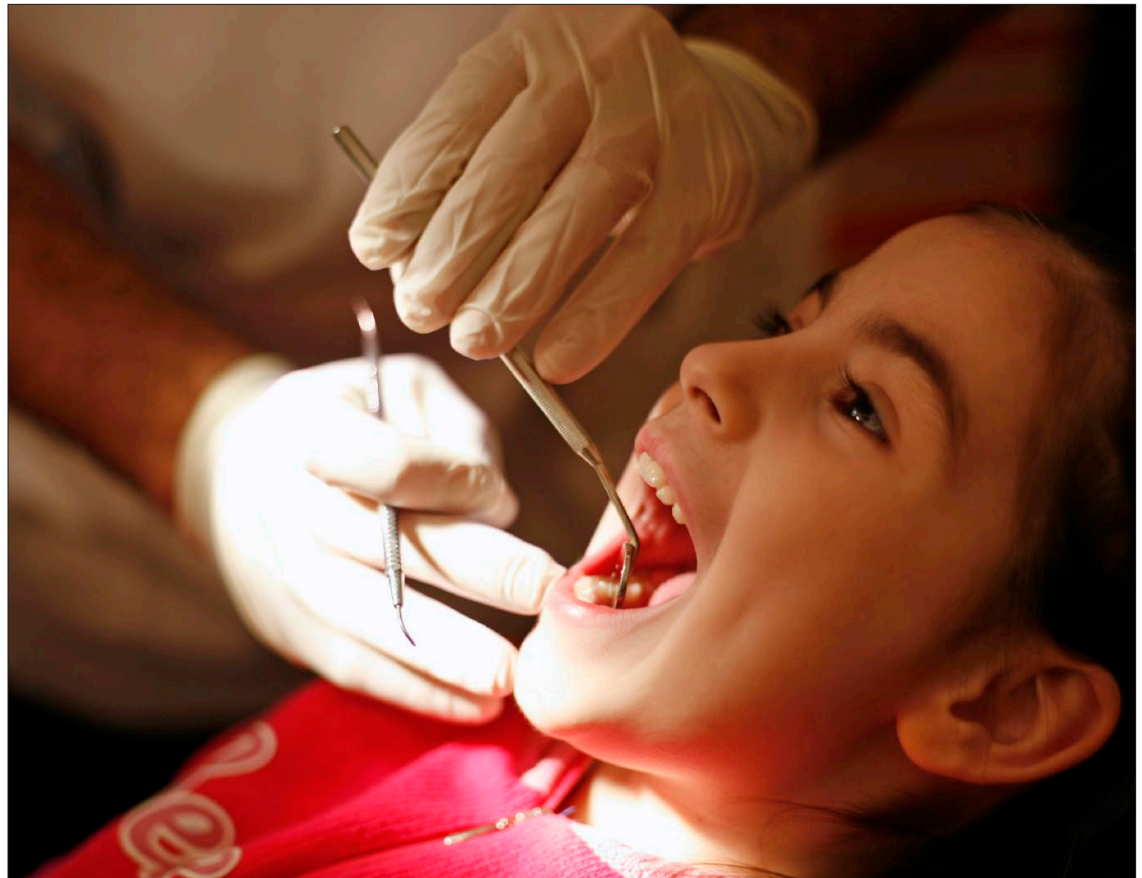
In 2009 there were an estimated 3,142 active dentists and 2,891 dental hygienists in Wisconsin. Overall Wisconsin's oral health workforce is similar to the United States. Wisconsin has 43 low-income population dental Health Professional Shortage Areas and 33 facility dental Health Professional Shortage Areas.

During State Fiscal Year 2009 only 25 percent of Medicaid and BadgerCare Plus members received at least one dental service and rates have remained the same over the past six years. Of the active licensed dentists in 2009, only 32 percent had at least one paid Medicaid claim and 11 percent had claims of \$10,000 or more.

Wisconsin has one dental school, The School of Dentistry at Marquette University, which admits 80 new students per year. Forty of the new students are Wisconsin residents. Ten Wisconsin Technical Colleges offer dental hygiene programs. In addition, five technical college campuses offer a one year dental assistant program and seven offer a short-term technical diploma.

Only 25% of Medicaid and BadgerCare Plus members received at least one dental service.

11% of active licensed dentists had Medicaid paid claims of \$10,000 or more.



▶ III. BACKGROUND

a. Purpose and Use of the Burden Report

The burden document is a summary of the most current data available on the oral disease prevalence among people in Wisconsin. It also includes information on oral health disparities and groups in Wisconsin that are most at risk. Whenever possible, Wisconsin data are compared to national data and to the *Healthy People 2010* objectives from the federal health plan. For some topics state level data are not available. In addition to disease data, the report includes data on prevention programs, the oral health workforce, Medicaid, community health centers, and dental education programs. This burden report can be used to monitor the oral health status of Wisconsin residents and can assist in targeting limited resources and programs for oral disease prevention and treatment.

b. Most Common Oral Diseases

The most common oral diseases among both adults and children are dental caries and periodontal disease. These oral diseases can affect basic functions like eating and talking and can affect work and school attendance and productivity. Dental caries can occur anytime after teeth erupt and is the most common chronic disease among children, five times more frequent than asthma and seven times more frequent than hay fever [USDHHS 2000b]. Like dental caries, periodontal diseases are infections caused by bacteria. Gingivitis is a more mild form of periodontal disease causing the gums to bleed, while periodontitis can involve all soft tissues and the bone supporting the teeth. Untreated periodontitis can lead to tooth loss.

c. Wisconsin Demographics

Wisconsin is located in the Midwest and borders Lake Michigan, Lake Superior and the Mississippi River. The land area covers 54,310 square miles, with a population density of 99 people per square mile, compared to 80 people per square mile nationally. In 2008 the estimated population of Wisconsin was 5,627,967, with a 4.9 percent increase from 2000. The population growth in Wisconsin has been lower compared to the national average of 8.0 percent [USCB 2009]. Forty-seven of Wisconsin's 72 counties are considered rural.

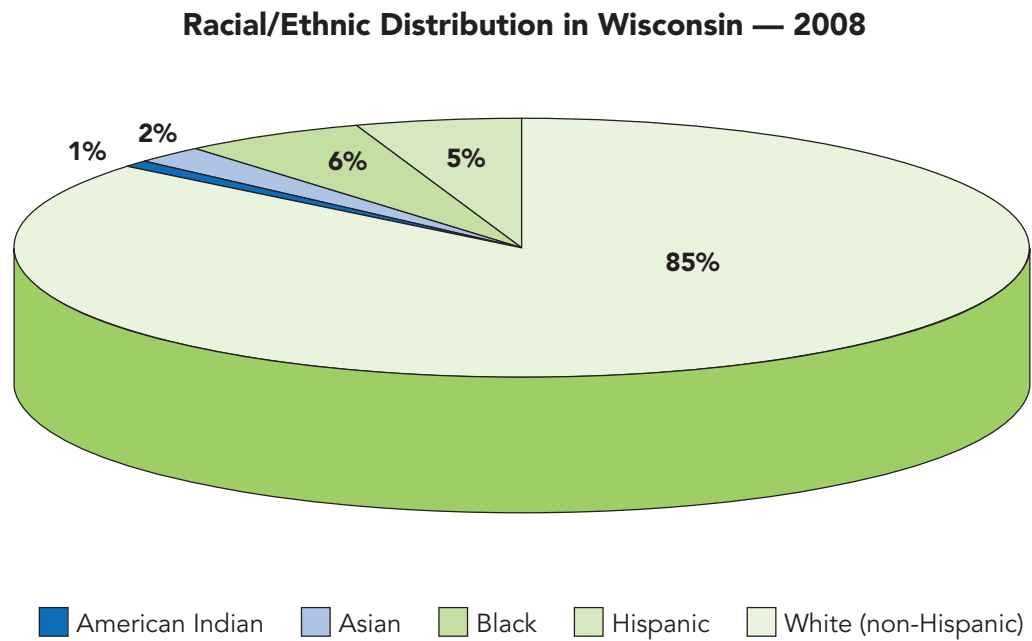
Wisconsin's population is primarily white non-Hispanic, with 85.1 percent compared to only 65.6 percent nationally (Figure I). However, Hispanic populations have been increasing in Wisconsin. In 2000, 3.6 percent of the population was of Hispanic ethnicity compared to 5.1 percent in 2008.

Approximately 92 percent of Wisconsin residents, age five years or older, speak only English at home. Among residents who speak something other than English the most common languages spoken are Spanish (52%), German (9%), Miao/Hmong (8%), French (3%), Chinese (3%), and Polish (2%) [USCB 2010].

The median household income in Wisconsin of \$50,567 is similar to the national average household income (\$50,740). Nonetheless, Wisconsin has a smaller percentage of people living below poverty, 10.8 percent compared to 13.0 percent nationally. In addition, Wisconsin has a higher percentage of adults with a high school diploma (85.1%) compared to the national average

(80.4%). However, Wisconsin has a slightly lower percentage with a bachelor's degree or higher, 22.4 percent compared to 24.4 percent [USCB 2009].

Figure I.



Source: U.S. Census Bureau, Wisconsin Quick Facts

▶ IV. NATIONAL AND STATE OBJECTIVES ON ORAL HEALTH

Oral Health in America: A Report of the Surgeon General (the *Report*) alerted Americans to the importance of oral health in their daily lives [USDHHS 2000b]. Issued in May 2000, the *Report* further detailed how oral health is promoted, how oral diseases and conditions are prevented and managed, and what needs and opportunities exist to enhance oral health. The *Report's* message was that oral health is essential to general health and well-being and can be achieved. However, several barriers hinder the ability of some Americans to attain optimal oral health. The Surgeon General's *Report* concluded with a framework for action, calling for a national oral health plan to improve quality of life and eliminate oral health disparities.

One component of an oral health plan is a set of measurable and achievable objectives on key indicators of oral disease burden, oral health promotion, and oral disease prevention. One set of national indicators was developed in November 2000 as part of *Healthy People 2010*, a document that presents a comprehensive, nationwide health promotion and disease prevention agenda [USDHHS 2000c]. *Healthy People 2010* is designed to serve as a road map for improving the health of all people in the United States during the first decade of the 21st century. Included are objectives for key structures, processes, and outcomes related to improving oral health. These objectives represent the ideas and expertise of a diverse range of individuals and organizations concerned about the nation's oral health.

The Surgeon General's *Report* on oral health was a wake-up call, spurring policy makers, community leaders, private industry, health professionals, the media, and the public to affirm that oral health is essential to general health and well-being and to take action. That call to action led a broad coalition of public and private organizations and individuals to generate *A National Call to Action to Promote Oral Health* [USDHHS 2003]. The Vision of the *Call to Action* is "To advance the general health and well-being of all Americans by creating critical partnerships at all levels of society to engage in programs to promote oral health and prevent disease." The goals of the *Call to Action* reflect those of *Healthy People 2010*:

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

National objectives on oral health such as those in *Healthy People 2010* provide measurable targets for the nation, but most core public health functions of assessment, assurance, and policy development occur at the state level. The *National Call to Action to Promote Oral Health* calls for the development of plans at the state and community levels, with attention to planning, evaluation, and accountability [USDHHS 2003]. Wisconsin has had a state health plan since *Healthier People in Wisconsin*, a public health agenda for the year 2000. The National *Healthy People 2020* objectives are currently in draft form and *Healthiest Wisconsin 2020*, which includes an oral health focus area, has been completed. The *Healthy People 2010* oral health objectives for the nation and the current status of each indicator for the United States and for Wisconsin are summarized in Table I.

Table I — Healthy People 2010 Oral Health Indicators, Target Levels, and Current Status in the United States and Wisconsin

Healthy People 2010 Objective [Objective Number and Description]	Target (%)	National ^a (%)	Wisconsin (%)
21-1) Dental caries (tooth decay) experience			
a) Young children, aged 2–4 years	11	24	35 ^c
b) Children, aged 6–8 years	42	53	55 ^d
c) Adolescents, aged 15 years	51	56	DNC
21-2) Untreated caries (tooth decay)			
a) Young children, aged 2–4 years	9	19	26 ^c
b) Children, aged 6–8 years	21	29	20 ^d
c) Adolescents, aged 15 years	15	18	DNC
d) Adults, aged 35–44 years	15	28	DNC
21-3) Adults with no tooth loss, aged 35–44 years	42	38	75 ^e
21-4) Edentulous (toothless) older adults, aged 65–74 years	20	24	15 ^e
21-5) Periodontal (gum) diseases, adults aged 35–44 years			
a) Gingivitis, aged 35–44 years	41	DNC ^f	DNC
b) Destructive periodontal (gum) diseases, aged 35–44 years	14	16	DNC
3-6) Oral and pharyngeal cancer death rates reduction (per 100,000 population)*	2.7	2.6 ^b	2.4 ^b
21-6) Oral and pharyngeal cancers detected at earliest stages, all	50	35 ^b	39 ^b
21-7) Oral and pharyngeal cancer exam within past 12 months, aged 40+ years	20	DNA	DNC
21-8) Dental sealants			
a) Children, aged 8 years (1st molars)	50	32	51 ^d
b) Adolescents (1st and 2nd molars) aged 14 years	50	21	DNC
21-9) Population served by fluoridated water systems, all	75	69	90 ^f
21-10) Dental visit within past 12 months Children and adults aged 2+ years	56	45	75 ^g
21-11) Use of oral health care system by adult residents in long-term care facilities	25	DNC	DNC
21-12) Low-income children and adolescents receiving preventive dental care during past 12 months, aged 0–18 years	57	31	DNC

Table I — Healthy People 2010 Oral Health Indicators, Target Levels, and Current Status in the United States and Wisconsin

Healthy People 2010 Objective [Objective Number and Description]	Target (%)	National ^a (%)	Wisconsin (%)
21-13) School-based health centers w/ oral health component, K–12 a) Dental sealants b) Dental care	--	24 10	NA
21-14) Community-based health centers and local health departments with oral health components, all	75	70	63.3 [§]
21-15) System for recording and referring infants and children with cleft lip and cleft palate, all	51 (all) states and D.C.	32 states and D.C.	Y
21-16) Oral health surveillance system, all	51 (all) states and D.C.	DNA	Y
21-17) Tribal, state, and local dental programs with a public health trained director, all a) state and local b) tribal and Indian Health Service	--	51 10	1 0

Sources:

DNC = Data not collected

DNA = Data not available

NA = Not applicable

*Age adjusted to the year 2000 standard population

† Objective was dropped midcourse

§ Local health departments, tribes, and Federally Qualified Health Centers were included in the calculation.

a National data are the most recent available from DATA2010 database, unless otherwise noted.

b 2003-2006 SEER

c 2008-09 Healthy Smiles for a Healthy Head Start

d 2007-08 Make Your Smile Count

e 2008 Wisconsin BRFSS

f 2009 Fluoridation Census

g 2007 Wisconsin Family Health Survey

NOTE: Often state and national data that are being compared are from different sources, which may use different methods.

► V. THE BURDEN OF ORAL DISEASES

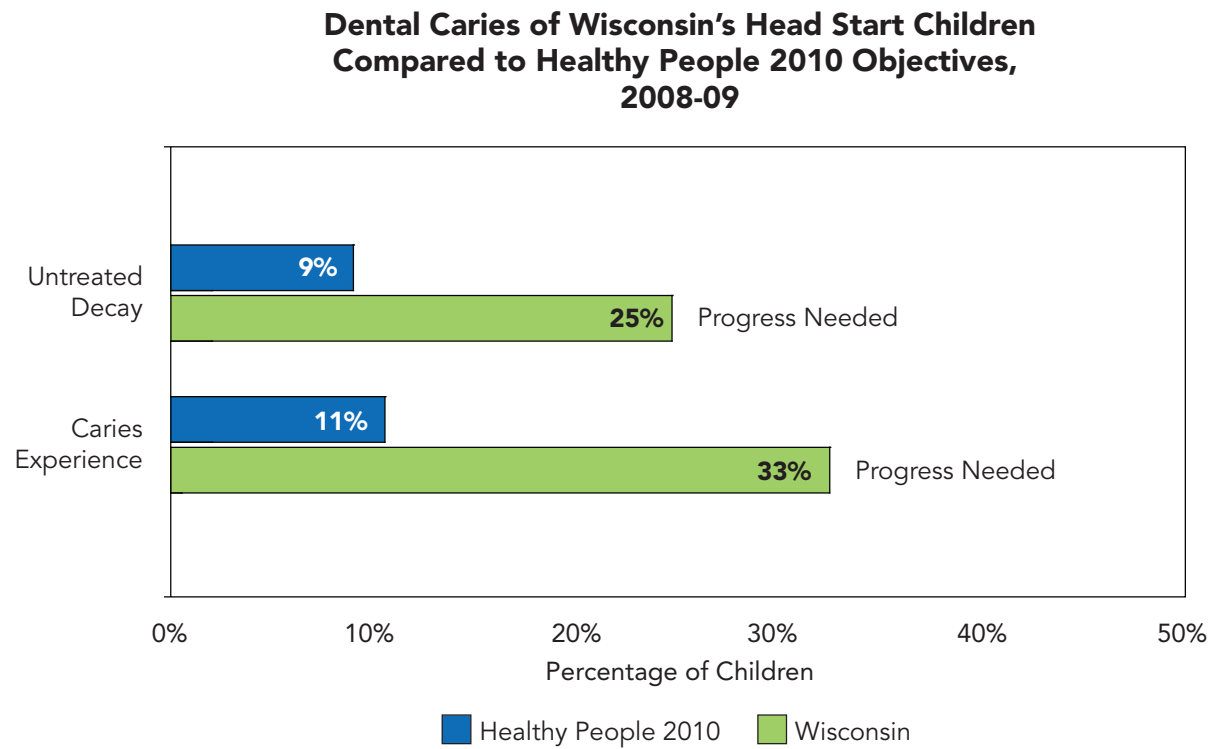
a. Prevalence of Disease and Unmet Needs

i. Children

Nationally, dental caries (tooth decay) is four times more common than childhood asthma and seven times more common than hay fever. Dental caries is a disease in which acids produced by bacteria on the teeth lead to loss of minerals from the enamel and dentin, the hard substances of teeth. If left unchecked, dental caries can result in loss of tooth structure, inadequate tooth function, unsightly appearance, pain, infection, and tooth loss.

The prevalence of decay in children is measured by assessing caries experience (if they have ever had decay and now have fillings), untreated decay (active unfilled cavities), and urgent care (reported pain or a significant dental infection that requires immediate care).

Caries experience and untreated decay are monitored in Wisconsin, as consistent with the National Oral Health Surveillance System (NOHSS), which allows comparisons with other states and with the nation. According to the most recent surveys 33 percent of Head Start children and 55 percent of third grade children had caries experience. Also, 25 percent of Head Start children and 20 percent of third grade children had untreated decay at the time of the surveys. In addition to monitoring untreated decay and caries experience, treatment need is also identified. In Wisconsin 27 percent of Head Start children and 20 percent of third grade children had either early or urgent treatment needs at the time of the screening. Wisconsin has met the untreated decay and dental sealant *Healthy People 2010* objectives for children six to eight years old. However, much progress is needed to achieve the two objectives for children aged two to four and the objective for untreated decay for children six to eight (Figures II and III).

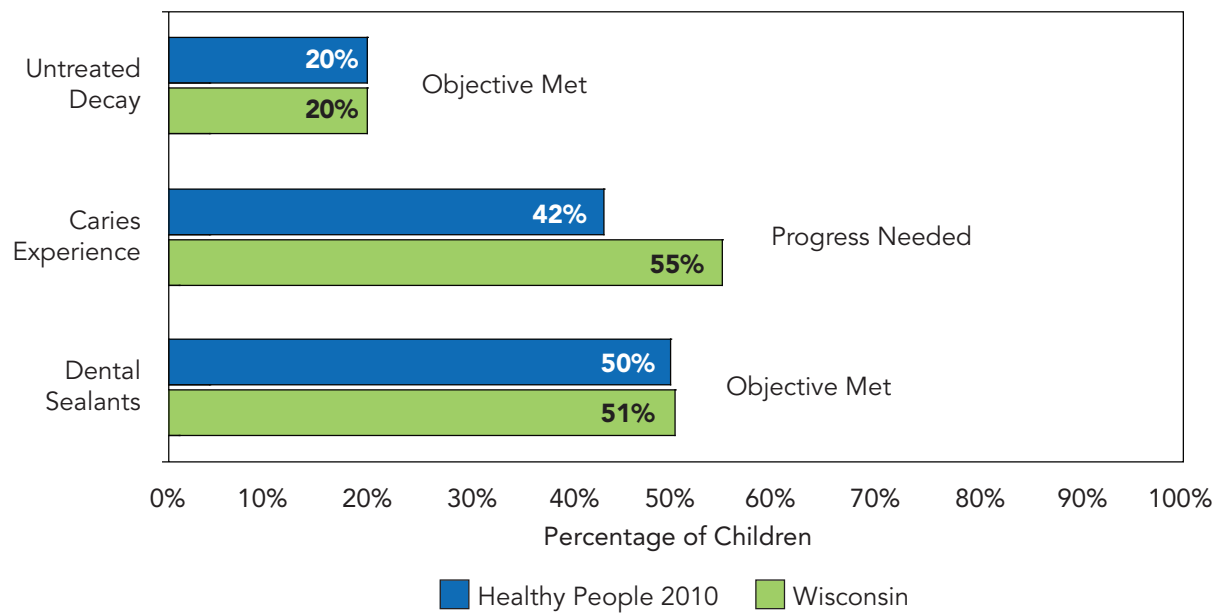
Figure II.

* The Healthy People objective is for children ages 2 to 4, while these Wisconsin data only include children ages 3 and 4.

Source: Wisconsin Department of Health Services, Healthy Smiles for a Healthy Head Start

Figure III.

**Dental Caries of Wisconsin's Third Grade Children
Compared to Healthy People 2010 Objectives,
2007-08**

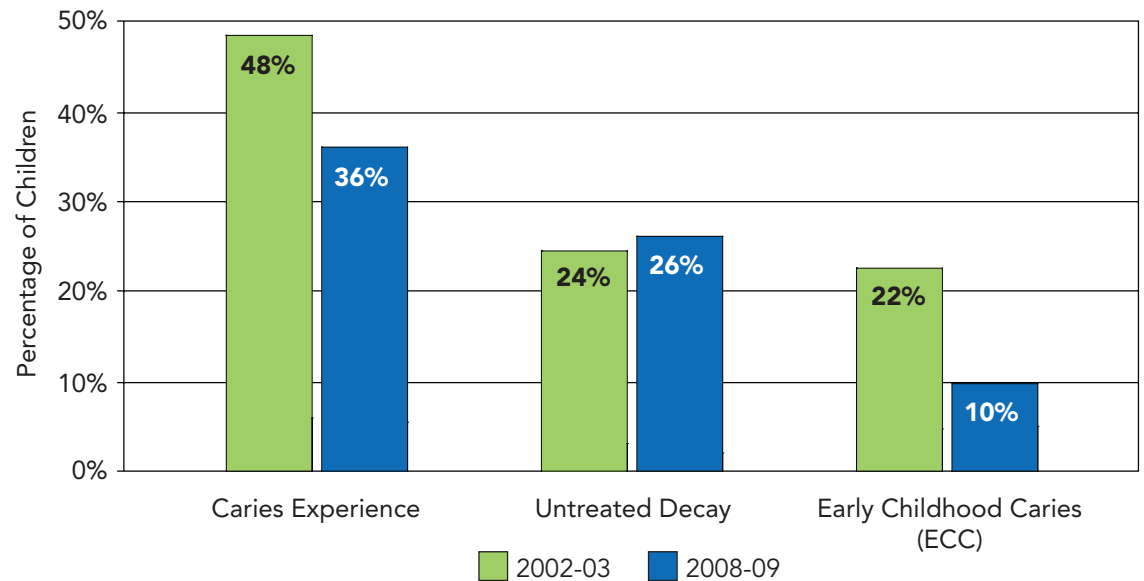


Source: Wisconsin Department of Health Services, Make Your Smile Count

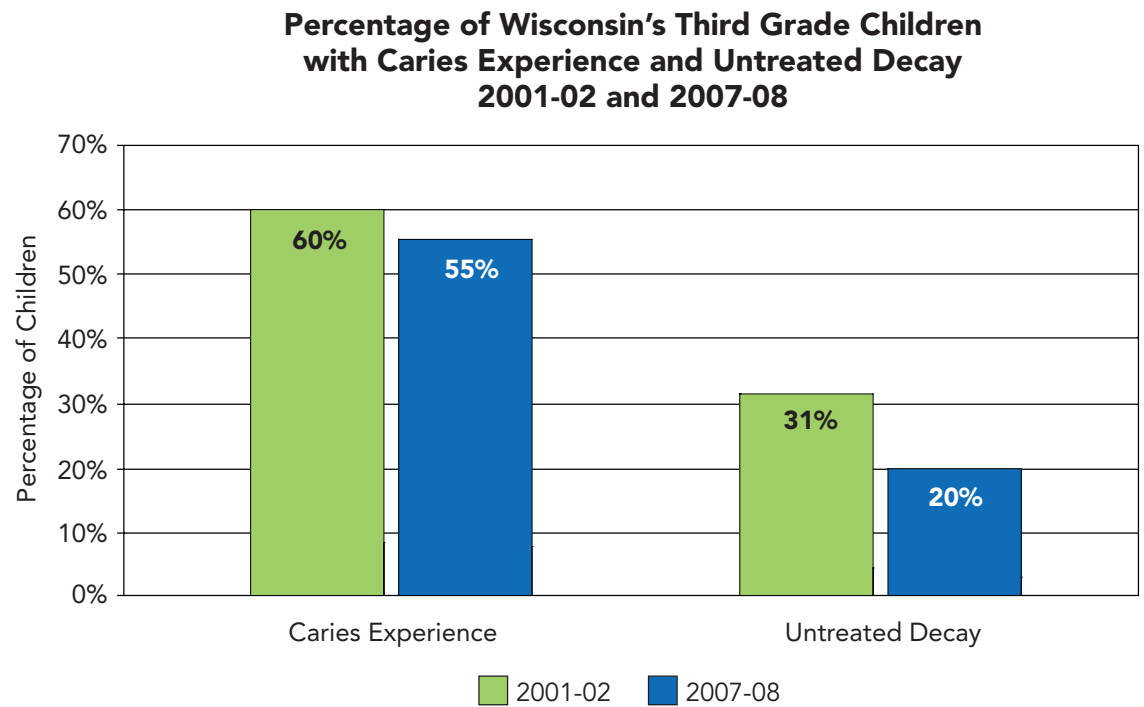
Wisconsin first conducted a survey of third grade students during the 2001-02 school year and in 2002-03 for Head Start children. Much improvement was made from baseline among Head Start children for caries experience (48% to 36%) and Early Childhood Caries (22% to 10%), while untreated decay remained unchanged (Figure IV). Likewise some progress was made among third grade students, with a small decrease in caries experience and a significant decrease in untreated decay from 31 percent to 20 percent (Figure V)

Figure IV.

**Percentage of Wisconsin's Head Start Children
with Caries Experience, Untreated Decay and Early Childhood Caries
2002-03 and 2008-09**



Source: Wisconsin Department of Health Services, Healthy Smiles for a Healthy Head Start

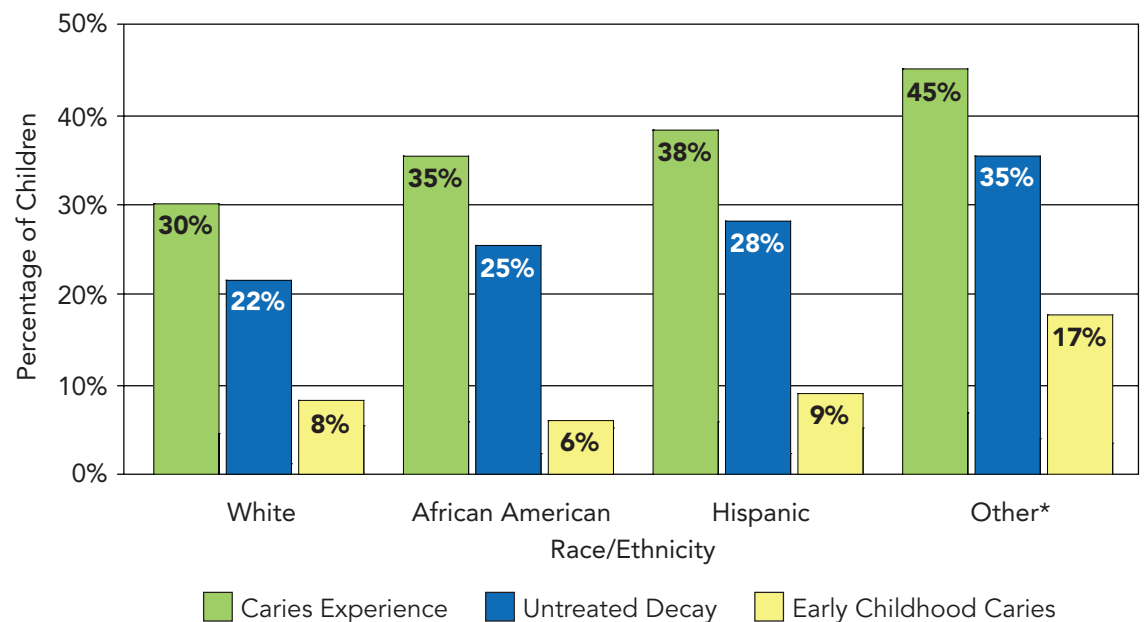
Figure V.

Source: Wisconsin Department of Health Services, Make Your Smile Count

Dental caries is not uniformly distributed in the United States or in Wisconsin. Some groups are more likely to experience the disease and are less likely to receive treatment. Wisconsin conducted a basic screening survey of Head Start children during the 2008-09 school year. Although all of the children included in the sample came from low income families, racial and ethnic disparities were still found. African American and Hispanic children were more likely to have caries experience and untreated decay compared to white children (Figure VI). Due to small numbers, children from all other racial/ethnic groups were grouped together into an other category. The children in the other group were much more likely to have caries experience, untreated decay, and Early Childhood Caries compared to white children.

Figure VI.

**Percentage of Wisconsin's Head Start Children
with Caries Experience, Untreated Decay and Early Childhood Caries
by Race/Ethnicity, 2008-09**

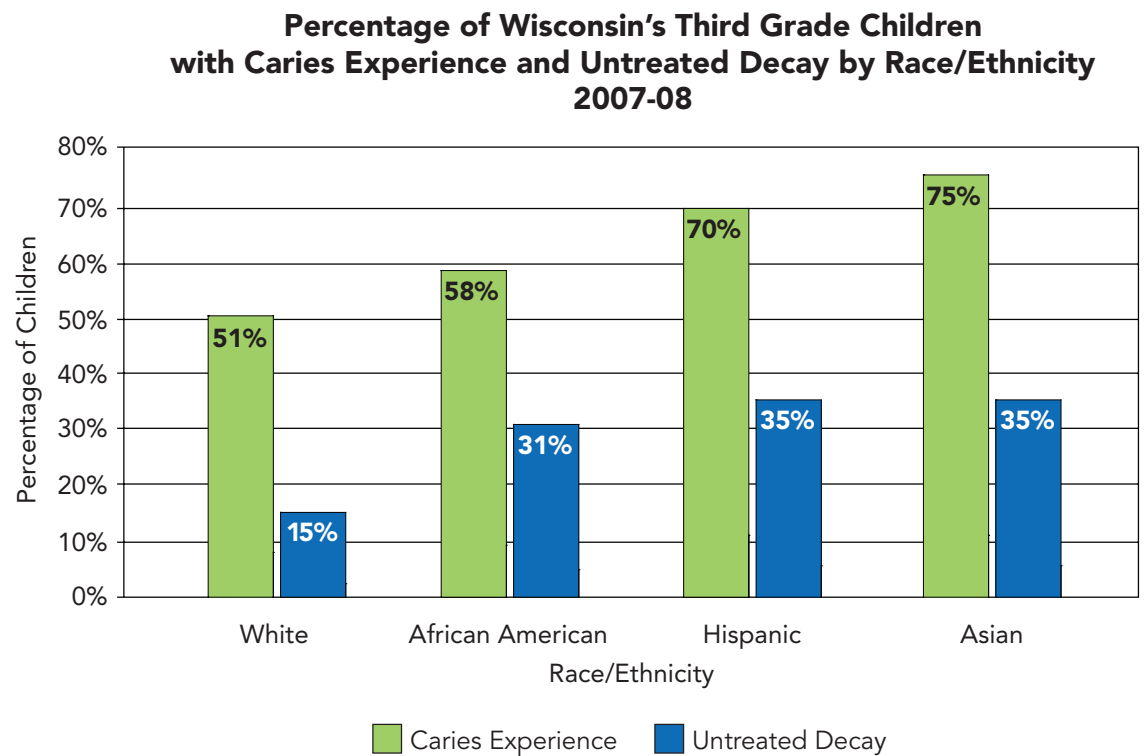


* Other includes: American Indian/Alaska Native, Native Hawaiian/Pacific Islander, multi-racial and missing/unknown

Source: Wisconsin Department of Health Services, Healthy Smiles for a Healthy Head Start

Significant racial/ethnic disparities were also found among third grade students in Wisconsin public schools. Among Asian children, 75 percent had caries experience compared to 51 percent of white children (Figure VII). In addition, 70 percent of Hispanic students had caries experience and African American, Hispanic, and Asian students were all much more likely to have untreated decay compared to white students.

Figure VII.



Source: Wisconsin Department of Health Services, Make Your Smile Count

ii. Adults

Dental Caries

People are susceptible to dental caries throughout their lifetime. Like children and adolescents, adults can experience new decay on the crown (enamel covered) portion of the tooth. But adults can also develop caries on the root surfaces of teeth as those surfaces become exposed to bacteria and carbohydrates as a result of gum recession. In the most recent national examination survey, 85 percent of U.S. adults had at least one tooth with decay or a filling on the crown. Root surface caries affects 50 percent of adults aged 75 years or older [USDHHS 2000b].

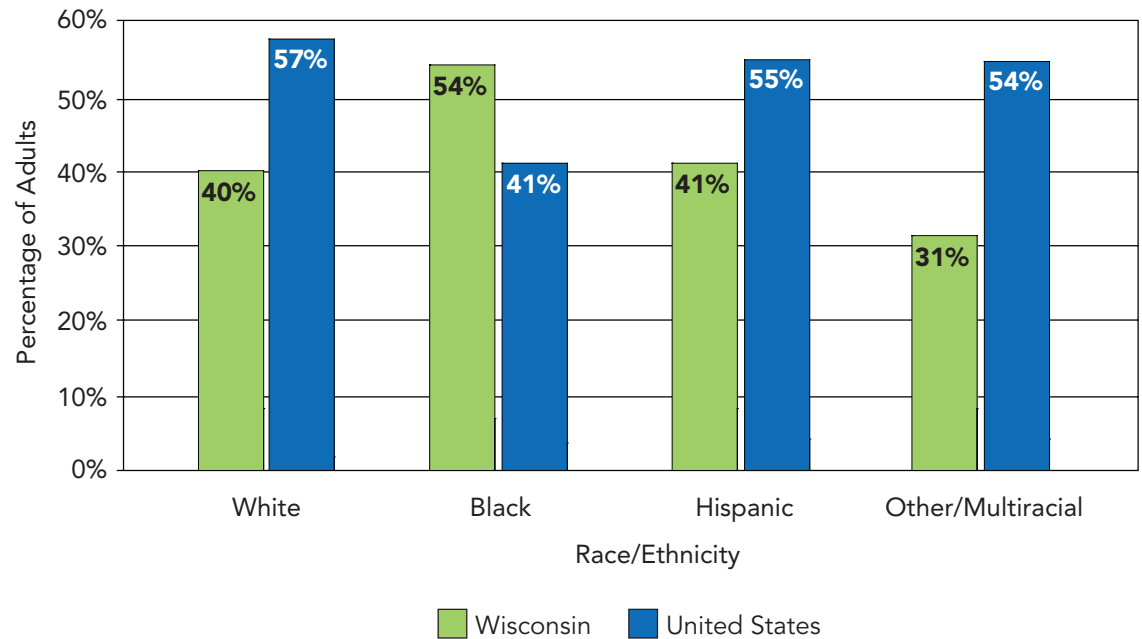
Not only do adults experience dental caries, but a substantial proportion of that disease is untreated at any point in time. About 28 percent of adults between the ages of 35 and 44 participating in the 2004 National Health and Nutrition Examination Survey had untreated caries [CDC 2010].

Tooth Loss

A full dentition is defined as having 28 natural teeth, exclusive of third molars (the wisdom teeth) and teeth removed for orthodontic treatment or as a result of trauma. Most people can keep their teeth for life with adequate personal, professional, and population-based preventive practices. As teeth are lost, a person's ability to chew and speak decreases, which can interfere with social functioning. The most common reasons for tooth loss among adults are tooth decay and periodontal (gum) disease. Tooth loss can also result from infection, unintentional injury, and head and neck cancer treatment. In addition, certain orthodontic and prosthetic services sometimes require the removal of teeth.

Despite an overall trend toward a reduction in tooth loss in the U.S. population, not all groups have benefited to the same extent. Women tend to have more tooth loss than men of the same age group. African Americans (54%) are more likely than whites (40%) to have tooth loss (Figure VIII). Among all predisposing and enabling factors, low educational level often has been found to have the strongest and most consistent association with tooth loss (Figure IX). Adults with more education are less likely to have lost a tooth to decay or gum disease, both in Wisconsin and the United States. However, adults in Wisconsin are less likely to have lost a tooth for each educational level compared to the United States. In addition, there are some geographic disparities, where adults in the northern half of Wisconsin are more likely to lose teeth due to decay or gum disease compared to adults in the southern half (Figure X).

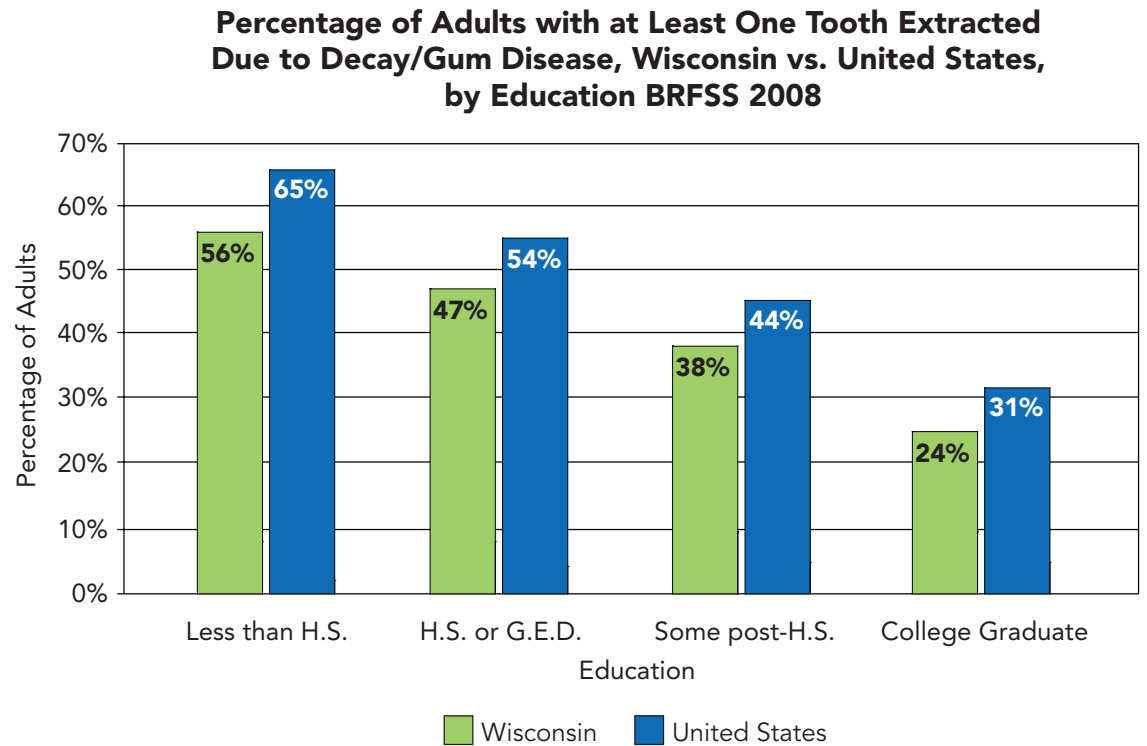
In Wisconsin 75 percent of adults between the ages of 35 and 44 have not lost a tooth due to decay or gum disease, which is well above the *Healthy People 2010* objective of 42 percent. Wisconsin has also met the objective for edentulous older adults, where 15 percent of adults between 65 and 74 years old are toothless compared to the *Healthy People 2010* objective of 20 percent.

Figure VIII.**Percentage of Adults with at Least One Tooth Extracted
Due to Decay/Gum Disease, Wisconsin vs. United States,
by Race/Ethnicity BRFSS 2004, 2006 & 2008**

Sources: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System and CDC Behavioral Risk Factor Surveillance System

Note: Due to small numbers three years of BRFSS data were combined.

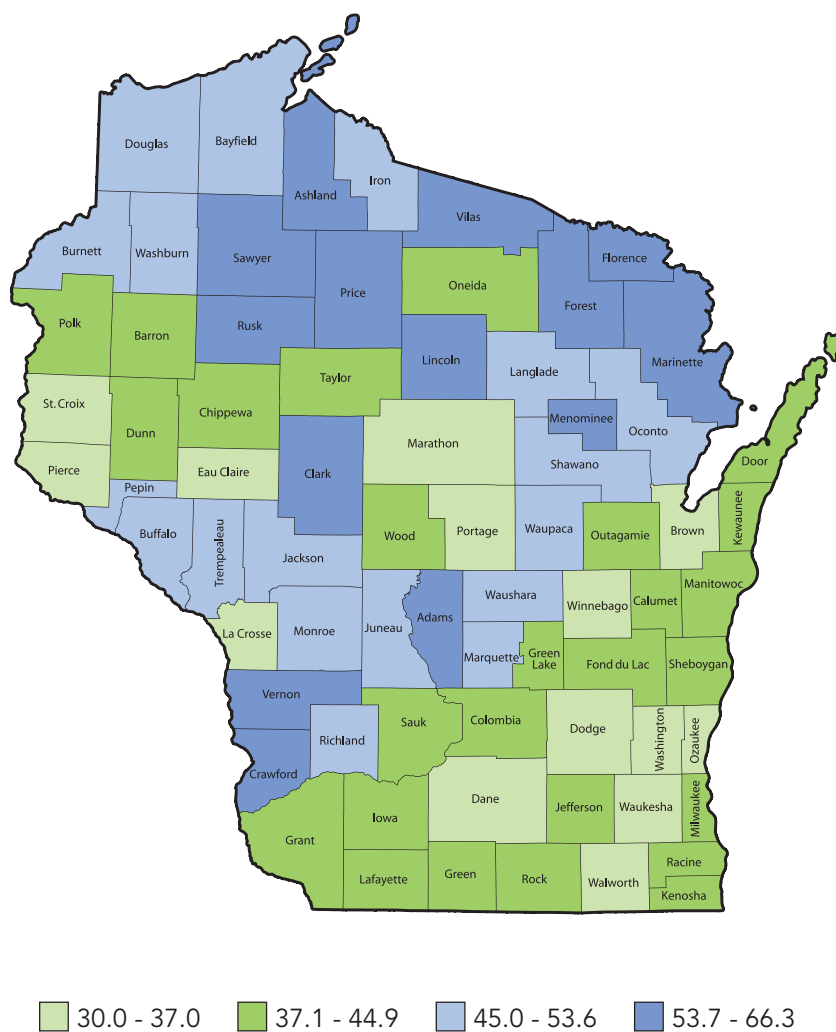
Figure IX.



Sources: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System and CDC Behavioral Risk Factor Surveillance System

Figure X.

**Percentage of Wisconsin Adults with Tooth Loss
Due to Decay/Gum Disease, BRFSS 2004, 2006 & 2008**



Source: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System

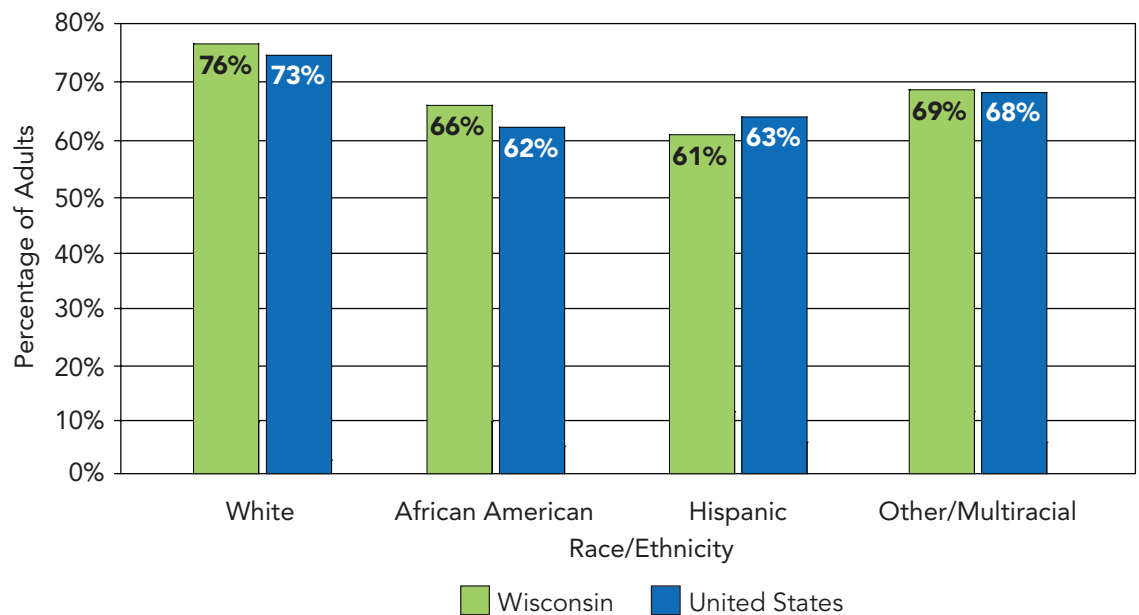
Note: Due to small numbers three years of BRFSS data were combined.

Dental Visits

Regular dental visits are important to achieve good oral health. In 2008, 73 percent of Wisconsin adults reported a dental visit in the past 12 months, which was slightly higher than the national average of 71 percent. A similar pattern of racial/ethnic disparities are seen both in Wisconsin and the United States, where white adults are more likely to report a dental visit in the past year compared to adults who are black, Hispanic and other/multiracial (Figure XI).

Figure XI.

**Percentage of Adults with a Dental Visit in the Past Year,
Wisconsin vs. United States, by Race/Ethnicity
BRFSS 2004, 2006 & 2008**



Sources: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System and CDC Behavioral Risk Factor Surveillance System

Note: Due to small numbers three years of BRFSS data were combined.

Periodontal (Gum) Diseases

Gingivitis is characterized by localized inflammation, swelling, and bleeding gums without a loss of the bone that supports the teeth. Gingivitis is usually reversible with good oral hygiene. Daily removal of dental plaque from the teeth is extremely important to prevent gingivitis, which can progress to destructive periodontal disease.

Periodontitis (destructive periodontal disease) is characterized by the loss of the tissue and bone that support the teeth. It places a person at risk of eventual tooth loss unless appropriate treatment is provided. Among adults, periodontitis is a leading cause of bleeding, pain, infection, loose teeth, and tooth loss [Burt & Eklund 1999].

Data on the prevalence of gingivitis and destructive periodontitis are not available for Wisconsin, however disease patterns observed nationally are most likely occurring in Wisconsin as well. In the United States, the prevalence of gingivitis is highest among American Indians and Alaska Natives, Mexican Americans, and adults with less than a high school education. Cases of gingivitis likely will remain a substantial problem and may increase as tooth loss from dental caries declines or as a result of the use of some systemic medications. Although not all cases of gingivitis progress to periodontal disease, all periodontal disease starts as gingivitis. The major method available to prevent destructive periodontitis, therefore, is to prevent the precursor condition of gingivitis and its progression to periodontitis through practicing good oral hygiene.



Oral Cancer

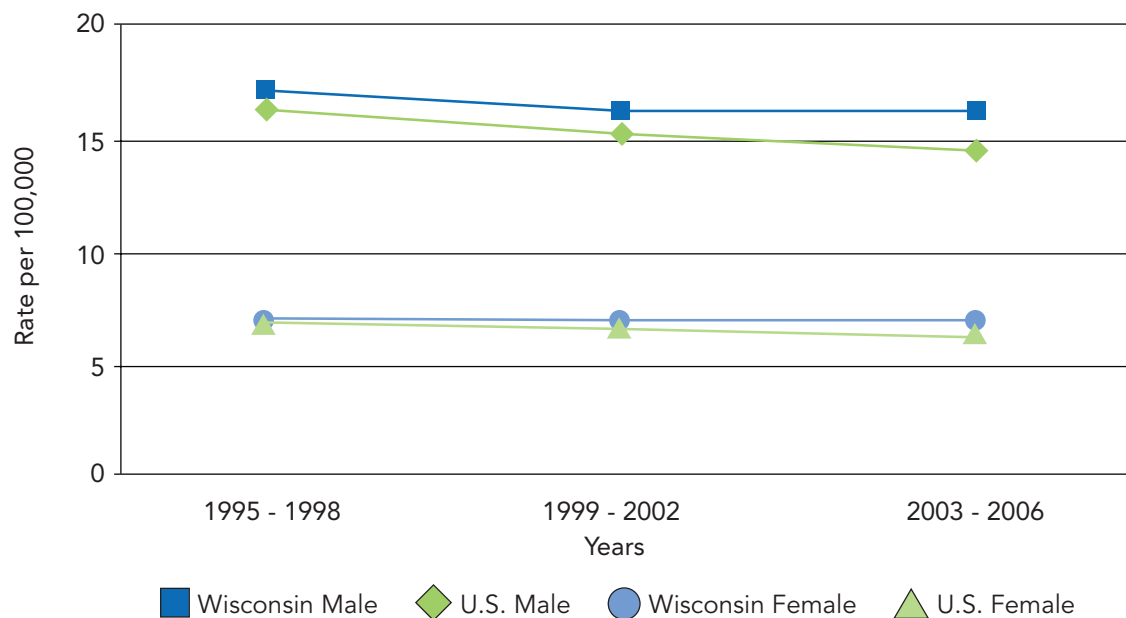
Cancer of the oral cavity or pharynx (oral cancer) is the fourth most common cancer in African American men and the seventh most common cancer in white men in the United States [Ries et al. 2004]. It is estimated that 35,720 men and women (25,240 men and 10,480 women) were diagnosed with and 7,600 men and women died of cancer of the oral cavity and pharynx in 2009 (ACS 2009). The age-adjusted (to the 2000 U.S. population) incidence rate of oral cancer in the United States for the combined years of 2003 through 2006 was 10.0 per 100,000 population, compared to 11.2 per 100,000 in Wisconsin during that time period (SEER 2009). Nearly 90 percent of cases of oral cancer in the United States occur among people aged 45 years and older. As seen in figures XII and XIII, the age-adjusted incidence is more than twice as high among men compared to women, as is the mortality rate [WCRS 2009].

Survival rates for oral cancer have not improved substantially over the past 25 years. The 5-year and 10-year survival rates are 60 percent and 49 percent respectively [ACS 2009]. Survival rates vary greatly based on stage at the time of diagnosis, with a 5-year relative survival rate of 81 percent for people with localized stage cancer. In contrast, the 5-year survival rate is only 51 percent once the cancer has spread to regional lymph nodes and is just 29 percent for people with distant metastasis [Reis et al. 2004]. Overall mortality rates have decreased very slightly over the past 12 years in Wisconsin and the United States (Figure XIII).

Some groups experience a disproportionate burden of oral cancer. In Wisconsin and nationally, blacks are more likely than whites to develop oral cancer and much more likely to die from oral cancer (Table II). The incidence rate for oral cancer among blacks is 13.0 per 100,000 in Wisconsin compared to 10.3 per 100,000 in the United States. Cigarette smoking and alcohol are the major known risk factors for oral cancer in the United States, accounting for more than 75 percent of these cancers [Blot et al. 1988]. The use of other forms of tobacco, including smokeless tobacco [USDHHS 1986; IARC 2005] and cigars [Shanks & Burns 1998] also increases the risk of oral cancer. Dietary factors, particularly low consumption of fruit, and some types of viral infections also have been implicated as risk factors for oral cancer [McLaughlin et al. 1998; De Stefani et al. 1999; Levi 1999; Morse et al. 2000; Phelan 2003; Herrero 2003]. Radiation from sun exposure is a risk factor for lip cancer [Silverman et al. 1998].

Figure XII.

**Age-Adjusted Oral and Pharyngeal Cancer Incidence Rates by Sex,
Wisconsin and United States, 1995-2006**

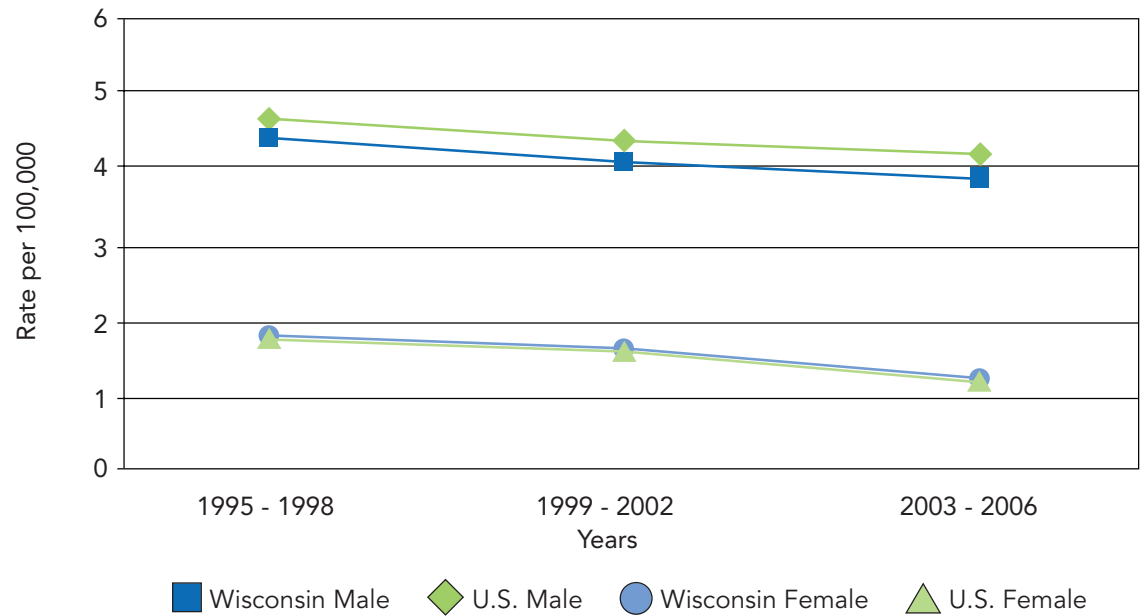


Sources: Wisconsin Cancer Reporting System 1995-2006 and SEER*Stat

Note: This data set contains invasive cases only, Indian Health Service linkage, and NAACCR Hispanic and Asian/Pacific Islander algorithm results for race and ethnicity categories.

Note: Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

Figure XIII.

**Age-Adjusted Oral and Pharyngeal Cancer Mortality Rates by Sex,
Wisconsin and United States, 1995-2006**

Source: SEER*Stat Database Mortality file

Note: Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

Table II: Age-Adjusted Oral and Pharyngeal Cancer Incidence and Mortality Rates by Race and Ethnicity, Wisconsin and United States, 2003-2006.

	United States Incidence	Wisconsin Incidence	United States Mortality	Wisconsin Mortality
<i>Healthy People 2010 Target</i>	-	-	2.7	2.7
TOTAL	10.0	11.2	2.6	2.4
Race or Ethnicity				
White	10.1	11.0	2.4	2.4
Black	10.3	13.0	3.6	3.9
American Indian/Alaska Native	6.4	11.5*	1.9	DSU
Asian/Pacific Islander	8.0	8.6	2.1	3.5*
Hispanic	5.8	4.4	1.5	DSU
Non-Hispanic	10.6	11.2	2.6	2.5

Sources: Wisconsin Cancer Reporting System 2003-2006 and SEER*Stat Database Mortality file

Note: Rates are per 100,000 and age-adjusted to the 2000 U.S. standard population.

DSU = Data are statistically unreliable due to small numbers (less than 5 deaths)

* Rates are based on less than 20 cases/deaths

Based on available evidence that oral cancer diagnosed at an early stage has a better prognosis, several *Healthy People 2010* objectives specifically address early detection of oral cancer: Objective 21-6 is to “Increase the proportion of oral and pharyngeal cancers detected at the earliest (localized) stage,” and Objective 21-7 is to “Increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancer” [USDHHS 2000c]. Progress is needed in both Wisconsin and throughout the United States overall and for all racial and ethnic groups to reach the *Healthy People 2010* objective of 50 percent for cancers detected at the earliest stage (Table III). However, a greater percentage of cases are diagnosed at the earliest stage in Wisconsin both overall and for each racial and ethnic group compared to the United States. In addition, Wisconsin did meet the objective for the Hispanic population.

Table III: Proportion of Oral Cancer Cases Detected at the Earliest Stage by Race and Ethnicity, Wisconsin and United States, 2003-2006

	United States %	Wisconsin %
<i>Healthy People 2010 Target</i>	50	50
TOTAL	35	39
Race or Ethnicity		
White	38	40
Black	21	24
American Indian/Alaska Native	24	DSU
Asian/Pacific Islander	29	DSU
Hispanic	36	55
Non-Hispanic	34	39

Sources: U.S. Department of Health and Human Services, *Healthy People 2010, Progress Review*, and Wisconsin Cancer Reporting System 2003-2006.

DSU = Data are statistically unreliable due to small numbers (less than 5 cases)

b. Disparities

i. Racial and Ethnic Groups

Although gains in oral health status have been achieved for the population as a whole, they have not been evenly distributed across subpopulations. Non-Hispanic blacks, Hispanics, and American Indians and Alaska Natives generally have the poorest oral health of any of the racial and ethnic groups in the U.S. population. As reported above, these groups tend to be more likely than non-Hispanic whites to experience dental caries in some age groups, are less likely to have received treatment for it, and have more extensive tooth loss. African American adults in each age group are more likely than other racial/ethnic groups to have gum disease. Compared with white Americans, African Americans are more likely to develop oral or pharyngeal cancer, are less likely to have it diagnosed at early stages, and experience a worse 5-year survival rate.

ii. Women's Health

Most oral diseases and conditions are complex and are the product of interactions between genetic, socioeconomic, behavioral, environmental, and general health influences. Multiple factors may act synergistically to place some women at higher risk of oral diseases. For example, the comparative longevity of women, compromised physical status over time, and the combined effects of multiple chronic conditions and side effects from multiple medications used to treat them can result in increased risk of oral disease [Redford 1993].

Many women live in poverty, are not insured, and are the sole head of their household. For these women, obtaining needed oral health care may be difficult. In addition, gender-role expectations of women may affect their interaction with dental care providers and could affect treatment recommendations as well.

Many, but not all, statistical indicators show women to have better oral health status than do men [Redford 1993; USDHHS 2000b]. Women are less likely than men at each age group to have severe periodontal disease. Both African American and white women have a substantially lower incidence rate of oral and pharyngeal cancers than do African American and white men, respectively. However, a higher proportion of women than men have oral-facial pain, including pain from oral sores, jaw joints, face/cheek, and burning mouth syndrome.

Table IV. Wisconsin PRAMS (Pregnancy Risk Assessment Monitoring System), Responses to Oral Health Question by Race/Ethnicity, 2007-2008

PRAMS question about care for teeth during most recent pregnancy	Total	White, non-Hispanic	Black, non-Hispanic	Hispanic, Latina	Other, non-Hispanic
Needed to see dentist for a problem	23%	21%	35%	26%	33%
Went to a dentist/dental clinic	48%	53%	35%	26%	38%
Told by dental or other health care worker how to care for teeth and gums	42%	44%	41%	28%	40%

Source: Wisconsin Pregnancy Risk Assessment Monitoring System

Notes: The 2007-2008 combined PRAMS data file includes responses from 2,059 mothers who recently had a live birth in Wisconsin. This includes 915 white non-Hispanic mothers, 461 black non-Hispanic mothers, 431 Hispanic mothers, and 252 non-Hispanic mothers of other races.

The practice of good oral hygiene is particularly important for women during pregnancy. Pregnant women are at risk for pregnancy gingivitis affecting up to 50 percent of pregnant women [AAP 2008]. In addition, there is some research that suggests that periodontal disease is associated with preterm low birth weight babies [Offenbacher et al. 2001]. However, in a more recent clinical trial it was found that the treatment of periodontal disease during pregnancy improves periodontal disease and is safe, but does not significantly alter the rates of preterm birth [Michalowicz et al. 2006].

The Wisconsin PRAMS shows disparities by race/ethnicity for the answers to one oral health-related question (Table V). Black, non-Hispanic mothers (35%) and Other, non-Hispanic mothers (33%) were more likely to report needing to see a dentist for a problem during their most recent pregnancy compared to White, non-Hispanic mothers (21%). While Black, non-Hispanic and Other, non-Hispanic mothers were less likely to see a dentist during pregnancy compared to White, non-Hispanic mothers, the greatest disparity was seen among Hispanic/Latina mothers. The same is true for the percent of mothers told by a dental or other health care worker how to care for teeth and gums during pregnancy, with only 28 percent of Hispanic/Latina mothers responding yes, compared to 44 percent of White, non-Hispanic mothers.

Cleft lip/palate is one of the most common birth defects, with both genetic and environmental factors. Two modifiable risk factors for cleft lip/palate include a diet deficient in the B vitamin folic acid during pregnancy and smoking during pregnancy. Cleft lip/palate affects basic life functions including: feeding, breathing, speaking, and swallowing and increases the risk of repeated respiratory infections [USDHHS 2000b]. In addition, as children grow with cleft lip/palate they must cope with the social impact of the facial deformity. In 2006 there were 93 babies born with cleft lip/palate in Wisconsin, a rate of 1.3 per 1,000 live births [WDHS 2009a]. Wisconsin has added a Behavioral Risk Factor Survey folic acid module during the even survey years since 2000. During 2008, about 30 percent of women between the ages of 18 and 44 who took supplements or vitamins reported taking folic acid. In addition, only 37 percent of women of child bearing age knew why health experts recommend that women take folic acid [WDHS 2009a].

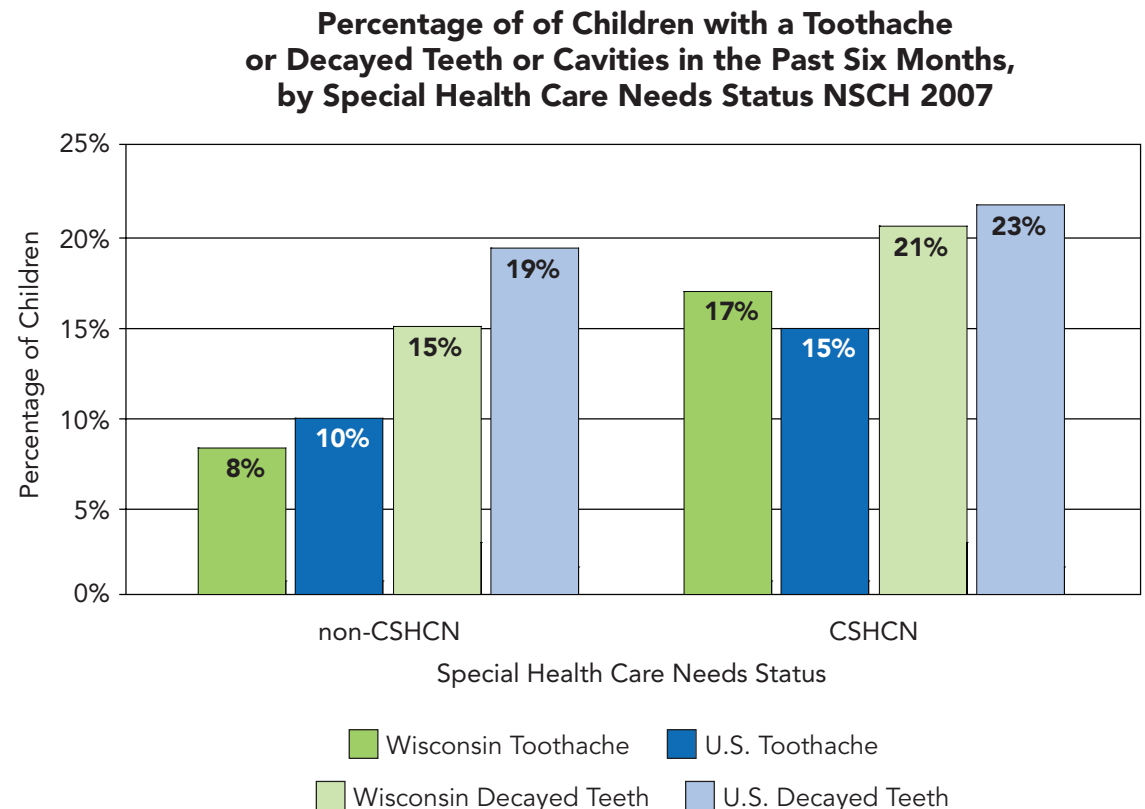
iii. People with Disabilities

The oral health problems of individuals with disabilities are complex. These problems may be due to underlying congenital anomalies as well as to inability to receive the personal and professional health care needed to maintain good oral health. More than 54 million people are defined as disabled under the Americans with Disabilities Act, including almost 1 million children under 6 years of age and 4.5 million children between 6 and 16 years of age.

No national studies have been conducted to determine the prevalence of oral and craniofacial diseases among the various populations with disabilities. Several smaller-scale studies show that the population with an intellectual disability or other developmental disabilities has significantly higher rates of poor oral hygiene and needs for periodontal disease treatment than the general population, due, in part, to limitations in individual understanding of and physical ability to perform personal prevention practices or to obtain needed services. Caries rates among people with disabilities vary widely among people with disabilities, but overall their caries rates are higher than those of people without disabilities [USDHHS 2000b].

In Wisconsin in 2007 about 17 percent of children with special health care needs (CSHCN) had a toothache in the past six months compared to 8 percent of children without special health care needs (Figure XIV). In addition, CSHCN children are more likely to have had decayed teeth or cavities in the past six months (21%) compared to non-CSHCN children (15%) [CAHMI 2007].

Figure XIV.



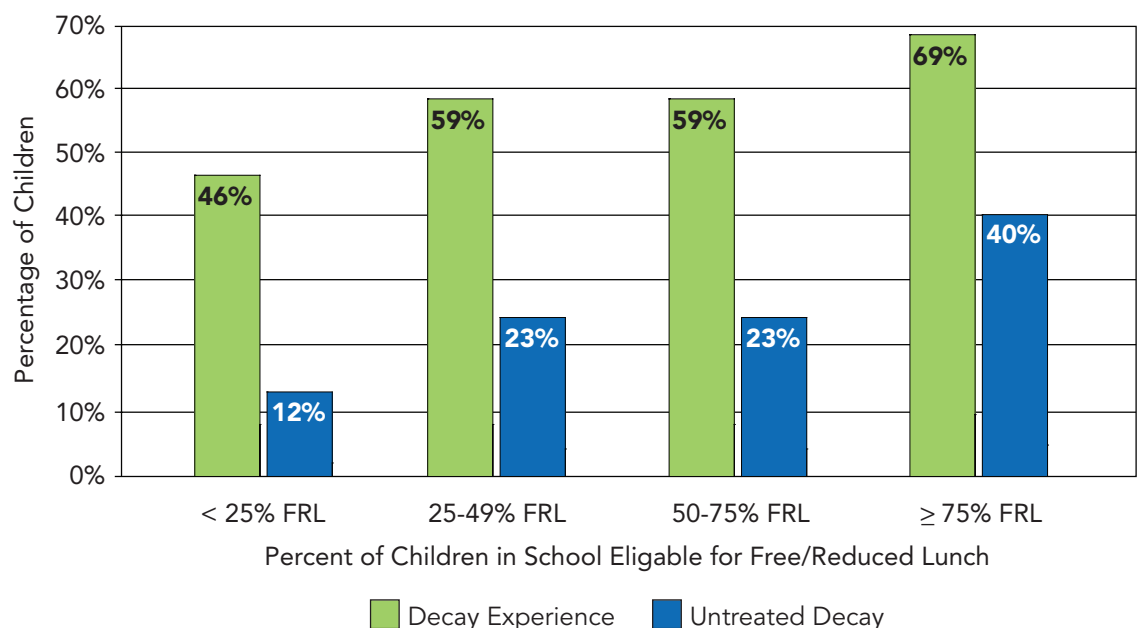
Source: Child and Adolescent Health Measurement Initiative, National Survey of Children's Health

iv. Socioeconomic Disparities

People living in low-income families bear a disproportionate burden from oral diseases and conditions. For example, despite progress in reducing dental caries in the United States, children and adolescents in families living below the poverty level experience more dental decay than do children who are economically better off. Furthermore, the caries seen in individuals of all ages from poor families is more likely to be untreated than caries in those living above the poverty level. Nationally, 50 percent of poor children aged 2 to 11 years have one or more untreated decayed primary teeth, compared with 31 percent of nonpoor children [USDHHS 2000b]. In Wisconsin children who attend schools with a higher percentage of students eligible for the Free/Reduced Price Lunch program are more likely to have decay experience and untreated decay (Figure XV). Poor adolescents aged 12 to 17 years in each racial/ethnic group have a higher percentage of untreated decay in the permanent teeth than does the corresponding nonpoor adolescent group. The pattern is similar in adults, with the proportion of untreated decayed teeth being higher among the poor than the nonpoor. At every age, a higher proportion of those at the lowest income level than at the higher income levels have periodontitis. Adults with some college (15%) have 2 to 2.5 times less destructive periodontal disease than do adults with high school (28%) or with less than high school (35%) levels of education [USDHHS 2000c]. Overall, a higher percentage of Americans living below the poverty level are edentulous (have lost all their natural teeth) than are those living above the poverty level [USDHHS 2000b]. Among adults aged 65 years and older, approximately 41 percent of people with less than a high school education were edentulous in 2008, compared with 6 percent of people with a college degree [CDC 2010].

Figure XV.

Percentage of Wisconsin's Third Grade Children with Decay Experience and Untreated Decay, by Free/Reduced Lunch (FRL) Status, 2007-08



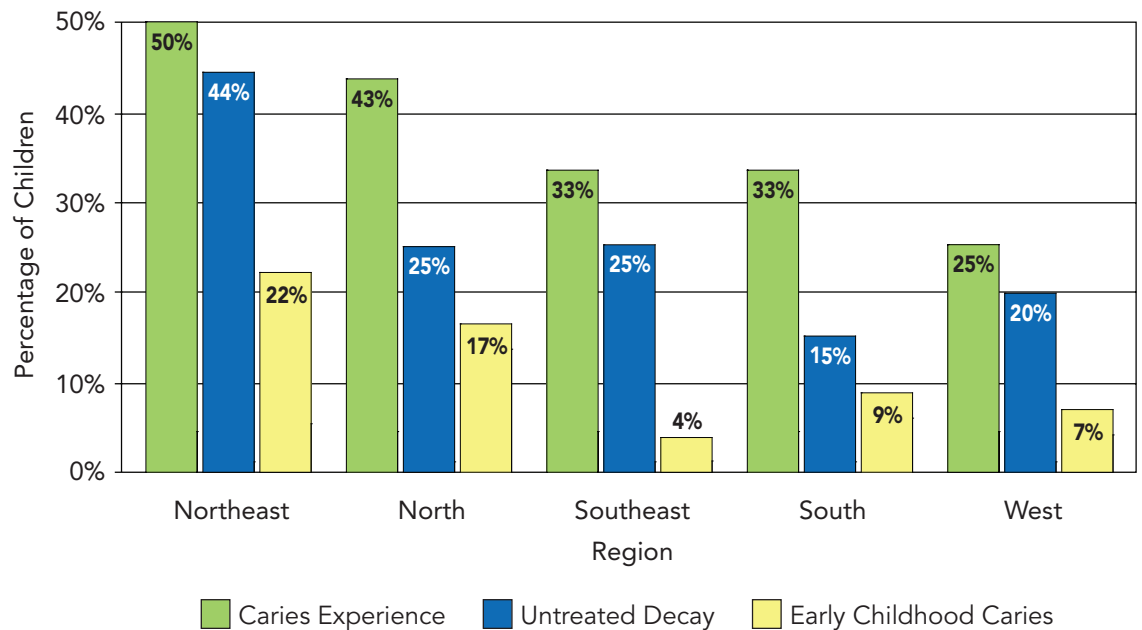
Source: Wisconsin Department of Health Services, Make Your Smile Count

v. Geographic Disparities

People living in rural areas often have a higher disease burden because of difficulties in accessing preventive and treatment services. Some of the factors contributing to rural disparities include: geographic isolation, transportation issues, poverty, lack of providers accepting Medicaid, and large populations of elderly. In addition, rural populations are less likely to have the benefit of fluoridated community water. In Wisconsin, the northern part of the state has a growing safety net dental system that is improving utilization of oral health care services in these rural counties. In 2008, 46 percent of adults in rural counties in Wisconsin had lost a tooth to decay or gum disease compared to 36 percent of adults in urban counties. Also, 29 percent of adults in rural counties did not have a dental visit in the past year compared to 26 percent in the urban counties [WDHS 2009a]. In addition, Wisconsin is divided into five public health regions and oral health disparities exist among these regions. According to the most recent Head Start survey children in the Northeastern and Northern regions were more likely to have caries experience and Early Childhood Caries compared to the other regions. The Northeastern region was also much more likely to have untreated decay (44%) compared to the other regions (Figure XVI). Disparities were also found among the third grade children surveyed. Children in the Southeastern and Western regions were most likely to have untreated decay, while children in the Northern region were the most likely to have decay experience (Figure XVII).

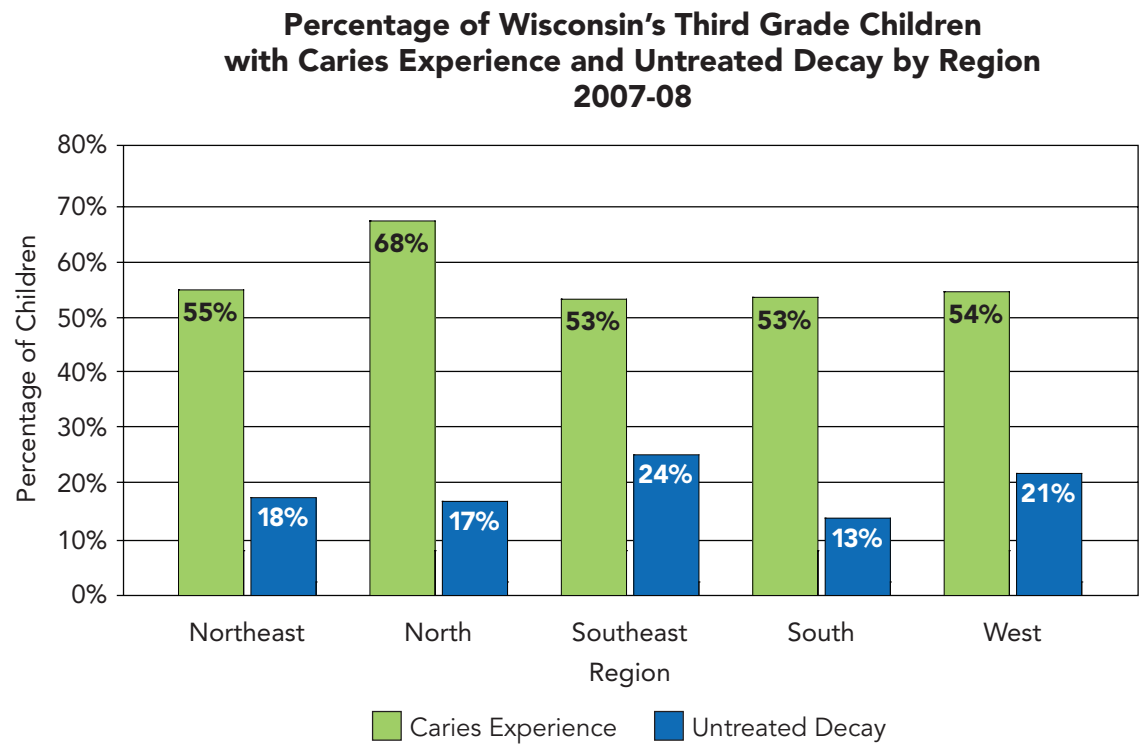
Figure XVI.

Percentage of Wisconsin's Head Start Children with Caries Experience, Untreated Decay and Early Childhood Caries by Region, 2008-09



Source: Wisconsin Department of Health Services, Healthy Smiles for a Healthy Head Start

Figure XVII.



Source: Wisconsin Department of Health Services, Make Your Smile Count

vi. Long-Term Care Residents

According to *Oral Health in America: A Report of the Surgeon General*, nursing homes and long-term care facilities have restricted ability to deliver the necessary oral health services to their residents, while most residents of these facilities are at increased risk for oral disease. Long-term care residents have an average of 3.3 chronic diseases per resident and take an average of 8.1 medications per resident [USDHHS 2000b]. Many of the medications have oral side effects, most commonly dry mouth, which increases the risk of dental caries. Also, the most common chronic conditions can deteriorate oral health status or the chronic condition can be exacerbated if oral disease is present. Wisconsin does not currently collect data on the oral health status of nursing home or long-term care residents, but may in the future. Dental hygienists in Wisconsin are able to provide services in long-term care facilities under the current practice act as long as they contract with or are employed by a local health department.

vii. People with HIV/AIDS

Most individuals infected with HIV develop oral lesions at some time during their illness. Some of the most common oral lesions associated with HIV include: oral candidiasis (thrush), oral hairy leukoplakia, necrotizing ulcerative periodontitis, and Kaposi's sarcoma. Oral lesions can be among the first symptoms of HIV infection and can also signal progression of the disease. Individuals with HIV are at higher risk for dental caries due to decreased salivary flow, which can result from salivary gland disease or as a side effect of the many prescription medications used to treat HIV [USDHHS 2002].

In 2009 there were 443 cases of HIV infection reported in Wisconsin. In addition, as of the end of 2009 there were an estimated 6,971 individuals (124 cases per 100,000) living with HIV [WDHS 2010d]. Due to the numerous oral conditions found among people with HIV, access to regular dental care is essential. While there are not recent data available on unmet dental needs of individuals with HIV, it is very probable that they are significantly more likely to have unmet needs compared to the population without HIV [Mascarenhas & Smith, 1999].

viii. People in the Corrections System

The corrections population has been found to have higher prevalence of dental disease and unmet needs [Heng & Morse 2002; Salive et al 1989]. As of April 2010 there were 22,455 inmates in the Wisconsin adult corrections system. Dental needs are traced at the time of intake to the corrections system. Approximately 45 percent of inmates entering the adult system have significant and multiple dental needs. The level of dental staffing available in the corrections systems allows for care of urgent and emergent dental needs, along with some routine dental care. However, wait for routine care can be up to two to three years depending on the facility. There are currently 19.2 Full Time Equivalent (FTE) dentist positions in the adult corrections system and 1.0 FTE dentists in the juvenile system. In addition, there are 6.9 FTE dental hygienists in the adult system and 0.5 FTE hygienists in the juvenile system. Limited term dentists and hygienists are hired to cover for vacancies and at facilities without a hygienist position [WDOC 2010].

c. Societal Impact of Oral Disease

i. Social Impact

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

More than any other body part, the face bears the stamp of individual identity. Attractiveness has an important effect on psychological development and social relationships. Considering the importance of the mouth and teeth in verbal and nonverbal communication, diseases that disrupt their functions are likely to damage self-image and alter the ability to sustain and build social relationships. The social functions of individuals encompass a variety of roles, from intimate interpersonal contacts to participation in social or community activities, including employment. Dental diseases and disorders can interfere with these social roles at any or all levels. Perhaps due to social embarrassment or functional problems, people with oral conditions may avoid conversation or laughing, smiling, or other nonverbal expressions that show their mouth and teeth. In addition, it is estimated that more than 164 million hours of work are lost each year due to dental disease or dental visits [USDHHS 2004]. Among adults seeking jobs, those with visible dental problems are less employable than those with healthy smiles.

ii. Economic Impact

Direct Costs of Oral Diseases

Expenditures for dental services in the United States in 2008 were \$101.2 billion, 4.3 percent of the total spent on health care that year [Centers for Medicare & Medicaid Services 2010].

A large proportion of dental care is paid out-of-pocket by patients. Nationally in 2008, 44 percent of dental care was paid out-of-pocket, 49 percent was paid by private dental insurance, and 7 percent was paid by federal or state government sources. In comparison, 10 percent of physician and clinical services were paid out-of-pocket, 49 percent were covered by private medical insurance, and 35 percent were paid by government sources (Centers for Medicare & Medicaid Services, 2010).

Indirect Costs of Oral Diseases

Oral and craniofacial diseases and their treatment place a burden on society in the form of lost days and years of productive work. In 1996, the most recent year for which national data are available, U.S. schoolchildren missed a total of 1.6 million days of school as a result of acute dental conditions, which is more than 3 days for every 100 students [USDHHS 2000b]. Acute dental conditions were responsible for more than 2.4 million days of work loss and contributed to a range of problems for employed adults, including restricted activity and bed days. In addition, conditions such as oral and pharyngeal cancers contribute to premature death and can be measured by years of life lost. In Wisconsin there were 160 deaths from oral and pharyngeal cancers in 2008, with almost 1,400 years of potential life lost [WDHS 2010b].

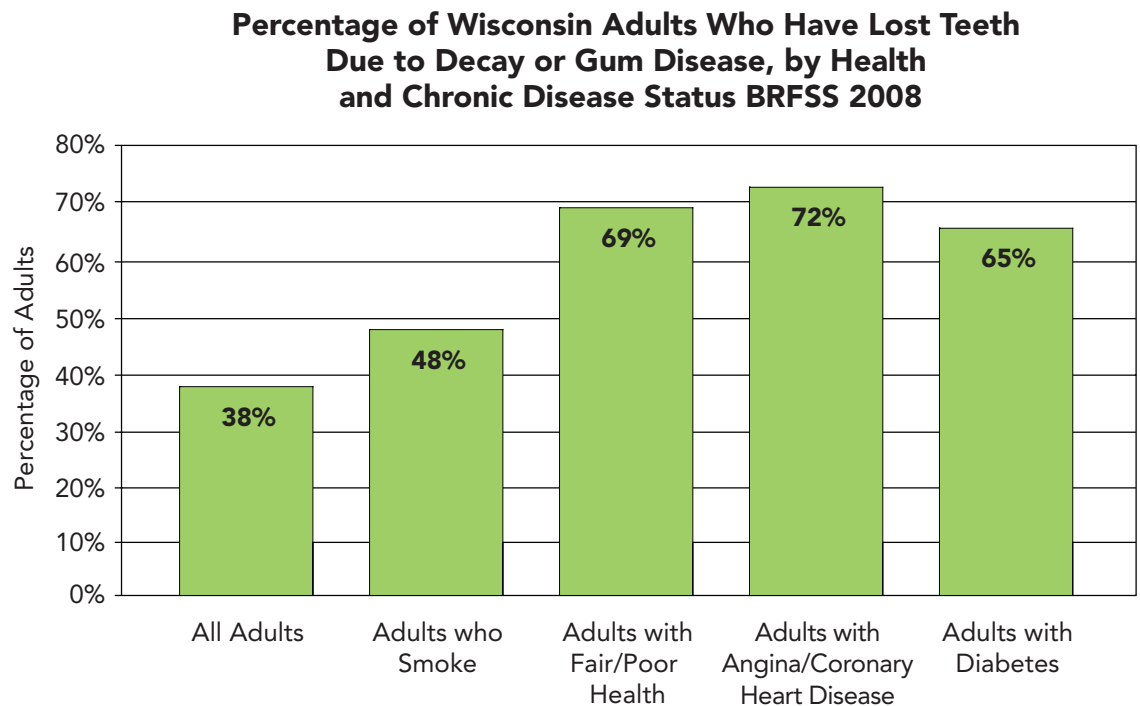


iii. Oral Disease and Other Health Conditions

Oral health and general health are integral to each other. Many systemic diseases and conditions including diabetes, HIV, and nutritional deficiencies, have oral signs and symptoms, and these manifestations may be the initial sign of clinical disease and therefore may serve to inform health care providers and individuals of the need for further assessment. The oral cavity is a portal of entry as well as the site of disease for bacterial and viral infections that affect general health status. Recent research suggests that inflammation associated with periodontitis may increase the risk of heart disease and stroke, premature births in some women, difficulty in controlling blood sugar in people with diabetes, and respiratory infection in susceptible individuals [Dasanayake 1998; Offenbacher et al. 2001; Davenport et al. 1998; Beck et al. 1998; Scannapieco et al. 2003; Taylor 2001]. More research is needed in these areas.

Among adults with angina/coronary heart disease, 72 percent lost a tooth to decay or gum disease compared to 38 percent of all adults surveyed. In addition, 69 percent of adults with self-reported fair or poor health and 65 percent of adults with diabetes lost a tooth (Figure XVIII).

Figure XVIII.



Source: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System

VI. RISK AND PROTECTIVE FACTORS AFFECTING ORAL DISEASES

The most common oral diseases and conditions can be prevented. Safe and effective measures are available to reduce the incidence of oral disease, reduce disparities, and increase quality of life.

a. Community Water Fluoridation

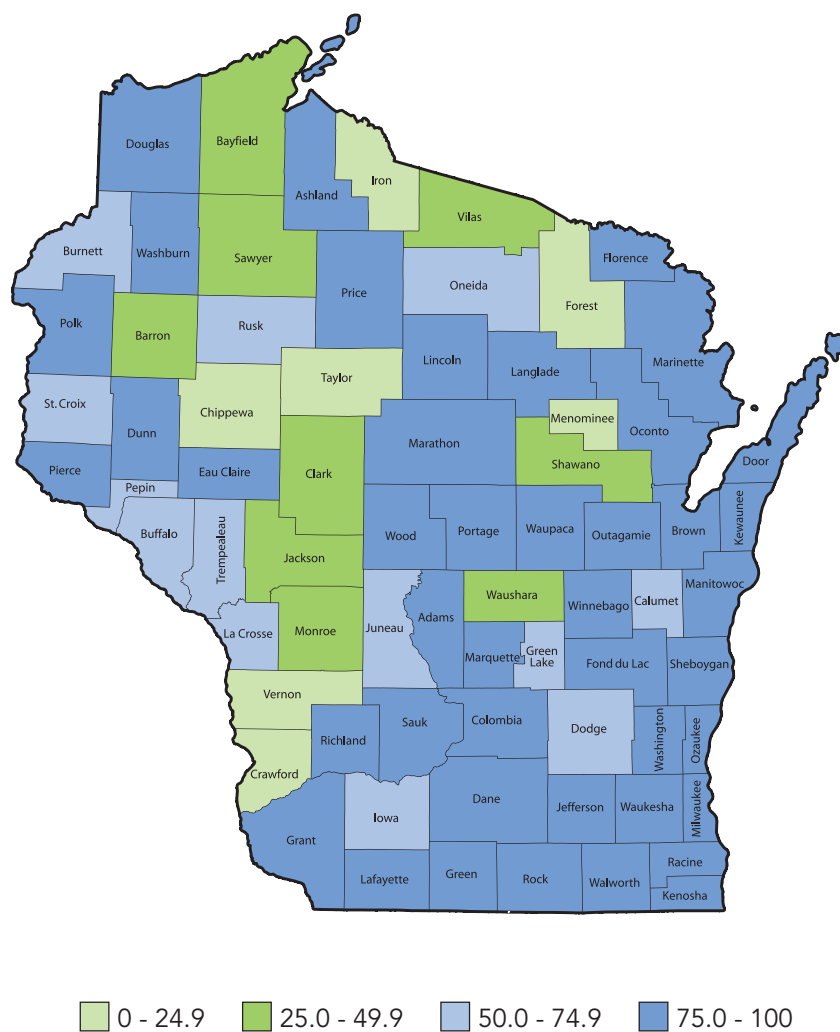
Community water fluoridation is the process of adjusting the natural fluoride concentration of a community's water supply to a level that is best for the prevention of dental caries. In the United States, community water fluoridation has been the basis for the primary prevention of dental caries since 1945 and has been recognized as one of 10 great achievements in public health of the 20th century [CDC 1999]. It is an ideal public health method because it is effective, eminently safe, inexpensive, requires no behavior change by individuals, and does not depend on access or availability of professional services. Water fluoridation is equally effective in preventing dental caries among different socioeconomic, racial, and ethnic groups. Fluoridation helps to lower the cost of dental care and helps residents retain their teeth throughout life [USDHHS 2000b].

Recognizing the importance of community water fluoridation, *Healthy People 2010* Objective 21-9 is to "Increase the proportion of the U.S. population served by community water systems with optimally fluoridated water to 75 percent." In the United States during 2006, approximately 184 million individuals (69 percent of the population served by public water systems) received optimally fluoridated water [CDC 2010b]. Wisconsin has met the *Healthy People 2010* Objective, where approximately 90 percent of the population on community water systems have access to optimally fluoridated water [WDHS 2009b]. In addition, 43 of Wisconsin's 72 counties have met the *Healthy People 2010* Objective (Figure XIX). All but seven of the counties are over 40 percent. However, three very small counties are at zero. Figure XX shows the percent of the total county population, including all water supplies that are served by fluoridated water. Because the northern half of Wisconsin is more rural, with more people on well water, most of the counties are in the two bottom groups. These populations should be targeted with fluoride mouth rinse, fluoride varnish, and fluoride supplement programs.

Not only does community water fluoridation effectively prevent dental caries, it is one of very few public health prevention measures that offer significant cost savings to almost all communities [Griffin et al. 2001]. It has been estimated that about every \$1 invested in community water fluoridation saves approximately \$38 in averted costs. The cost per person of instituting and maintaining a water fluoridation program in a community decreases with increasing population size.

Figure XIX.

**Percent of Population on Community Water Systems
Who Have Access to Optimally Fluoridated Water**

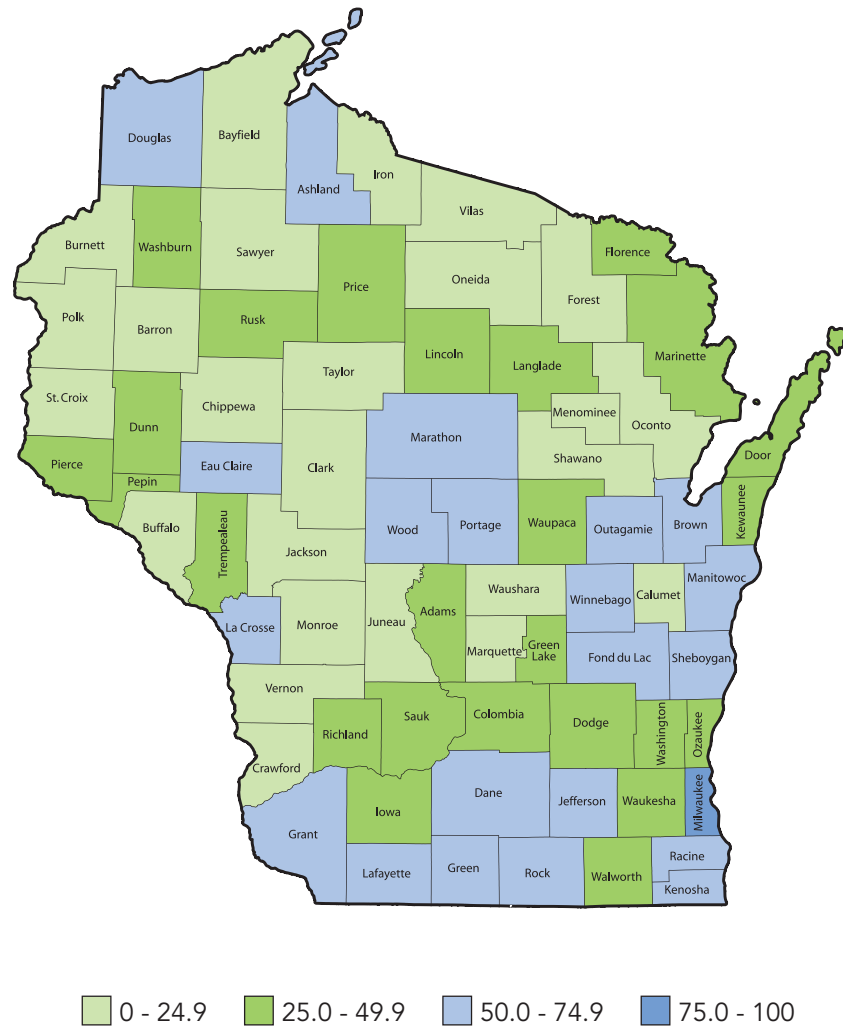


Source: CDC Water Fluoridation Reporting System (WFRS)

Note: This map includes only people on community water systems.

Figure XX.

**Percentage of Total County Population (All Water Sources)
Served by Fluoridated Water**



Source: CDC Water Fluoridation Reporting System (WFRS)

Note: This map include people on community water systems and private wells.

b. Topical Fluorides and Fluoride Supplements

Because frequent exposure to small amounts of fluoride each day will best reduce the risk of dental caries in all age groups, all people should drink water with an optimal fluoride concentration and brush their teeth twice daily with fluoride toothpaste [CDC 2001]. For communities that do not receive fluoridated water and people at high risk of dental caries, additional fluoride measures might be needed. Community measures include fluoride mouth rinse or tablet programs, which typically are conducted in schools. Each year in Wisconsin \$25,000 of General Purpose Revenue (GPR) is used to fund mouth rinse programs through local health departments. During State Fiscal Year (SFY) 2009 almost 5,000 children were served by these local programs. In addition, \$25,000 of GPR annually goes to fund fluoride supplement programs in local health departments. In SFY 2009 just over 1,300 children were served by these fluoride supplement programs.

Individual measures include professionally applied topical fluoride gels or varnish for people at high risk of caries. During SFY 2009 over 5,900 children received fluoride varnish applications through the Seal-A-Smile program. The Wisconsin Oral Health Program has a Fluoridation Specialist/Program Coordinator who gives fluoride varnish trainings to primary care providers, large clinic systems, and local health department staff. The goal is to integrate oral health into medical practice through early interventions. During SFY 2009 almost 106,900 claims for fluoride varnish for children were submitted to Medicaid by dental professionals and nearly 16,800 claims were submitted by medical providers. More than 84,100 children on Medicaid were served with at least one fluoride varnish treatment in SFY 2009. The use of fluoride varnish in both dental and medical practices has increased over the past few years. During SFY 2007 almost 55,400 children on Medicaid were served with at least one fluoride varnish application [WDHS 2010c].

c. Dental Sealants

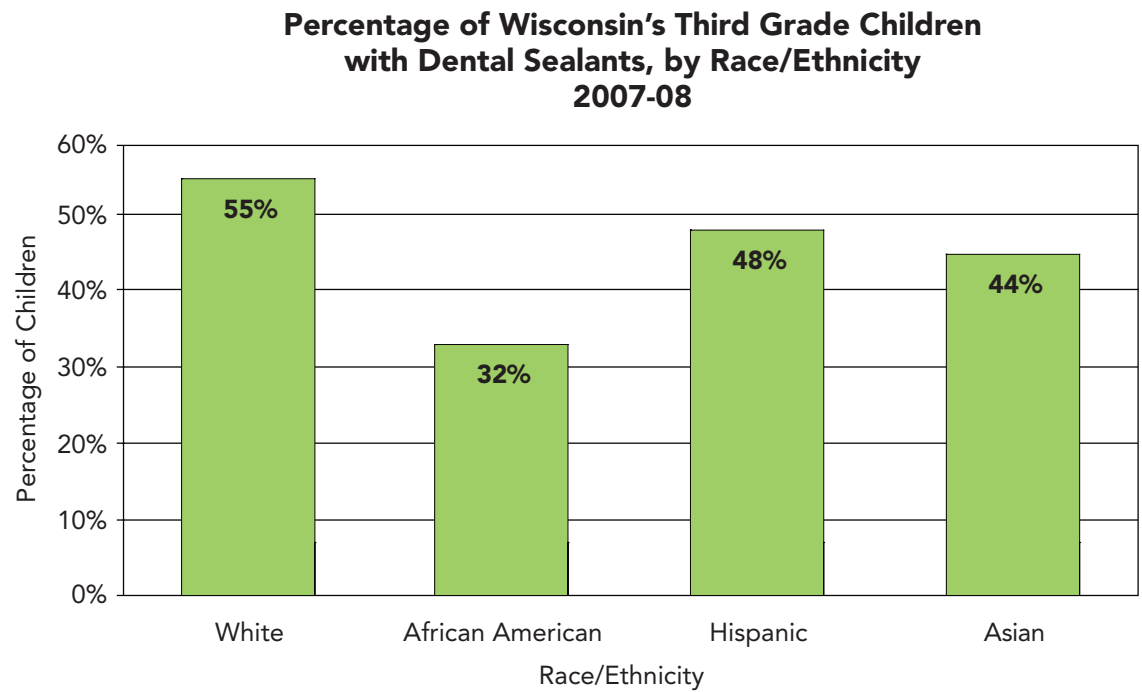
Since the early 1970s, the incidence of childhood dental caries on smooth tooth surfaces (those without pits and fissures) has declined markedly because of widespread exposure to fluorides. Most decay among school age children now occurs on tooth surfaces with pits and fissures, particularly the molar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

Pit-and-fissure dental sealants—plastic coatings bonded to susceptible tooth surfaces—have been approved for use for many years and have been recommended by professional health associations and public health agencies. First permanent molars erupt into the mouth at about age six years. Placing sealants on these teeth shortly after their eruption protects them from the development of caries in areas of the teeth where food and bacteria are retained. If sealants were applied routinely to susceptible tooth surfaces in conjunction with the appropriate use of fluoride, most tooth decay in children could be prevented [USDHHS 2000c].

Second permanent molars erupt into the mouth at about age 12 to 13 years. Pit-and-fissure surfaces of these teeth are as susceptible to dental caries as the first permanent molars of younger children. Therefore, young teenagers need to receive dental sealants shortly after the eruption of their second permanent molars.

The *Healthy People 2010* target for dental sealants on molars is 50 percent for 8-year-olds and 14-year-olds. In Wisconsin 51 percent of third grade students have dental sealants on their first molars (Figure III). However, African Americans, Hispanic, and Asian students are less likely than non-Hispanic whites to have sealants (Figure XXI). The prevalence of sealants also varies by the education level of the head of household.

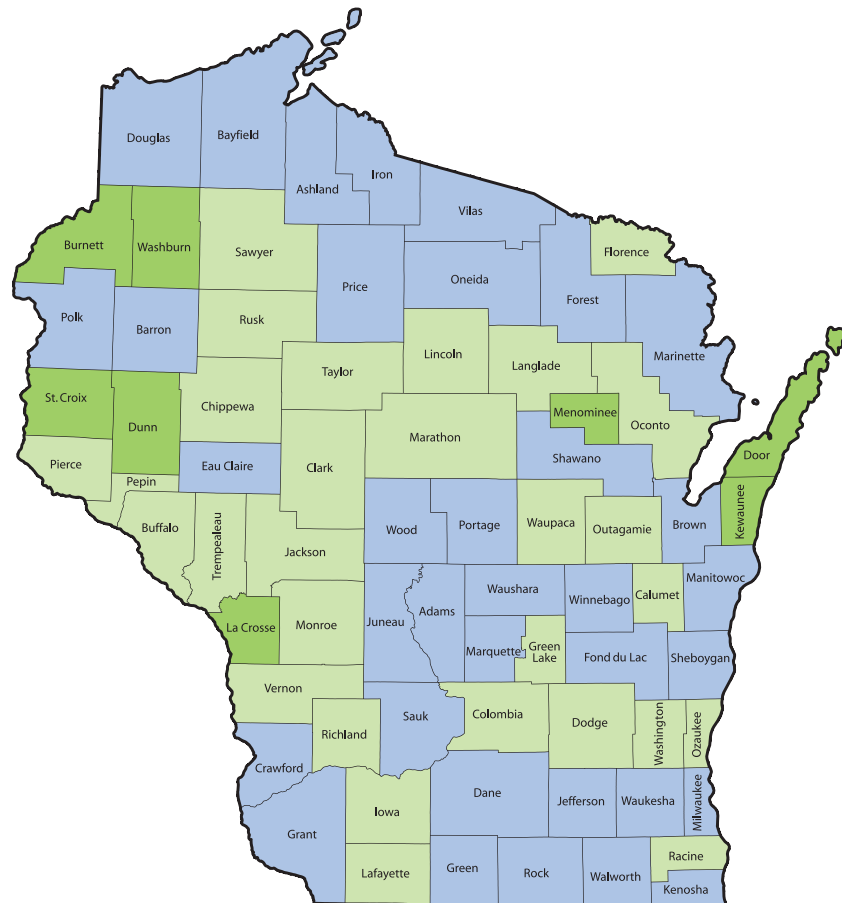
The Wisconsin Seal-A-Smile Program is in its tenth year of operation. During the 2008-09 school year almost 9,800 children were screened and nearly 6,300 of those children received dental sealants. In addition, almost 4,200 children were referred for further dental care [CHAW 2009]. The programs operating during the 2009-10 school year are displayed in the map by program type (Figure XXII).

Figure XXI.

Source: Wisconsin Department of Health Services, Make Your Smile Count

Figure XXII.

Wisconsin Sealant Programs — 2009-10



No Program
 Non-Funded Program
 Funded Program

d. Preventive Visits

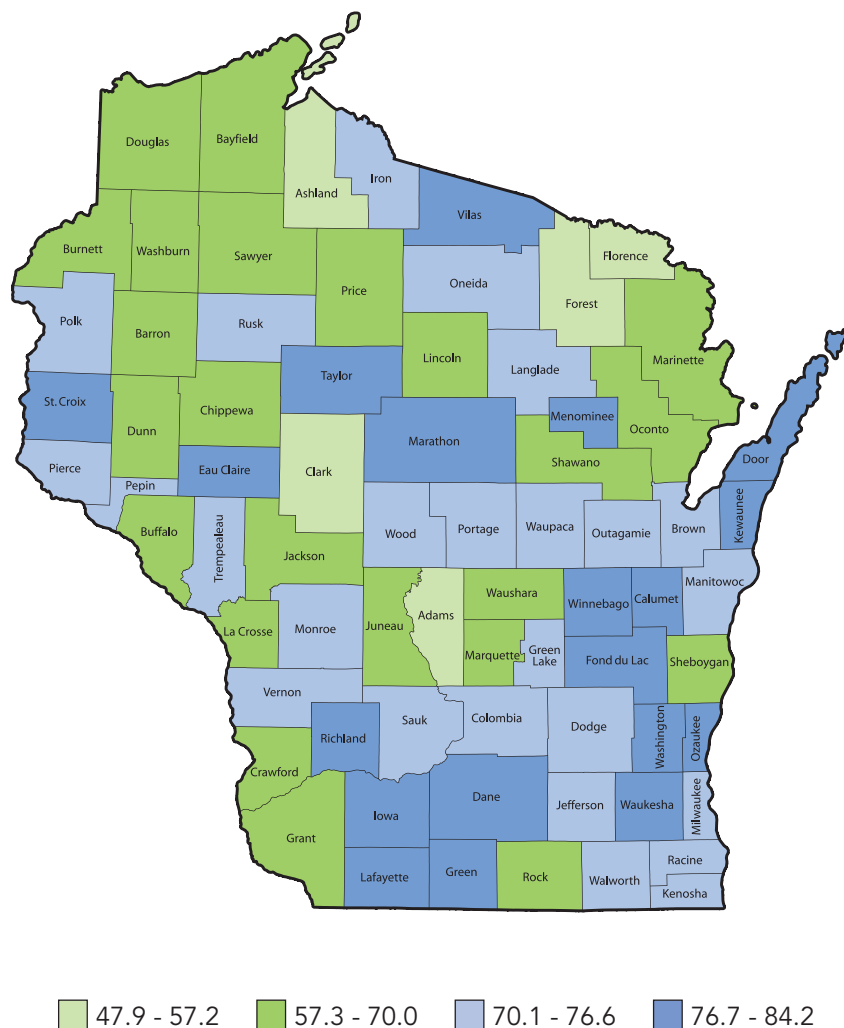
Maintaining good oral health takes repeated efforts on the part of the individual, caregivers, and health care providers. Daily oral hygiene routines and healthy lifestyle behaviors play an important role in preventing oral diseases. Regular preventive dental care can reduce the development of disease and facilitate early diagnosis and treatment. One measure of preventive care that is being tracked is the percentage of adults who had their teeth cleaned in the past year. Having one's teeth cleaned by a dentist or dental hygienist is indicative of preventive behaviors. According to the 2008 Wisconsin Behavioral Risk Factor Survey 72 percent of adults had their teeth cleaned in the past year compared to 69 percent in the United States. The prevalence of having teeth cleaned in Wisconsin varies by county with a range of 48 percent to 84 percent (Figure XXIII).



Picture courtesy of Scenic Bluffs Community Health Center, Cashton, WI

Figure XXIII.

**Percentage of Wisconsin Adults with a Dental Cleaning
in the Past Year, BRFSS 2004, 2006 & 2008**



Source: Wisconsin Department of Health Services, Behavioral Risk Factor Surveillance System

Note: Due to small numbers three years of BRFSS data were combined.

e. Screening for Oral Cancer

Oral cancer detection is accomplished by a thorough examination of the head and neck; an examination of the mouth including the tongue, the entire oral and pharyngeal mucosal tissues, and the lips; and palpation of the lymph nodes. Although the sensitivity and specificity of the oral cancer examination have not been established in clinical studies, most experts consider early detection and treatment of precancerous lesions and diagnosis of oral cancer at localized stages to be the major approaches for secondary prevention of these cancers [Silverman 1998; Johnson 1999; CDC 1998]. If suspicious tissues are detected during an examination, definitive diagnostic tests, such as biopsies, are needed to make a firm diagnosis.

Oral cancer is more common after the age of 60 years. Known risk factors include use of tobacco products and alcohol. The risk of oral cancer is increased 6 to 28 times in current smokers. Alcohol consumption is an independent risk factor and, when combined with the use of tobacco products, accounts for most cases of oral cancer in the United States and elsewhere [USDHHS 2004a]. Individuals should also be advised to avoid other potential carcinogens, such as exposure to sunlight (a risk factor for lip cancer) without protection (use of lip sunscreen and hats is recommended).

Recognizing the need for dental and medical providers to examine adults for oral and pharyngeal cancer, *Healthy People 2010* Objective 21-7 is to increase the proportion of adults who, in the past 12 months, report having had an examination to detect oral and pharyngeal cancers. Nationally, relatively few adults aged 40 years and older (13%) reported receiving an examination for oral and pharyngeal cancer, although the proportion varied by race/ethnicity.

f. Tobacco Control

Tobacco use has a devastating effect on the health and well-being of the public. More than 400,000 Americans die each year as a direct result of cigarette smoking, making it the nation's leading preventable cause of premature mortality, and smoking causes over \$150 billion in annual health-related economic losses [CDC 2002]. In Wisconsin almost 7,000 deaths occur annually from smoking and an estimated \$2.8 billion in health care costs due to smoking are paid each year [Voskuil, KR et al 2010]. The effects of tobacco use on the public's oral health are also alarming. The use of any form of tobacco — including cigarettes, cigars, pipes, chewing tobacco, and snuff — has been established as a major cause of oral and pharyngeal cancer [USDHHS 2004a]. The evidence is sufficient to consider smoking a causal factor for adult periodontitis [USDHHS 2004a]; one-half of the cases of periodontal disease in this country may be attributable to cigarette smoking [Tomar & Asma 2000]. Tobacco use substantially worsens the prognosis of periodontal therapy and dental implants, impairs oral wound healing, and increases the risk of a wide range of oral soft tissue changes [Christen et al. 1991; AAP 1999].

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

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

The dental office provides an excellent venue for providing tobacco intervention services. More than one-half of adult smokers see a dentist each year [WDHS 2009a]. Dental patients are particularly receptive to health messages at periodic check-up visits, and oral effects of tobacco use provide visible evidence and a strong motivation for tobacco users to quit. Because dentists and dental hygienists can be effective in treating tobacco use and dependence, the identification, documentation, and treatment of every tobacco user they see needs to become a routine practice in every dental office and clinic [Fiore et al. 2000]. However, national data from the early 1990s indicated that just 24 percent of smokers who had seen a dentist in the past year reported that their dentist advised them to quit, and only 18 percent of smokeless tobacco users reported that their dentist ever advised them to quit.

As seen in table V, approximately 20 percent of Wisconsin adults are current smokers. In addition, 16 percent use chewing tobacco, snuff, or snus every day or some days [CDC 2010a]. Snus is a new tobacco product in the United States and is a moist powder tobacco product placed under the upper lip and does not require spitting. In addition, 28 percent of high school students in Wisconsin (33% of males and 23% of females) currently use some form of tobacco (Figure XXIV) [WDHS 2008].

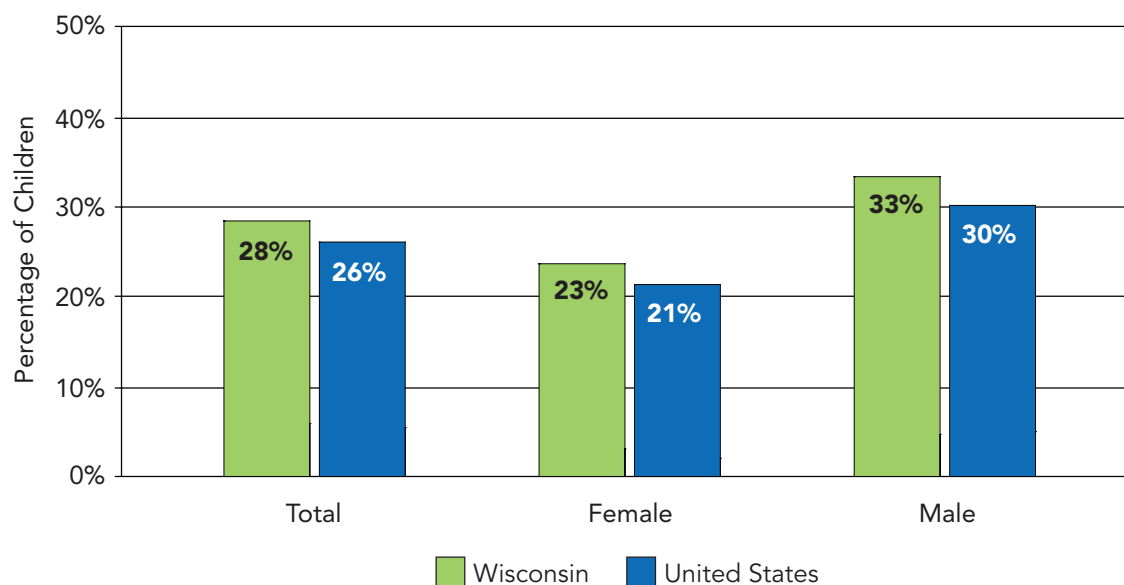
Table V. Cigarette Smoking among Adults aged 18 Years and Older, 2008

	United States %	Wisconsin %
<i>Healthy People 2010 Target</i>	12	12
TOTAL	18	20
Education		
Less than High School	30	29
High School or GED	25	25
Some post High School	20	22
College Graduate	9	11
Sex		
Female	17	18
Male	20	22

Sources: CDC Behavioral Risk Factor Surveillance System

Figure XXIV.

Percentage of High School Students who Currently Use Any Tobacco Products, Wisconsin vs. the United States, by Sex, YTS 2008 and NYTS 2006



Source: Wisconsin Department of Health Services, Youth Tobacco Survey High School Fact Sheet, 2008 and The National Youth Tobacco Survey and Key Prevalence Indicators, 2006.

g. Oral Health Education

Oral health education for the community is a process that informs, motivates, and helps people to adopt and maintain beneficial health practices and lifestyles; advocates environmental changes as needed to facilitate this goal; and conducts professional training and research to the same end [Kressin and DeSouza 2003]. Although health information or knowledge alone does not necessarily lead to desirable health behaviors, knowledge may help empower people and communities to take action to protect their health.

Through the Wisconsin Seal-A-Smile Program over 16,400 children received oral health education during the 2008-09 school year [CHAW 2009]. In addition, almost 2,900 individuals receiving services from Wisconsin local health departments and tribes, also received oral health education in 2009 [WDHS 2010a].

The primary care trainings that the Fluoridation Specialist conducts throughout the state include information on oral health risk assessment and anticipatory guidance in addition to information on fluoride varnish application. The risk assessment and anticipatory guidance are included in order for the primary care physicians to provide appropriate oral health education to parents.

Oral health education is also provided through Head Start schools. The current practice act allows dental hygienists to work in schools and Wisconsin considers Head Start locations to be schools. Many of these sites have dental professionals actively providing fluoride varnish and health education to Head Start enrollees.



h. Integration with Chronic Disease Programs

Chronic diseases account for seven out of every ten deaths in the United States annually and the three leading causes of mortality of cancer, heart disease, and stroke account for more than 50 percent of all deaths each year. In addition, nationally almost half of all Americans are living with at least one chronic condition [CDC 2010d]. The economic costs of chronic disease are great, with 80 percent of the two trillion dollars spent on health care each year going towards the treatment of chronic diseases [McKenna & Collins 2010]. Chronic diseases have many shared modifiable risk factors such as tobacco, alcohol, nutrition, and physical activity that if addressed collectively by the chronic disease programs, could greatly improve the health of Wisconsin residents.

Wisconsin is a pilot state in the Center for Disease Control and Prevention's Program Integration initiative. As part of the program integration project the Oral Health Program has been collaborating with a diverse set of internal partners to develop common health and wellness messaging, incorporating the mission of the Wisconsin Division of Public Health and promoting health across the lifespan. In regard to surveillance activities, the Oral Health Program is collaborating with the other chronic disease programs, including Heart Disease and Stroke Prevention, Arthritis, and Diabetes Prevention and Control in the Bureau of Community Health Promotion to integrate data and reporting processes. Also, as part of the integration project an epidemiology and surveillance ad hoc subcommittee was formed, which is in the process of creating an integrated risk factor report.

VII. PROVISION OF DENTAL SERVICES

a. Dental Workforce and Capacity

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

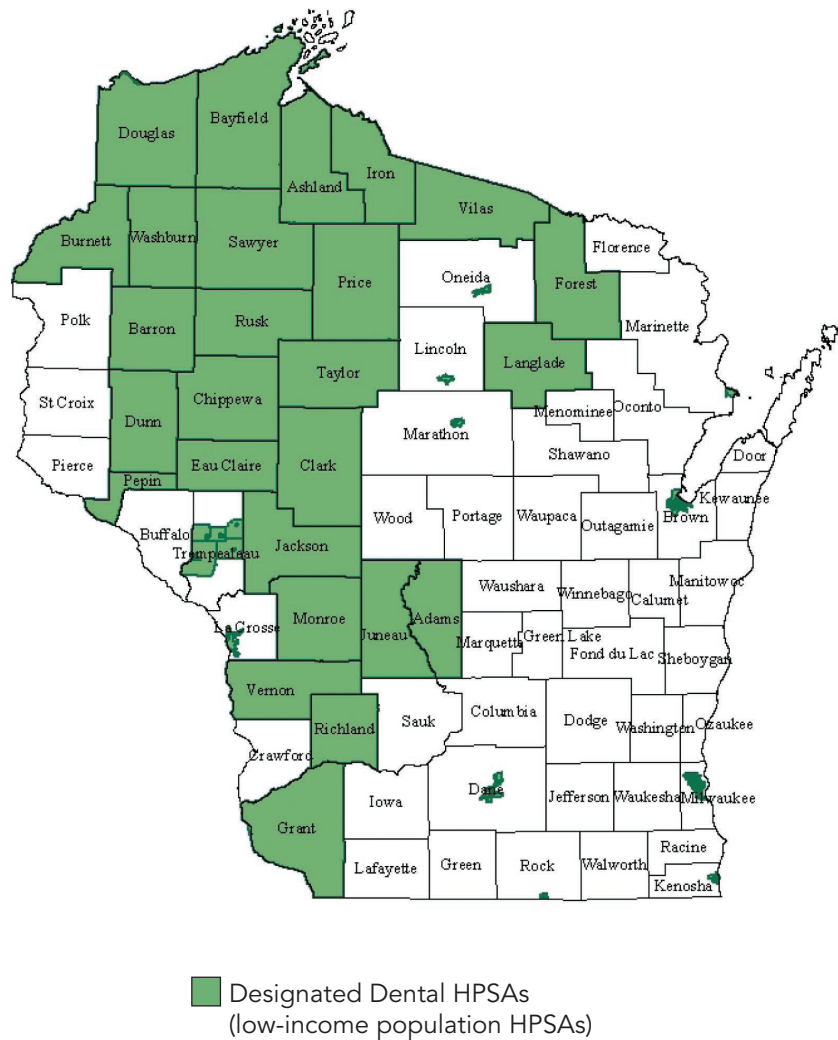
According to a recent study conducted by Beazoglou et al for the Wisconsin Dental Association, in 2009 there were 3,142 active dentists, 2,891 dental hygienists, and 2,465 dental assistants in general practice offices in Wisconsin. The total number of licensed in state dentists in 2009 was 3,511 and there were 4,487 in state licensed hygienists. Of the active dentists 84 percent worked full time, defined as 32 hours per week or more. The average general practice dentist works 1,385 hours per year, has 2.9 operatories, uses 1,592 square feet of space, and employs 4.1 staff. The mean age of Wisconsin dentists is 52, with 48 percent of active dentists over age 55. When compared to the Nation, Wisconsin's oral health workforce is similar including the dentist to population ratio (1/1,811) and dentists' income, except Wisconsin dentists work about nine percent fewer hours per year and Wisconsin has proportionately fewer specialists (18%) [Beazoglou et al. 2010].

Federal Health Professional Shortage Area (HPSA) designations for service areas provide eligibility for certain federal and state benefits that help increase access to care (e.g., provider recruitment assistance via student loan repayment). In September 2009, Wisconsin had 10 dentists and 1 dental hygienist completing their service obligations for federal loan repayment and scholarship in dental HPSAs throughout the state[USDHHS 2009].

As of April 2010, Wisconsin had 43 dental low-income population HPSAs, some are whole-county and some partial county (Figure XXV). These dental HPSAs represent service areas which requested a HPSA in order to be eligible for the HPSA-linked benefits and they meet federal dental low-income population HPSA requirements, including: they have a significant shortage of dentists providing care to the low-income population for their service areas (a low-income population to dentist providing care ratio of 4,000:1 dentist or higher), they are rational service areas, and at least 30 percent of the area's population is below 200 percent of the federal poverty level. Wisconsin does not have the detailed dentist workforce data necessary to calculate whole-population to dentist ratios, and has not had capacity to review all other areas to see if they meet federal HPSA requirements. Wisconsin also had 33 facility dental HPSAs – these are automatic safety-net facility dental HPSAs (community and tribal health centers which serve all patients regardless of their ability to pay for services). HPSA designations are reviewed and re-designated every four years [WDHS 2010e].

Figure XXV.

**Wisconsin Dental HPSAs
Federally Designated Health Professional Shortage Areas**



Source: Wisconsin Department of Health Services Primary Care Office
<http://dhs.wisconsin.gov/health/PrimaryCare/Dental%20HPSA%20map%20%203%2011%2010.pdf>

b. Dental Workforce Diversity

One cause of oral health disparities is a lack of access to oral health services among under-represented minorities. Increasing the number of dental professionals from under-represented racial and ethnic groups is viewed as an integral part of the solution to improving access to care [USDHHS 2000c]. Recent data on the race/ethnicity of dental care providers are not available, but the American Dental Association does collect self-reported race and ethnicity on a survey of new dental graduates. According to the most recent survey, conducted in 2008 on dental graduates in 2007, 72 percent of respondents were white, followed by 17 percent Asian or Pacific Islander, and 4 percent black [ADA 2009]. In addition, about five percent of respondents were of Hispanic ethnicity. More black and Hispanic graduates are needed in order for the dental workforce to be comparable to the general population. In Wisconsin, only 37 percent of licensed dentists reported their race/ethnicity in 2008 to the Wisconsin Department of Regulation and Licensing. Of those reporting, 90 percent were white, 5 percent were Asian/Pacific Islander, and 2 percent were Hispanic [WDRL 2009]. Only about one percent of those dentists reporting were African American, while about six percent of Wisconsin's population is African American [WDRL 2009].

The percent of dentists who are female has been increasing over the past few decades in Wisconsin and throughout the United States. Currently 17 percent of active dentists in Wisconsin are female. More female dentists in Wisconsin practice in the larger, more urban counties compared to the rural counties [Beazoglou et al. 2010].



c. Dental Medicaid and State Children's Health Insurance Programs

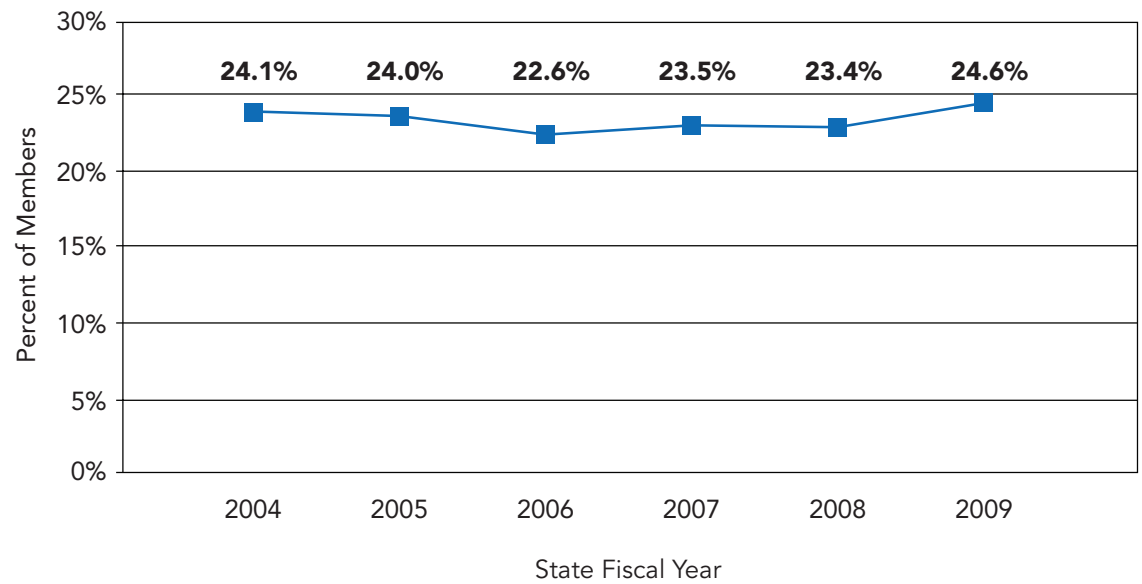
Medicaid is the primary source of health care for low-income families, the elderly and disabled people in the United States. This program became law in 1965 and is jointly funded by the federal and state governments (including the District of Columbia and the Territories) to assist states in providing medical, dental, and long-term care assistance to people who meet certain eligibility criteria. People who are not U.S. citizens can receive Medicaid only to treat a life-threatening medical emergency; eligibility is determined on the basis of state and national criteria. Dental services are a required service for most Medicaid-eligible individuals under the age of 21 years, as a required component of the Early and Periodic Screening, Diagnostic and Treatment (EPSDT) benefit. Services must include, at a minimum, relief of pain and infections, restoration of teeth, and maintenance of dental health. Dental services may not be limited to emergency services for EPSDT recipients [Centers for Medicare and Medicaid, 2004].

Nationally, federal Medicaid expenditures for dental services totaled \$6.0 billion in 2008, or six percent of the total \$101.2 billion spent on dental services nationally [Centers for Medicare and Medicaid Services 2010].

In Wisconsin comprehensive dental benefits are available to all children enrolled in the State Medicaid and BadgerCare Plus program and for all pregnant women and women 60 days post-partum. For 66 of the 72 counties in Wisconsin dental benefits are fee for service and the six remaining counties, which are in the Milwaukee area, have dental benefits administered through managed care organizations. Dental utilization rates are lower among these managed care counties [Bailit 2010].

During State Fiscal Year (SFY) 2009 25 percent of Medicaid and BadgerCare Plus members received at least one dental service. Utilization rates have remained unchanged over the past six years (Figure XXVI); however both the number of eligible members and the number of members receiving a service has increased over that timeframe. There is variation in utilization rates by county, with higher rates in the northwestern part of the state where there are more Federally Qualified Health Centers and lower rates in the southeast (Figure XXVII). Of the 3,142 active licensed dentists, 32 percent had at least one paid Medicaid claim in SFY 2009. Also, during SFY 2009 only 11 percent of the active dentists had paid claims of \$10,000 or more and only 8 percent saw 50 or more beneficiaries under age 21 [WDHS 2010c].

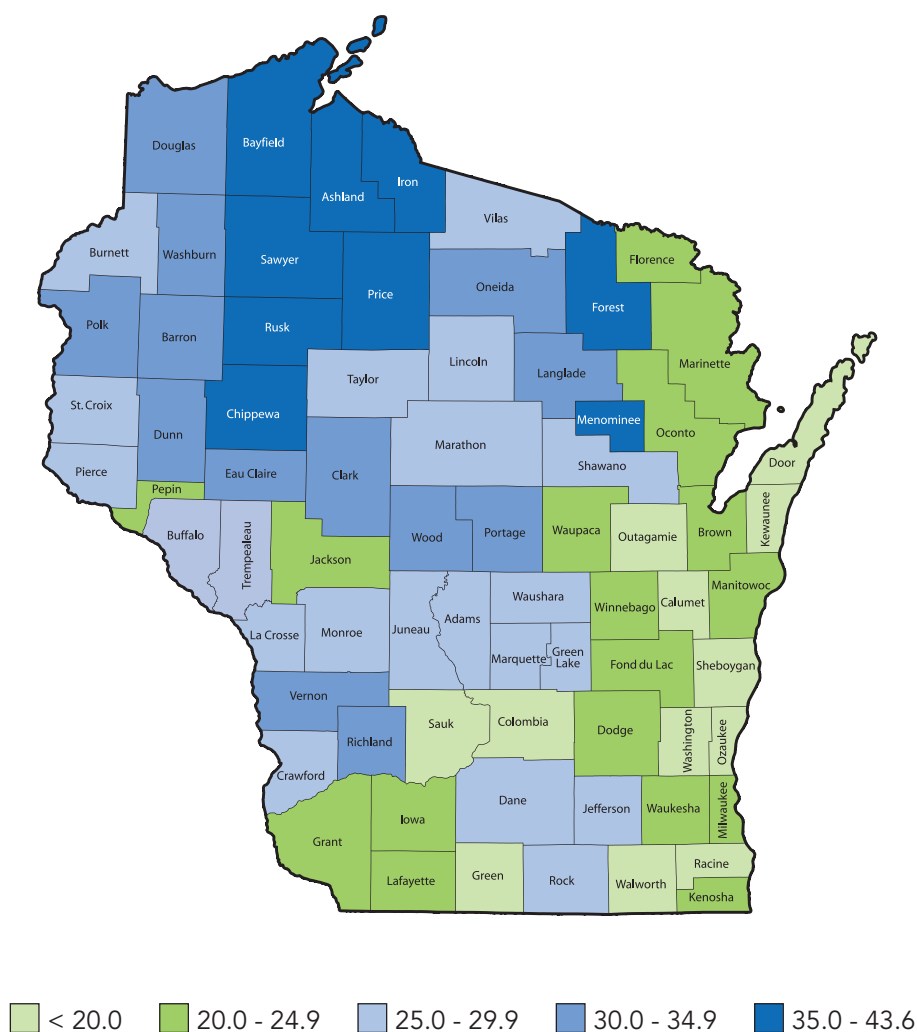
Figure XXVI.

**Trends in Wisconsin Medicaid Dental Utilization Rates
2004-2009**

Source: Forward Health Dental Utilization Tables

Figure XXVII.

**Percentage of Medicaid Members
Receiving a Dental Service, SFY2009**



Source: Wisconsin Department of Health Services, Division of Health Care Access and Accountability

d. Community and Migrant Health Centers and other State, County, and Local Programs

Federally supported Community Health Centers (CHCs) provide comprehensive, culturally competent primary and preventive health care services to medically underserved populations and vulnerable populations in rural and urban underserved communities. The federal CHC program awards competitive federal grants to community, migrant and homeless health centers to provide care in areas where economic, geographic, or cultural barriers limit access to primary and preventive care. Each CHC: must provide financial access to care (serve Medicaid/SCHIP, Medicare, and uninsured on a sliding fee schedule), must have a community governing board, and is required to provide comprehensive primary care, preventive and emergency dental care, pharmacy, and assure access to behavioral health services [USDHHS 2010b].

Healthy People 2010 objective 21-14 is to “Increase the proportion of local health departments and community-based health centers, including community, migrant, and homeless health centers, that have an oral health component” [USDHHS 2000c]. In 2006, 70 percent of local jurisdictions and health centers had an oral health component in the United States compared to 63 percent in Wisconsin. The *Healthy People 2010* target is 75 percent.

As of April 2010, 14 of Wisconsin’s 17 CHCs directly provide preventive and general dental care at 26 dental service delivery sites throughout the state. This is an increase from 2008, when Wisconsin’s CHCs had 18 dental service sites and provided 151,423 dental visits to 59,040 unduplicated patients, the most recent year for which there are data [WDHS 2010f; USDHHS 2008].

In addition, there are 11 American Indian Tribes in Wisconsin [USDHHS 2010a]. Nine of the eleven tribes currently operate dental clinics and the other two are in the planning and construction phases for their clinics. A brief telephone survey of the tribal dental clinics was conducted for this report, which found that there is great diversity among the tribes in size and how services are provided. Some of the dental clinics provide services to tribal and non-tribal members, while others only provide services to tribal members. Most of the tribes employ just one or two full time equivalent (FTE) dentists, but the others employ up to six FTE dentists and only a few tribes employ specialists. Tribal dental clinics also differ in the number of patient visits in a year, with a range of about 1,500 to 24,000.

e. Educational Programs

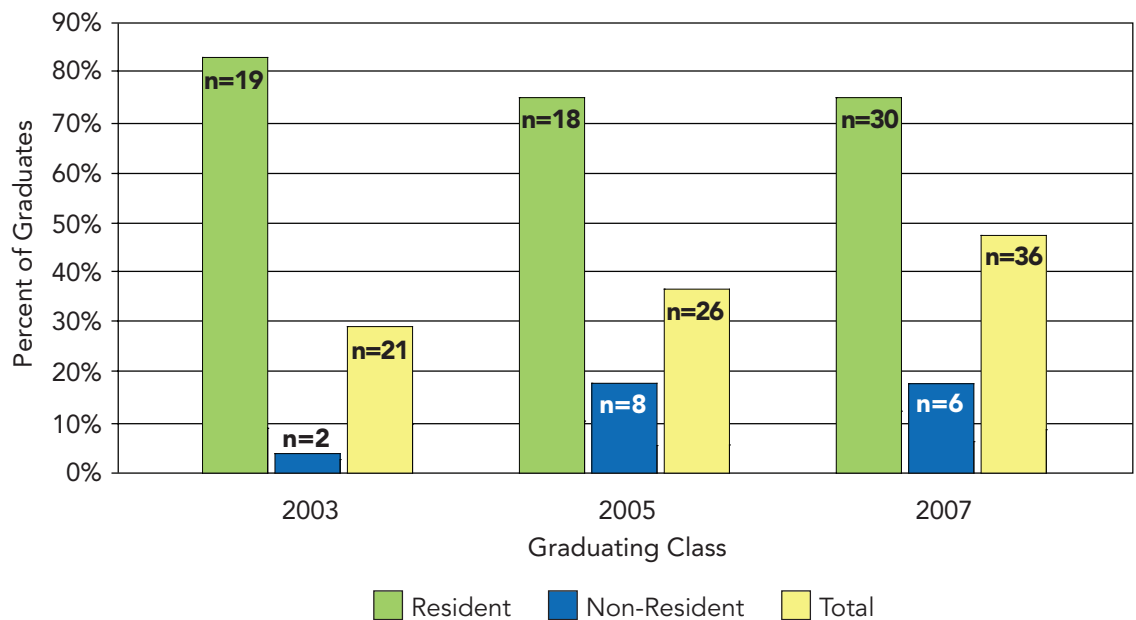
The School of Dentistry at Marquette University, located in Milwaukee, is the only dental school in Wisconsin, and admits 80 new students per year, 40 of which are Wisconsin residents. The Higher Education Aids Board contract for dental education allows a finite number of Wisconsin residents (160 students, 40 per class) to attend Marquette University School of Dentistry (MUSoD) at a resident tuition rate. Marquette University's graduate analysis finds that 75 percent of students who were Wisconsin residents at admission were practicing in Wisconsin during years one and three following graduation (Figure XXVIII).

MUSoD has an annual clinical services contract with the Wisconsin Department of Health Services, which provides a community based dental education to students and offers dental services to the underserved populations of Milwaukee and throughout the state. During State Fiscal Year 2008, over 13,300 patients were seen at the MUSoD Main Clinic. A large portion of the patients were eligible for Wisconsin Medicaid and services were also provided to pediatric patients and patients with special health care needs. In addition to the Main Clinic, MUSoD students treat many more patients at six additional sites in Milwaukee and throughout the state.

Dental hygiene educational programs are offered by ten Wisconsin Technical College campuses. In addition, there are five campuses that offer a one year dental assistant program and short-term technical diplomas in dental assisting are offered by seven campuses (Appendix b). In 2008, there were 182 dental hygiene associate degree graduates and 218 dental assistant graduates. Also, a public dental health certificate is offered online through one technical college campus.

Figure XXVIII.

Percentage of Marquette School of Dentistry Graduates Practicing in Wisconsin in 2008, by Residency at Time of Enrollment

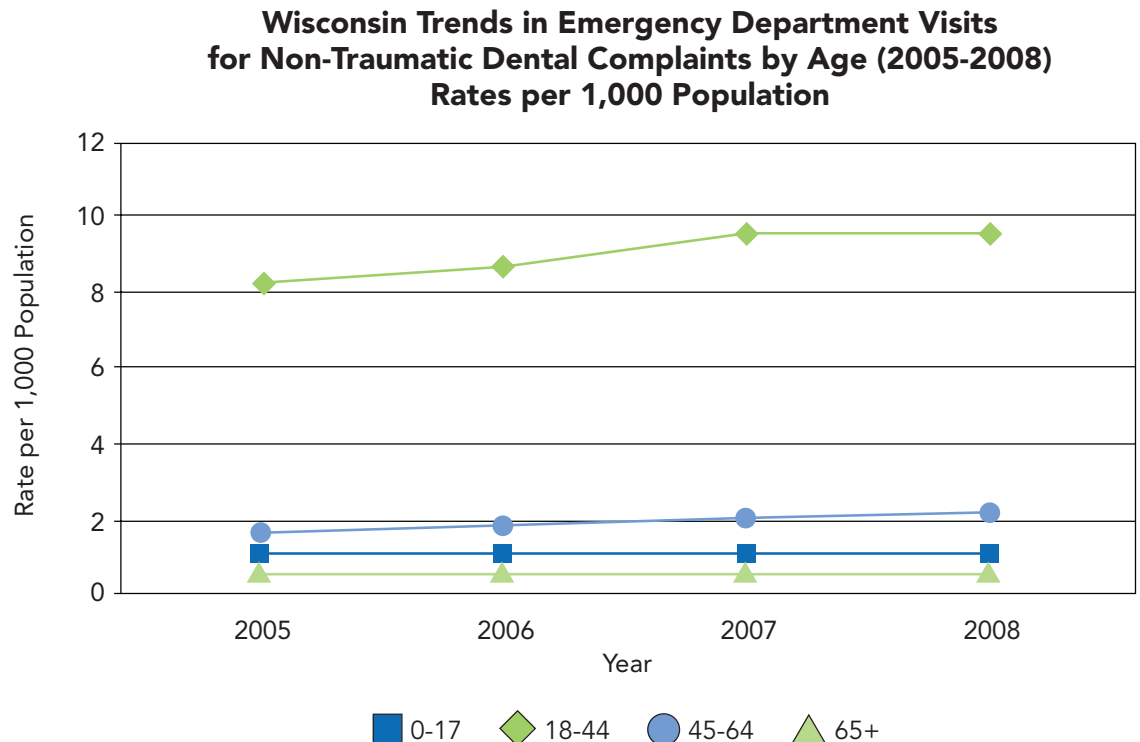


Source: Marquette University School of Dentistry, Educational Development and Assessment

f. Hospital Emergency Departments

Visits to hospital emergency departments for non-traumatic dental complaints have increased over the past several decades throughout the United States [Teresita et al 2006]. Nationally Medicaid members and uninsured individuals have a more difficult time obtaining dental services compared to medical services [Berk & Schur 1998]. Many of the individuals who are unable to obtain dental care end up in emergency departments. In 2008 there were a total of 25,187 visits to emergency departments for non-traumatic dental complaints in Wisconsin. Thirty-nine percent of the visits had a primary payer of Medicaid and 33 percent had a primary payer listed as self-pay. Adults between the ages of 18 and 44 are the most likely age group to end up in the emergency department for non-traumatic dental complaints. From 2005 to 2008 the rate per 1,000 population for adults 18 to 44 increased from 8.2 to 9.5 (Figure XXIX). Rates among children and older adults remained stable over the past four years.

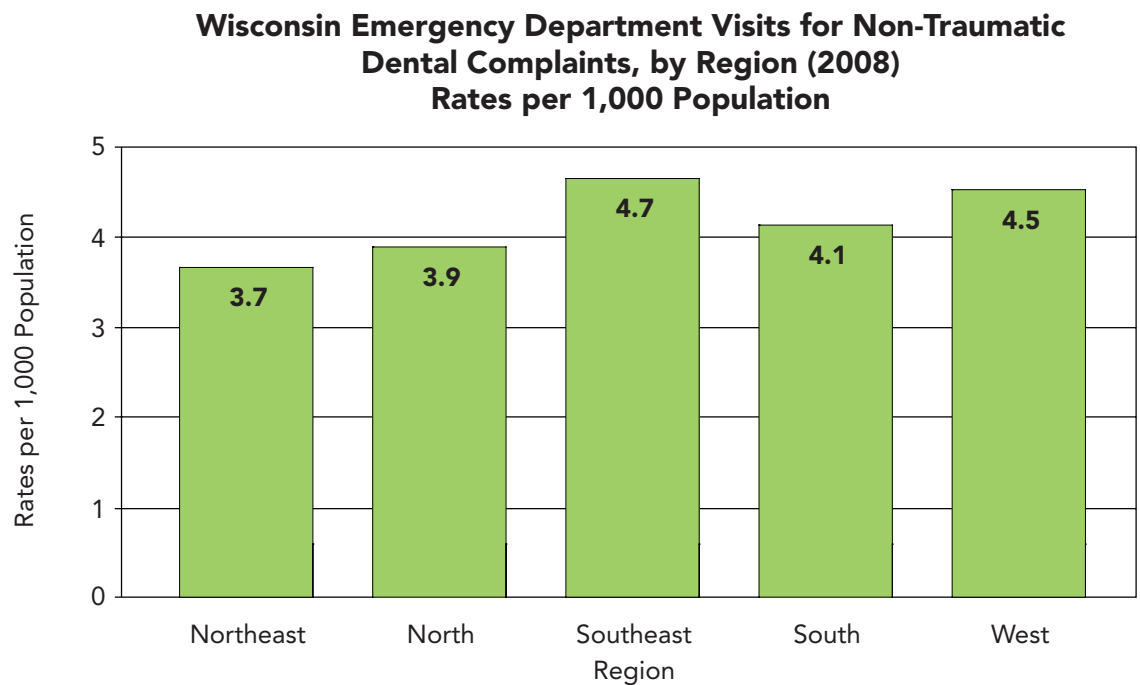
Figure XXIX.



Source: Wisconsin Department of Health Services, Emergency Department Data

Some disparities exist by region for use of the emergency department for non-traumatic dental complaints (Figure XXX). The Southeastern (4.7 per 1,000) and Western (4.5 per 1,000) regions have higher rates of emergency department visits compared to the other regions. Due to the large urban population in the Southeastern region, 40 percent of all emergency department visits for non-traumatic dental complaints in 2008 occurred in the region.

Figure XXX.



Source: Wisconsin Department of Health Services, Emergency Department Data

VIII. CONCLUSIONS

This report contains the most recent data available on the disease burden, prevention programs, risk behaviors, education, and workforce regarding oral health in Wisconsin. Some of the key findings of this report include:

- 26% of Wisconsin's Head Start children have untreated decay;
- 55% of Wisconsin's third grade students have caries experience;
- African American, Hispanic, and Asian third grade students are twice as likely as white students to have untreated decay;
- African Americans are more likely to develop oral and pharyngeal cancers, are less likely to be diagnosed at an early stage and are more likely to die from oral and pharyngeal cancers;
- 90% of the population on community water systems has access to optimally fluoridated water;
- In Wisconsin 51% of third grade students have dental sealants, meeting the *Healthy People 2010* objective;
- Only 25% of Medicaid and BadgerCare Plus members received at least one dental service;
- 11% of active licensed dentists had Medicaid paid claims of \$10,000 or more.

There is still more to learn and data gaps to be filled in order to have a complete picture of the oral health of Wisconsin. Ongoing surveillance activities are necessary to monitor the oral health of Wisconsin's residents and progress towards meeting state and national oral health objectives.

The data in this report can be used to appropriately target programs and policies in order to reduce or eliminate disparities in oral health status. In addition, the data in the report will be used as the basis for the first Wisconsin State Oral Health Plan.



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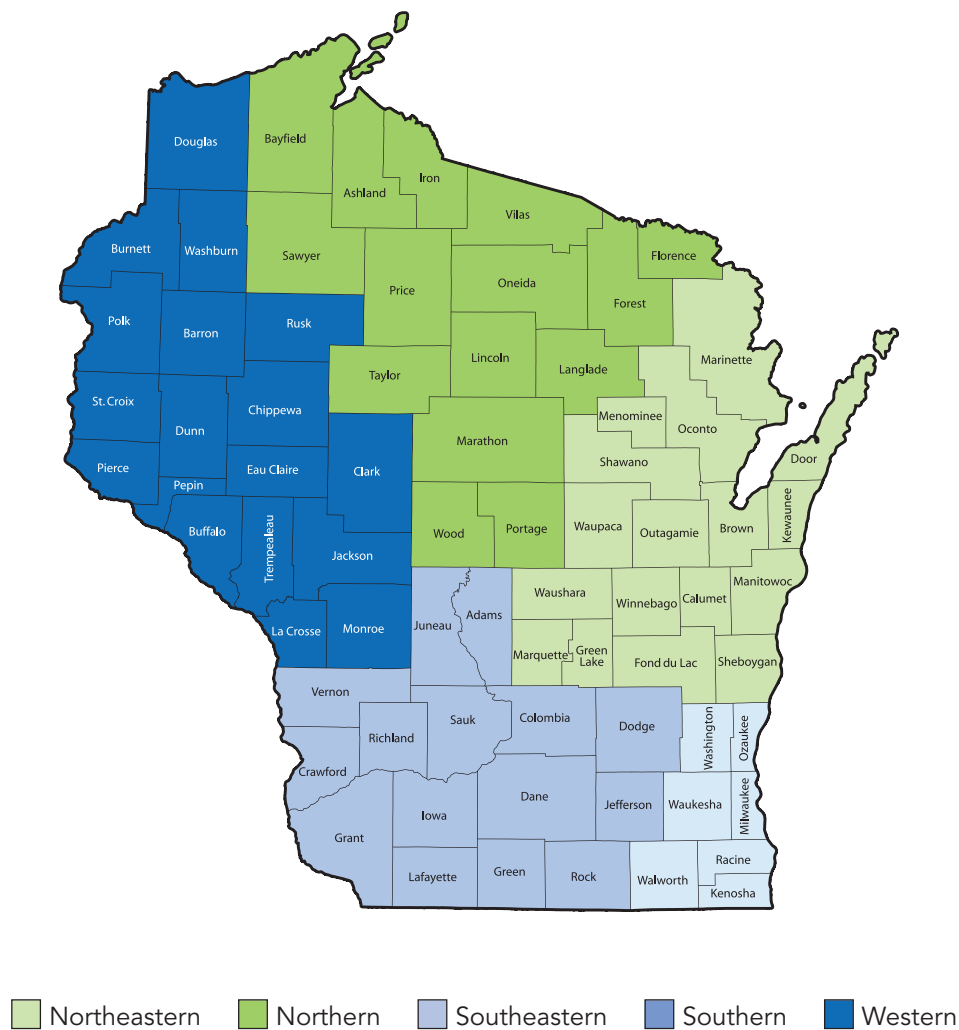
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IX. APPENDICES

a. Map of Wisconsin DHS Regions

**Wisconsin Department of Health Services
Regions by County**



b. Wisconsin Technical Colleges and Programs Offered

Wisconsin Technical Colleges	Program/Degrees Offered		
	Dental Hygiene Associates Degree	1 Year Dental Assistant Technical Diploma	Short Term Dental Assistant Technical Diploma
Blackhawk Technical College 6004 South County Road G, Janesville WI 53546	X*	X	
Chippewa Valley Technical College 620 W. Clairemont Avenue, Eau Claire, WI 54701	X		X
Fox Valley Technical College 1825 N. Bluemound Drive, Appleton, WI 54912	X	X	
Gateway Technical College 3520 - 30TH Avenue, Kenosha, WI 53144		X	
Lakeshore Technical College 1290 North Avenue, Cleveland, WI 53015	X		X
Madison Area Technical College 3550 Anderson Street, Madison, WI 53233	X		X
Mid-State Technical College 500 32nd Street North, Wisconsin Rapids, WI 54494			
Milwaukee Area Technical College 700 W. State Street, Milwaukee, WI 53233	X		X
Moraine Park Technical College 235 N. National Avenue, Fond du Lac, WI 54936			
Nicolet Area Technical College 5364 College Drive, Rhinelander, WI 54501			
Northcentral Technical College 1000 W. Campus Drive, Wausau, WI 54401	X		X
Northeast Wisconsin Technical College 2740 West Mason Street, Green Bay, WI 54307	X	X	
Southwest Tech 1800 Bronson Boulevard, Fennimore, WI 53809	X*		X
Waukesha County Technical College 800 Main Street, Pewaukee, WI 53072	X		X
Western Technical College 400 Seventh Street North, La Crosse, WI 54601	X	X	
Wisconsin Indianhead Technical College 505 Pine Ridge Drive, Shell Lake, WI 54871			

* Offered through Madison Area Technical College



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