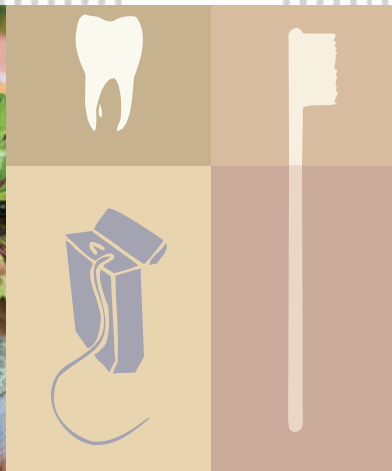


# THE BURDEN OF ORAL DISEASES IN RHODE ISLAND 2011



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## Introduction

Good oral health is critical to an individual's overall health and well-being. It includes the prevention or elimination of diseases and disorders that occur in the mouth, such as dental caries (tooth decay), periodontal disease (gum disease), and oral and pharyngeal cancers. When left untreated, these diseases and disorders are progressive and cumulative—growing more complex over time. According to the 2000 Surgeon General's *Oral Health in America* report, this can profoundly impact childhood development, adult workplace productivity, and quality of life for older adults.

Oral health status has improved for many Rhode Islanders over the past decade, but oral diseases still cause pain and disability for adults and children each year. More importantly, the burden of oral diseases is distributed unevenly among different populations. For example, national survey data reveal an inverse relationship between family income and tooth decay, untreated dental disease, and days lost from school or work due to pain from oral disease. The Surgeon General calls the pronounced oral health disparities among Americans a “silent epidemic,” explaining that “Those who suffer the worst oral health are found among the poor of all ages, with poor children and poor older Americans particularly vulnerable.”<sup>1</sup>

The good news is that appropriate interventions by health professionals can prevent or improve many oral diseases and disorders. The public health dentistry community generally accepts that spending \$1 on oral disease prevention activities will save \$50 in future restorative and rehabilitative costs.<sup>2</sup> In his 2003 *National Oral Health Call to Action*, US Surgeon General Vice Admiral Richard H. Carmona, MD emphasizes the importance of preventive healthcare—reminding us that oral health begins at birth. He encourages individuals to work together to plan oral health promotion and disease prevention activities in their own practices and work settings, through professional and community organizations, and in their personal lives. The *Call to Action* aims to: 1) promote oral health, 2) improve quality of life, and 3) eliminate oral health disparities. The following Action Areas can guide efforts towards reaching these goals:<sup>3</sup>

**Change perceptions of oral health.** Americans must believe oral health is not separate from their general well-being. Improving the health literacy of the public, including oral health literacy, is a key. Making sure other health professions are knowledgeable about oral health also is needed.

**Replicate effective programs and proven efforts.** Several states are conducting innovative programs through Medicaid to increase dental coverage.

**Build the science base.** Biomedical and behavioral research will transform our knowledge of the prevention, diagnosis, and treatment of oral disease. But, this knowledge must rapidly be turned into action for the public, providers, and community programs. New science should benefit all consumers, especially those who are in poorest oral health or at greatest risk.

**Increase oral health workforce diversity, capacity, and flexibility.** Women and minorities are underrepresented in the oral health professions, especially African Americans, Hispanics, and Native Americans. Diversity should be encouraged within the dental profession and culturally-competent messages should be used as part of efforts to eliminate disparities.

**Increase collaborations.** Disease prevention and health promotion campaigns that affect oral health, such as tobacco cessation, diet counseling, health education aimed at pregnant women

and new mothers, and support for the use of oro-facial protection for sports, can lead to overall improved oral health for the US.

This report summarizes statewide data on the serious impact of oral diseases in Rhode Island. Comparisons with national data are made whenever possible and to the *Healthy People 2010* objectives when appropriate. For some conditions, national data, but not state data, are available at this time. These data can guide the collaborative efforts of decision makers and stakeholders—individuals, families, professionals, communities, schools, work sites, organizations, and government agencies—as they plan and implement programs and policies to achieve the *Call to Action* goals.

In some cases, the statistics in this report represent 95% confidence intervals (CI). These are indicated visually using vertical (Y) error bars. CI reflect the “stability” of estimates. If the same exact survey was conducted 100 times, the 95% CI represents the range of values that 95 of the surveys would produce. If a CI is small, then one would expect to get an estimate very close to that seen if the same survey was repeated 100 times. If the CI is large, one would expect to get estimates that are very different from the one seen. Generally large CI are due to small numbers of people in a sample. If two groups have 95% CI that do not overlap, they are unlikely to have the same “true” value; one can assume that a difference exists between the groups.

## National and State Oral Health Objectives

Two US standards have primarily shaped oral health surveillance in Rhode Island: *Tracking Healthy People 2010* (HP2010), a compendium of indicators selected by the federal government to track the nation’s progress towards year 2010 public health objectives; and *The National Oral Health Surveillance System* (NOHSS), a collaborative effort between the Centers for Disease Control and Prevention (CDC) Division of Oral Health and the Association of State and Territorial Dental Directors (ASTDD).

Table I on the next page lists a summary of the *Healthy People 2010* objectives related to oral health. It includes national targets to accomplish by 2010, as well as current national and Rhode Island data. A more detailed look at this information is found throughout this report.

**Table I. Healthy People 2010 Oral Health Indicators, Target Levels, and Current Status in the United States and Rhode Island**

Healthy People 2010 Indicator	National Target <sup>4</sup>	United States	Rhode Island
21-1. Dental caries (tooth decay) experience			
a. Young children, aged 2–4 years	11%	24% <sup>5</sup>	7% <sup>6</sup> (1–5 yrs)
b. Children, aged 6–8 years	42%	53% <sup>5</sup>	48% <sup>7</sup>
c. Adolescents, aged 15 years	51%	56% <sup>5</sup>	DNC
21-2. Untreated caries (tooth decay)			
a. Young children, aged 2–4 years	9%	19% <sup>5</sup>	DNC
b. Children, aged 6–8 years	21%	29% <sup>5</sup>	28% <sup>7</sup>
c. Adolescents, aged 15 years	15%	18% <sup>5</sup>	DNC
d. Adults, aged 35–44 years	15%	28% <sup>5</sup>	DNC
21-3. Adults with no tooth loss, aged 35–44 years	42%	38% <sup>5</sup>	69% <sup>8</sup>
21-4. Edentulous (toothless) older adults, aged 65–74 years	20%	24% <sup>5</sup>	13% <sup>8</sup>
21-5. Periodontal (gum) diseases, adults aged 35–44 years			
a. Gingivitis, aged 35–44 years	41%	48% <sup>5</sup>	DNC
b. Destructive periodontal (gum) diseases, aged 35–44 years	14%	16% <sup>5</sup>	DNC
3-6. Oral and pharyngeal cancer death rates (per 100,000 population)	2.7	Male 3.9 <sup>9</sup> Female 1.4 <sup>9</sup>	Male 3.1 <sup>9</sup> Female 1.4 <sup>9</sup>
21-6. Oral and pharyngeal cancers detected at earliest stages	50%	50% <sup>10</sup>	35% <sup>10</sup>
21-7. Oral and pharyngeal cancer exam within past 12 months, aged 40 years and older	20%	19% <sup>11</sup>	41% <sup>8</sup>
21-8. Dental sealants			
a. Children, aged 8 years (1st molars)	50%	32% <sup>5</sup>	36% <sup>7</sup>
b. Adolescents (1st and 2nd molars) aged 14 years	50%	21% <sup>5</sup>	DNC
21-9. Population served by fluoridated water systems	75%	72% <sup>12</sup>	88% <sup>13</sup>
21-10. Dental visit within past 12 months, children and adults aged 2 years and older	56%	2–17 yrs 77% <sup>11</sup>	88% <sup>11</sup>
		18+ yrs 71% <sup>14</sup>	79% <sup>14</sup>
21-10. Low-income adults receiving annual dental visit	83%	51% <sup>4</sup>	DNA
21-11. Use of oral healthcare system by adult residents in long-term care facilities	25%	19% <sup>4</sup>	DNA
21-12. Low-income children and adolescents receiving preventive dental care during past 12 months, aged 0–18 years	57%	31% <sup>4</sup>	DNA

Healthy People 2010 Indicator	National Target <sup>4</sup>	United States	Rhode Island
21-13. School-based health centers with oral health component, K-12 a. Dental sealants b. Dental care	–	DNA	RI Total = 8 <sup>15</sup> a. 12.5% b. 12.5%
21-14. Community-based health centers with oral health components	75%	N/A	90% <sup>15</sup>
21-15. System for recording and referring infants and children with cleft lip and cleft palate	50 states and D.C.	N/A	Yes <sup>15</sup>
21-16. Oral health surveillance system	50 states and D.C.	N/A	Yes <sup>15</sup>
21-17. State dental programs with a public health trained director	–	N/A	Yes <sup>15</sup>
DNA = Data not analyzed; DNC = Data not currently collected; N/A = Not available			

## Prevalence of Oral Diseases and Disparities

Achieving oral health across the lifespan does not stop at maintaining healthy teeth. It is important to take care of all parts of the face, head, and skull, including the teeth, gingiva (gums), and tissues. Oral and craniofacial diseases and conditions include dental caries, periodontal disease, tooth loss, diminished salivary function, oro-facial pain, oro-pharyngeal cancers, and functional limitations of prostheses. These diseases and conditions can diminish social interactions, self-esteem, appreciation for food flavors, chewing satisfaction, and overall quality of life for many people.

### Rhode Island Children

#### Dental Caries

Nationally, dental caries (tooth decay) is the most common chronic disease of childhood; it is five times more common than childhood asthma and seven times more common than hay fever. The disease occurs when acids produced by bacteria on the teeth lead to mineral loss from the enamel and dentin (the hard substances of teeth). Unchecked, dental caries can result in loss of tooth structure, inadequate tooth function, unsightly appearance, pain, infection, and tooth loss.

#### Early Childhood

Early childhood caries (ECC) is a virulent form of dental caries that can destroy the teeth of preschool children and toddlers. This preventable, infectious disease is caused by the *streptococcus mutans* bacteria, which can live and grow in a baby's mouth. Parents and caregivers may transmit this bacteria to children whenever and however saliva is shared—for example, by using the same spoon to taste baby food and feed a baby, by a parent cleaning a pacifier in his or her own mouth before passing it to the child, or by using saliva to clean around a baby's mouth. A baby may also pick up saliva from a parent or caregiver on its hand or face and transfer the saliva to its own mouth during play.

Like many oral diseases and conditions, ECC is not distributed evenly throughout the population. In Rhode Island, the children most at risk for developing caries are likely those of minority races and ethnicities and/or those from low-income families.<sup>16,17</sup> These families reside primarily in the state's six core cities: Central Falls, Pawtucket, Providence, Newport, West Warwick, and Woonsocket. (A "core city" is defined as any city where the child poverty level is greater than 15%, according to the 2000 Census.) While updated data on the oral health of Rhode Island preschool children is not currently available, the state has plans for a state-wide screening survey of preschoolers that will target Head Start enrollees.

Reducing the prevalence of ECC in children with special health care needs (CSHCN), including those with disabilities and chronic illnesses, through programmatic oral health promotion/disease prevention activities, is consonant with the objectives of many reports and programs. These include *Oral Health in America: A Report of the Surgeon General*, *Healthy People 2010: Objectives for Improving Health*, the National and State Oral Health Surveillance System, and the Rhode Island Oral Health Commission. ECC prevention and treatment is also a high priority for the Oral Health Program at the Rhode Island Department of Health.

## School-Aged Children

The pain and disability caused by untreated dental caries may limit children's ability to focus and perform in the classroom, causing them to miss school days and fall behind their peers. The prevalence of decay in children is measured by assessing caries experience (if they have ever had decay and/or now have fillings) and untreated decay (active unfilled cavities). These indicators are monitored in Rhode Island and are consistent with the National Oral Health Surveillance System (NOHSS), allowing for comparisons with other states and with the nation as a whole.

Figure I compares the prevalence of caries experience and untreated decay for Rhode Island third grade children (8 through 9 years old) to national data for children 6-8 years old and to the *Healthy People 2010* targets. The data show that dental decay is a significant public health problem for Rhode Island's children. About half of third grade children (48%) have cavities and/or fillings, and more than a quarter (28%) have untreated tooth decay. Although Rhode Island disease rates are lower than the national rates, Rhode Island still has not met the *Healthy People 2010* targets of 42% and 21% for caries experience and untreated decay, respectively. It should be noted that the 2007 Rhode Island Third Grade Oral Health Survey was not designed to be representative of 6-8 year old children, as the majority of screened children were 8 or 9 years old.

Dental caries is not uniformly distributed among school-aged children in the United States or in Rhode Island. Some groups are more likely to experience the disease and less likely to receive treatment than others. Table II summarizes the most recent data for third grade children in Rhode Island and for children 6-8 years old nationwide. Like US children as a whole, Rhode Island children from minority racial/ethnic groups and from low-income families bear a greater burden of childhood dental caries than their peers. For example, Table II shows that Hispanic children and children attending schools with higher proportions of students eligible for free and reduced-price school meals (FRM) programs experience more caries and have more untreated decay than their counterparts.

**Figure I. Dental Caries Experience and Untreated Decay among 3rd Grade Children (8–9 Years Old) in Rhode Island Compared to 6–8 Year Olds in the United States and to *Healthy People (HP) 2010* Targets**

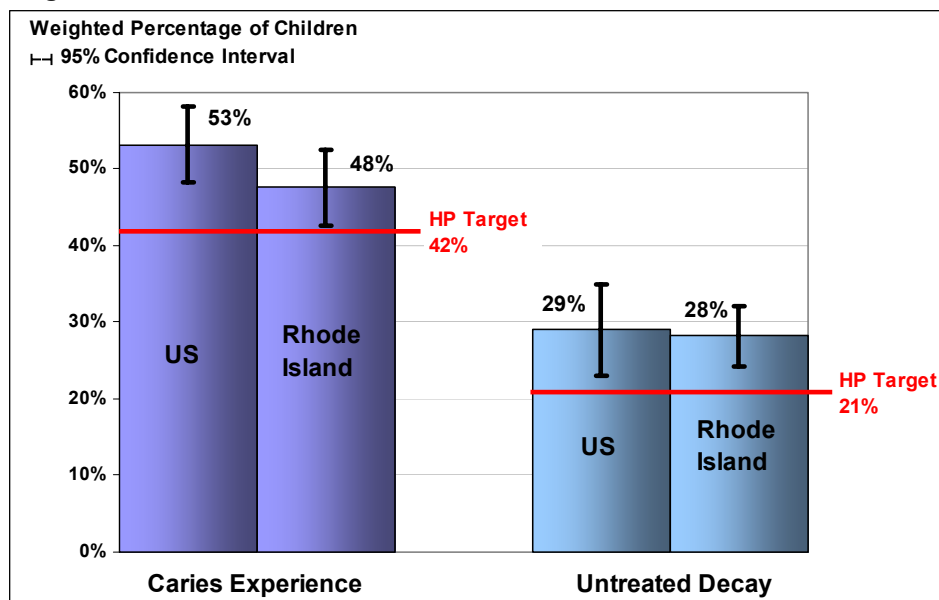


Figure I Source: US data from the National Health and Nutrition Examination Survey 1999–2004 (Trends in oral health status: United States, 1988–1994 and 1999–2004. National Center for Health Statistics. Vital Health Stat 11(248). 2007). Rhode Island data from The Oral Health of Rhode Island's Children. Rhode Island Department of Health, April 2008.

**Table II. Dental Caries Experience and Untreated Dental Decay among 6–8 Year Old Children in the United States and 3rd Grade Children in Rhode Island (8–9 Year Olds) by Selected Characteristics**

	Caries Experience		Untreated Decay	
	United States % (95% CI)	Rhode Island % (95% CI)	United States % (95% CI)	Rhode Island % (95% CI)
Total	53.2 (48.3–58.1)	47.6 (42.5–52.8)	29.2 (25.1–33.4)	28.2 (22.5–33.9)
Race/Ethnicity				
Non-Hispanic White	48.9 (41.9–55.9)	45.6 (39.6–51.6)	25.0 (18.3–31.7)	25.6 (18.8–32.4)
Non-Hispanic Black	56.1 (52.1–60.1)	47.2 (38.4–55.9)	37.4 (33.5–41.2)	26.5 (22.0–33.0)
Hispanic	68.5 (63.0–74.1)	53.9 (46.0–61.8)	40.6 (35.4–45.7)	38.4 (30.1–46.7)
Household Income as Percentage of the Federal Poverty Level (FPL)				
< 100% of FPL	67.4 (61.0–73.8)	N/A	41.3 (35.9–46.6)	N/A
100–199% of FPL	61.6 (54.7–68.5)		36.7 (28.9–44.4)	
≥ 200% of FPL	41.6 (34.4–48.8)		18.8 (14.3–23.3)	
School's Free and Reduced Meals (FRM) Program Percentage				
< 33% FRM	N/A	42.2 (35.3–49.0)	N/A	22.1 (14.9–29.2)
33–66.9% FRM		50.9 (35.1–66.7)		32.2 (16.1–48.3)
≥ 67% FRM		57.5 (47.2–67.8)		39.0 (26.9–51.1)
Table II Source: US data from the National Health and Nutrition Examination Survey 1999–2004 (Trends in oral health status: United States, 1988–1994 and 1999–2004. National Center for Health Statistics. Vital Health Stat 11(248). 2007.). Rhode Island data from The Oral Health of Rhode Island's Children. Rhode Island Department of Health, April 2008 N/A=Not Available				

## Need for Urgent Dental Care

The 2007 Rhode Island Third Grade Oral Health Survey included an indicator to assess if children needed immediate dental care within 24 to 48 hours because of dental pain, infection, or swelling. Four percent of the children screened reportedly needed urgent dental care.<sup>7</sup> To put this statistic into perspective, during the 2007-2008 school year, there were more than 9,700 third grade children in Rhode Island. If four percent urgently needed dental care, this means that almost 400 third grade children were in the classroom in pain or with an oral infection. If this percentage is expanded to include all elementary school children (kindergarten through sixth grade) in Rhode Island, more than 2,900 children may need urgent dental care because of pain or infection.

## Cranio-Facial Injuries

Many children are at risk of oro-facial trauma: an estimated 7.2 million youths participate in high school sports,<sup>18</sup> and sports account for 36% of all unintentional injuries to children and adolescents.<sup>19</sup> The National Youth Sports Safety Foundation reported dental injuries as the most common type of oro-facial injury sustained during participation in sports. Injuries appear to be more numerous in team sports, but more severe in individual sports.<sup>20</sup>

Oro-facial injuries vary by sport, but fractured, displaced, or knocked-out front (incisor) teeth are the most common sports-related oro-facial injuries. Overall, mandibular (lower jaw) fractures are the most common oro-facial fracture; 31% of all mandibular fractures are sports related<sup>21</sup>, while 10% of all maxillo-facial (upper jaw) fractures are sports related.<sup>22</sup> Helmets and facemasks offer athletes the most effective protection from oro-facial injuries, and are most used in football, hockey, and lacrosse. However, youth and adolescent athletes most commonly use mouth guards to prevent oro-facial injuries. Mandatory use of protective gear by football and hockey athletes appears to limit their vulnerability when compared with soccer, basketball, and baseball athletes.

A lack of state and national databases makes an accurate quantification of sports-related injuries difficult. However, given that an estimated 50,000 high school youth (25,500 boys and 24,500 girls) participated in organized Rhode Island Interscholastic League (RIIL) sports programs in the 2005-2006 school year<sup>23</sup>, and assuming an estimated injury rate of 19.4 injuries/100 athletes<sup>18</sup>, one can conservatively estimate 9,700 injuries during RIIL-sponsored programs per school year. It is more difficult to estimate injuries during unorganized sports activities without an accurate record of participants.

## **Cleft Lip and Cleft Palate**

One of the special healthcare needs that deal specifically with oral structures is the incidence of cleft lip/palate. Between 2002 and 2006, there were 80 cases of cleft/lip palate among Rhode Island children.<sup>24</sup> Cleft palate occurred in 4.7 babies among 10,000 live births, and cleft lip with or without cleft palate occurred in 8.3 among 10,000 live births during the same years.

## **Rhode Island Adults**

### **Dental Caries**

People are susceptible to dental caries throughout their lifetimes. Like children and adolescents, adults can experience new decay on the exposed crown portion of a tooth. However, adults can also develop caries on the root surfaces of teeth that are exposed as gums recede. Recently published national examination survey data reported that 28% of adults 35-44 years of age had untreated caries.<sup>5</sup> About one in five Rhode Island adults (22%) in the same age group have self-reported having cavities or untreated decay.<sup>8</sup>

Older adults experience a disproportionate rate of oral diseases, and frail elders are especially vulnerable to increased morbidity as a result. Nationally, approximately 42% of those age 75 years and older have root caries in at least one tooth.<sup>5</sup> Many explanations exist for higher rates of oral diseases and conditions among older adults. Common chronic diseases and their medications negatively impact the oral cavity, placing older individuals with physical and/or functional disabilities or who are medically compromised at greater risk for oral diseases. Older adults with poor general health also may have difficulty maintaining adequate oral hygiene, visiting a dental office, or tolerating dental treatment due to limited dexterity, visual acuteness, mobility, and tolerance for stress.

### **Tooth Loss**

A full dentition (set of teeth) is defined as having 28 natural teeth. This does not include third molars (wisdom teeth) or teeth removed for orthodontic treatment or as a result of trauma. With adequate personal, professional, and population-based preventive practices, most adults can keep their full set of teeth throughout their lives. Tooth loss affects a person's ability to chew and speak and can interfere with social functioning. The most common causes of tooth loss in adults are tooth decay and periodontal (gum) disease. Tooth loss also can result from infection, unintentional injury, or treatment for cancer of the head and neck. In addition, certain orthodontic and prosthetic services sometimes require the removal of teeth.

Rhode Island adults keep their teeth at better rates than their national counterparts, with 69% of Rhode Island adults age 35-44 years reporting never having had a tooth extracted due to dental caries or periodontal disease (Figure II) compared to 38% of adults nationally.<sup>5</sup> Similarly, 13% of

Rhode Island adults age 65-74 years report having lost all of their natural teeth (Figure III), compared to 24% of adults nationally.<sup>5</sup>

Since 2000, statewide trends in tooth loss and edentulism (complete tooth loss) have improved among Rhode Island adults, exceeding the *Healthy People 2010* targets. The percentage of adults age 35-44 years who have never had a permanent tooth extracted due to dental caries or periodontal disease increased from 61% in 2000 to 69% in 2008 (Figure II), and the percentage of adults age 65-74 years with complete tooth loss decreased from 23% in 2000 to 13% in 2008 (Figure III).

**Figure II. Adults Aged 35–44 Years with No Tooth Loss in Rhode Island, 2000–2008, Compared to *Healthy People 2010* Target**

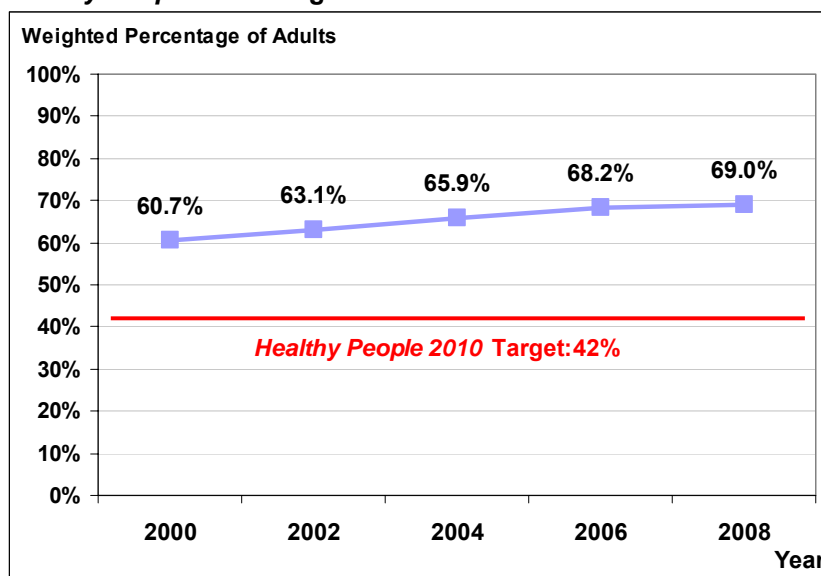


Figure II Source: Rhode Island Behavioral Risk Factor Surveillance System, 2000–2008.

**Figure III. Adults Aged 65–74 Years Who Have Lost All Their Natural Teeth in Rhode Island, 2000–2008, Compared to *Healthy People 2010* Targets**

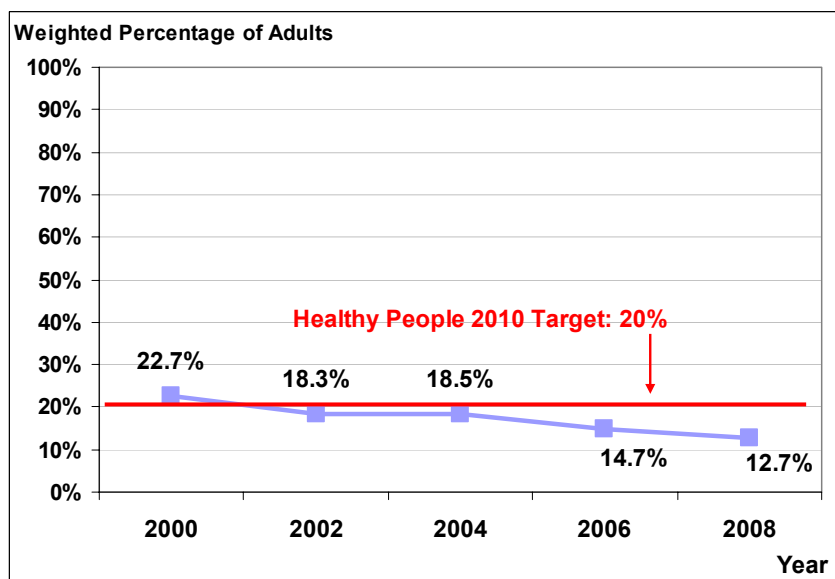


Figure III Source: Rhode Island Behavioral Risk Factor Surveillance System, 2000–2008.

Despite an overall trend towards reduced tooth loss in the US population, not all groups have benefited to the same extent.<sup>1</sup> Nationally, women tend to have more tooth loss than men of the same age group, and African Americans are more likely than Whites to lose teeth. The percentage of African Americans who have lost one or more permanent teeth more than triples that of Whites. Among all predisposing and enabling factors, a low education level has the strongest and most consistent association with tooth loss.

Rhode Island has observed similar disparities in tooth retention. Compared to their counterparts, more adults age 18 and older of minority race, with less education, and/or with lower income report having one or more teeth lost due to dental caries and periodontal disease (Table III). For Rhode Island adults age 65 years and older, edentulism is more common among those with lower education and income levels (Table III).

**Table III. Adults Aged 18 Years and Older Who Have Had No Teeth Extracted and Adults Aged 65 Years and Older Who Have Lost All Their Natural Teeth in the United States and in Rhode Island by Selected Characteristics**

	No Teeth Extracted Adults Aged 18 Years And Older		Lost All Natural Teeth Adults Aged 65 Years And Older	
	United States Median %	Rhode Island % (95 CI)	United States % (95% CI)	Rhode Island % (95% CI)
Total	56.1	57.5 (55.5–59.4)	18.0 (17.6–18.4)	17.7 (15.4–20.0)
<b>Gender</b>				
Male	57.1	57.8 (54.6–61.0)	16.9 (16.3–17.5)	17.5 (13.6–21.4)
Female	55.7	57.2 (54.9–59.4)	18.9 (18.4–19.4)	17.8 (15.0–20.6)
<b>Race/Ethnicity</b>				
Non-Hispanic White	57.6	58.7 (56.6–60.7)	17.0 (16.6–17.4)	17.6 (15.2–20.0)
Non-Hispanic Black	42.4	N/A	28.3 (26.3–30.3)	N/A
Hispanic	58.7	51.6 (44.1–59.1)	16.2 (14.1–18.3)	N/A
Non-Hispanic Other	54.8	N/A	18.3 (15.5–21.1)	N/A
Non-Hispanic Multi-Racial	59.5	N/A	27.6 (22.2–33.0)	N/A
<b>Household Income</b>				
< \$15,000	36.7	37.8 (29.1–46.6)	33.5 (32.0–35.0)	36.9 (28.3–45.5)
\$15,000 – \$24,999	41.1	44.7 (38.7–50.7)	25.4 (24.4–26.4)	23.8 (17.7–29.9)
\$25,000 – \$34,999	45.5	45.6 (38.8–52.4)	18.4 (17.3–19.5)	22.0 (15.1–28.9)
\$35,000 – \$49,999	51.6	54.9 (49.3–60.4)	13.4 (12.5–14.3)	13.4 (8.3–18.5)
≥ \$50,000	66.3	65.4 (62.9–67.9)	6.0 (5.5–6.5)	6.8 (3.5–10.1)
<b>Education</b>				
< High School	35.4	40.7 (32.2–49.1)	37.6 (36.2–39.0)	33.6 (26.6–40.6)
High School Graduate	45.8	45.8 (41.8–49.7)	22.0 (21.3–22.7)	21.3 (17.1–25.5)
Some College	56.3	59.0 (54.9–63.0)	14.1 (13.4–14.8)	15.1 (10.1–20.1)
College Graduate	69.1	68.8 (66.3–71.3)	6.0 (5.5–6.5)	8.0 (5.0–11.0)
Table III Source for No Tooth Extraction: CDC Behavioral Risk Factor Surveillance System, Prevalence and Trends Data. Nationwide (States and DC) and State of Rhode Island – 2008. Available at <a href="http://apps.nccd.cdc.gov/brfss/">http://apps.nccd.cdc.gov/brfss/</a>				
Table III Source for Complete Tooth Loss: CDC Oral Health Resources, National Oral Health Surveillance System. Available at <a href="http://apps.nccd.cdc.gov/nohss/ListV.asp?qkey=8&amp;DataSet=2">http://apps.nccd.cdc.gov/nohss/ListV.asp?qkey=8&amp;DataSet=2</a>				
N/A = Not available if unweighted sample size for denominator was < 50.				

## **Periodontal (Gum) Disease**

Gingivitis is characterized by localized inflammation, swelling, and bleeding gums without a loss of the bone that supports the teeth. Good oral hygiene can usually reverse gingivitis. It is very important to remove dental plaque from the teeth daily to prevent gingivitis and its progression.

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 he or she receives appropriate treatment. Among adults, periodontitis is a leading cause of bleeding, pain, infection, loose teeth, and tooth loss.<sup>25</sup>

Although not all cases of gingivitis progress to periodontal disease, all periodontal disease starts as gingivitis. Therefore, preventing gingivitis and its progression is the major available method to prevent destructive periodontal disease (periodontitis).

Nationally, 45% of adults age 35-44 years have been diagnosed with gingivitis, and 20% have been diagnosed with periodontitis.<sup>5</sup> Comparative data are not available for Rhode Island. Gingivitis will likely continue affecting a substantial number of adults, and cases may increase as tooth loss from dental caries declines or as adults use certain systemic medications.

## **Oral Cancer**

Cancer of the oral cavity or pharynx (oral cancer) is the sixth most common cancer in African American men and the eighth most common cancer in White men in the United States.<sup>26,27</sup> An estimated 36,540 new cases of oral cancers and 7,880 deaths from these cancers occurred in the United States in 2010. The 2003-2007 incidence and death rates of oral cancer in the United States were 10.7 and 2.5 per 100,000 persons, respectively (age-adjusted to 2000 US Census data).<sup>9</sup> Nearly 90% of oral cancer cases in the United States occur among people age 45 years and older. Although incidence and mortality rates have decreased in both men and women during the last few decades, the 2003-2007 age-adjusted incidence and mortality rates for men more than doubled those among women (Figure IV). Oral and pharyngeal cancers are a significant issue in Rhode Island, particularly among men. During 2003-2007, there were 16 new cases reported annually per 100,000 Rhode Island male adults. Figure V shows the incidence rates of cancers of the oral cavity and pharynx for males in Rhode Island and the United States.

**Figure IV. Incidence and Mortality Rate of Oral and Pharyngeal Cancer by Gender in the United States and Rhode Island, 2003–2007**

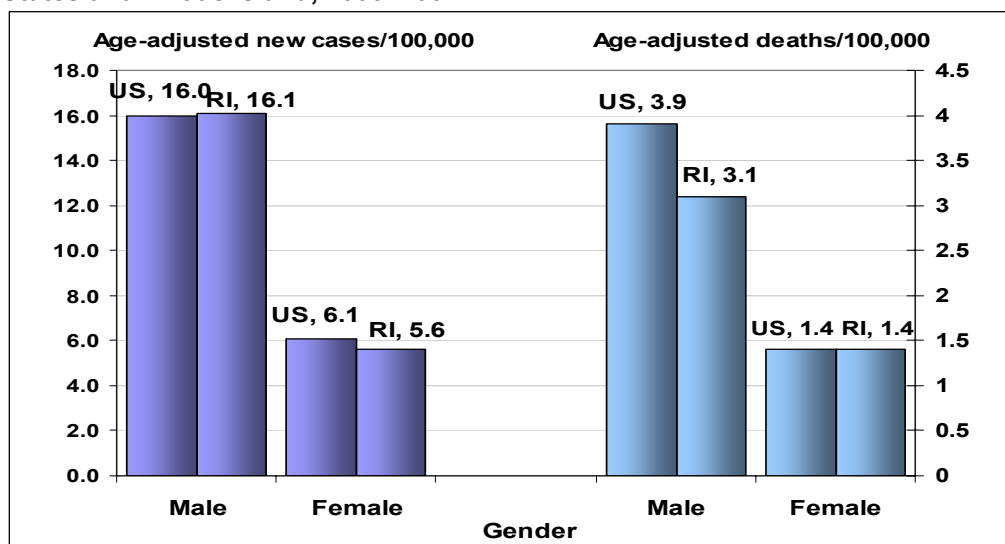


Figure IV Source: CDC, National Program of Cancer Registries, United States Cancer Statistics for 2003–2007. Available at <http://apps.nccd.cdc.gov/uscs/cancersbystateandregion.aspx>

**Figure V. Incidence Rate of Oral and Pharyngeal Cancer among Males by Race/Ethnicity in the United States and Rhode Island, 2003–2007**

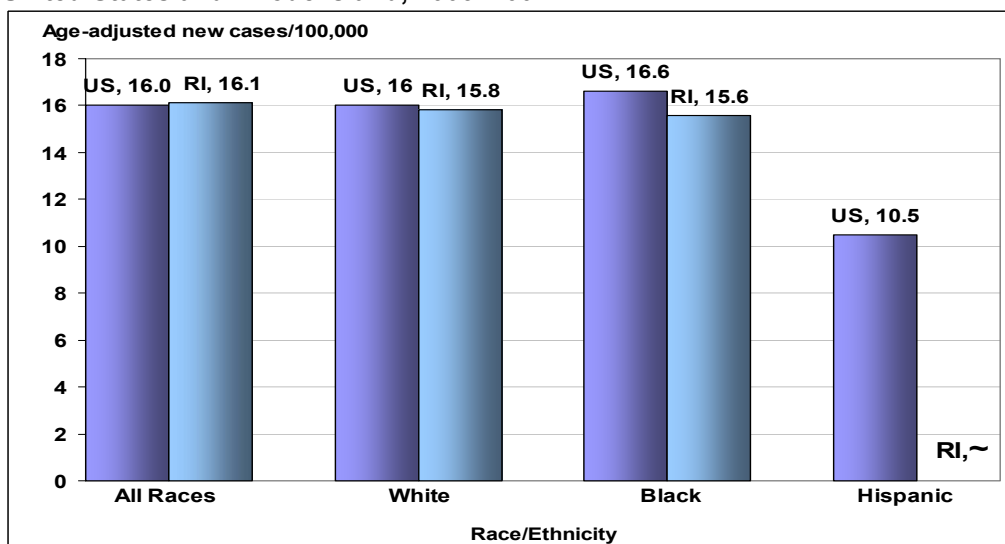


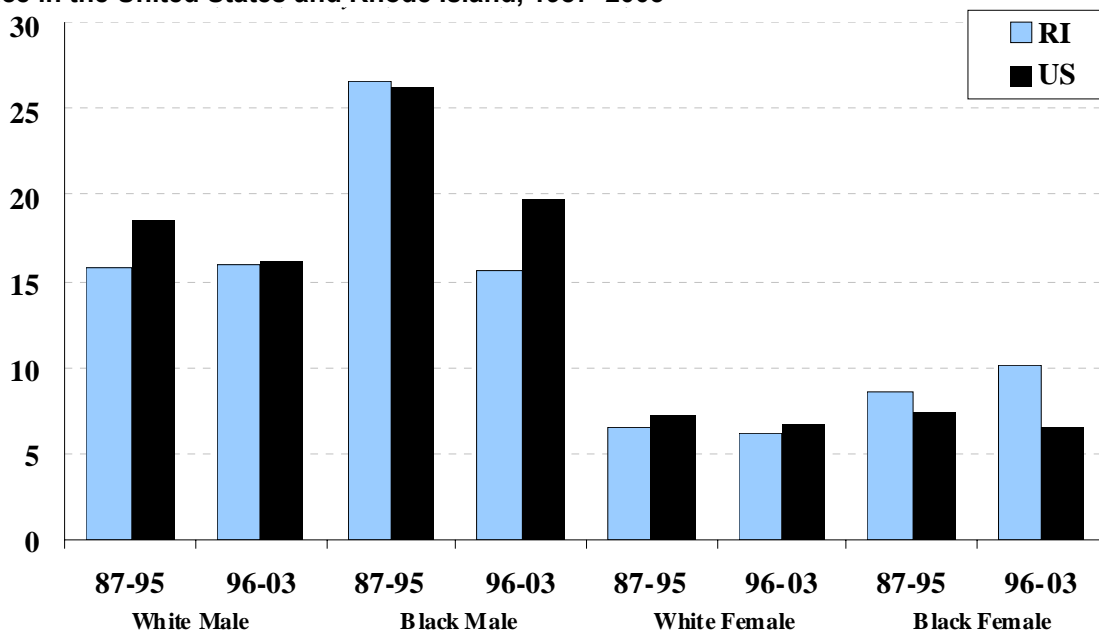
Figure V Source: CDC, National Program of Cancer Registries, United States Cancer Statistics for 2003–2007. Available at <http://apps.nccd.cdc.gov/uscs/cancersbystateandregion.aspx>  
 ~ State Hispanic rate is suppressed because fewer than 16 cases were reported.

Over time, the incidence of oral and pharyngeal cancers has decreased for Black men and increased for Black women in Rhode Island (Figure VI). US incidence rates have declined over time for both White and Black men and women.

Figure VII shows the age-adjusted oral and pharyngeal cancer mortality rates in Rhode Island and the United States by race over last three decades. Both nationally and in Rhode Island, oral cancer mortality rates declined steadily among the White population, with Rhode Island Whites experiencing steeper declines than the national average. The trend data among Black and

Hispanic adults in Rhode Island could not be determined due to the small number of death cases (fewer than 16) reported annually.

**Figure VI. Eight-Year Age-Adjusted Oral and Pharyngeal Cancer Incidence Rates by Gender and Race in the United States and Rhode Island, 1987–2003**



\* Rates are age-adjusted to the year 2000 US standard population, expressed as cases per 100,000 population.

Source: RICR, HEALTH; SEER Public-Use 1973-2003 Data; calculated with *SEER\*Stat*.

**Figure VII. Age-Adjusted Oral and Pharyngeal Cancer Mortality Rates of Both Sexes by Race in the United States and Rhode Island, 1975–2007**

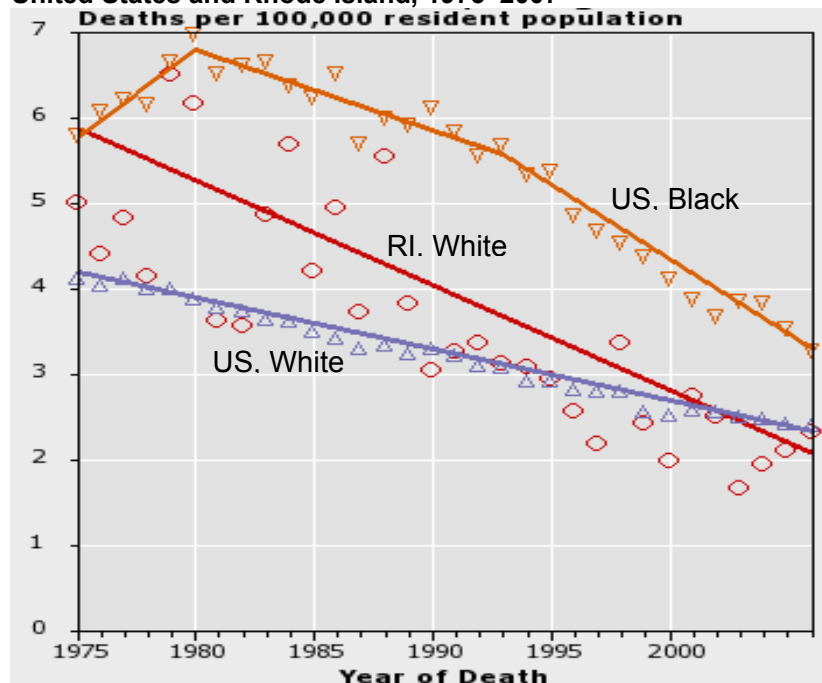


Figure VII Source: CDC/National Cancer Institute, State Cancer Profiles. Available at <http://statecancerprofiles.cancer.gov/index.html>

State Black rate is suppressed because fewer than 16 cases were reported annually.

Early detection and treatment of oral and pharyngeal cancers is critical to improve survival rates. Based on national estimates, the survival rate for adults with localized cancers exceeds 80% but drops to about 50% for those with moderately advanced (regional) diseases, and to less than 30% for those with distant metastases.<sup>27</sup> *Healthy People 2010* set an objective to increase the proportion of oral and pharyngeal cancers detected at an early stage to 50%.<sup>4</sup> Figure VIII presents the proportion of oral cancers detected at an early (localized) stage in the United States and Rhode Island during the period of 2003-2007. To reach the *Healthy People 2010* goal, the state needs to make significant progress.

**Figure VIII. Oral and Pharyngeal Cancer Detection at an Early (Localized) Stage by Gender in the United States and Rhode Island, 2003–2007**

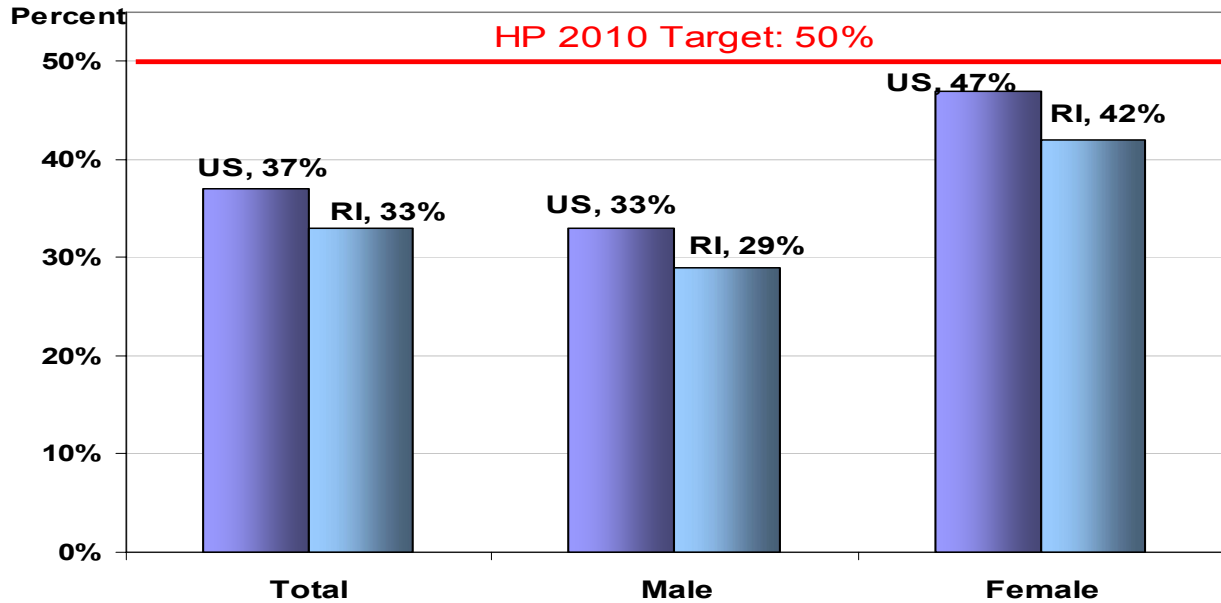


Figure VIII Source: Surveillance Epidemiology and End Results (SEER), 2003–2007. National and State data provided by the Rhode Island Department of Health Cancer Registry

# The Impact of Oral Diseases

## Societal 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 through a compromised ability to bite, chew, and swallow foods, limitations in food selection, and poor nutrition. Oral and craniofacial diseases and conditions include tooth loss, diminished salivary functions, alterations in taste, functional limitations of prosthetic replacements, and oral-facial pain conditions such as temporo-mandibular disorders. Oral-facial pain is a major source of diminished quality of life and 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. Oral 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, laughing, smiling, or other nonverbal expressions that show their mouth and teeth.

## Economic Impact

### Direct Costs

Expenditures for dental services in the United States in 2008 were \$101.2 billion, 4.6% of the total spent on healthcare (\$2,181.30 billion) that year.<sup>28</sup> A large proportion of dental care is paid out-of-pocket by patients. Nationally in 2008, 44% of dental care was paid out-of-pocket, 49% was paid by private dental insurance, and 7% was paid by federal or state government sources. In comparison, 10% of physician and clinical services were paid out-of-pocket, 49% were covered by private medical insurance, and 35% were paid by government sources (Figure IX).

Dental expenditures in Rhode Island amounted to 4.4% of all personal healthcare expenditures in 2004 (\$294 million of a total \$6,682 million), which calculates to an average of \$272 per Rhode Island resident. A negligible amount of the state expenditures were for Medicare-covered dental services. Medicare does not cover routine dental care and will only cover dental services needed by hospitalized elderly patients within very limited conditions. During the 2004 fiscal year, the Medicaid program spent a very small portion (1.5%) of total Medicaid expenditures on dental services (\$22 million of a total \$1,502 million), which calculates to an average of \$139 per Medicaid enrollee.<sup>29</sup> State Medicaid-enrolled children (21 years old and younger) receive comprehensive dental services under Medicaid's Early Periodic Screening, Diagnosis, and Treatment (EPSDT) program. On the other hand, optional dental benefits for poor, elderly, and disabled adult Medicaid enrollees are annually at risk of being cut or eliminated as a cost-saving measure in Rhode Island.

**Figure IX. National Health Expenditures for Dental Services by Source of Fund (unit: billions of dollars)**

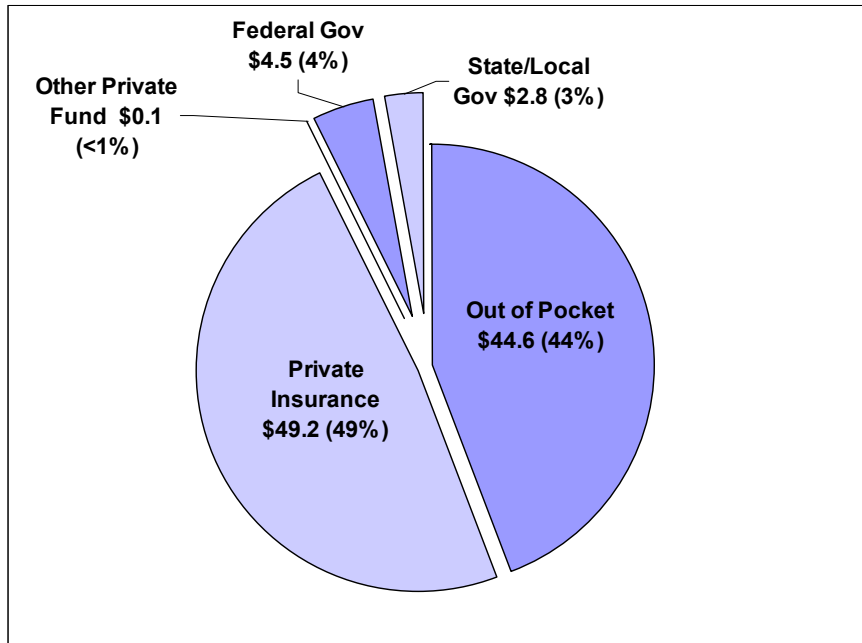


Figure IX Source: Center for Medicare and Medicaid Services. National Health Expenditure Data 2008. Available at <https://www.cms.gov/NationalHealthExpendData/downloads/tables.pdf>

## Indirect Costs

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, US school-aged children missed a total of 1.6 million days of school as a result of acute dental conditions, which is more than three days for every 100 students.<sup>1</sup> 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.

## Oral Diseases 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. These may be the initial signs of clinical diseases and therefore may serve to inform healthcare providers and individuals of the need for further testing. 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 persons with diabetes, and respiratory infection in susceptible individuals,<sup>30,31,32,33,34,35</sup> however, more research is needed in these areas.

## Protective and Risk Factors Associated With Oral Diseases

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

### 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 for 60 years and has been recognized as one of the 10 great achievements in public health of the twentieth century. 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.<sup>1</sup>

Recognizing the importance of community water fluoridation, *Healthy People 2010* Objective 21-9 is to "Increase the proportion of the US population served by community water systems with optimally-fluoridated water to 75 percent." Nationally, approximately 195 million persons (72% of the population served by public water systems) received optimally-fluoridated water in 2008.<sup>12</sup> See Figure X for the percentage of people receiving fluoridated public water by state.

**Figure X. Population on Public Water Systems Receiving Fluoridated Water in the United States and Rhode Island**

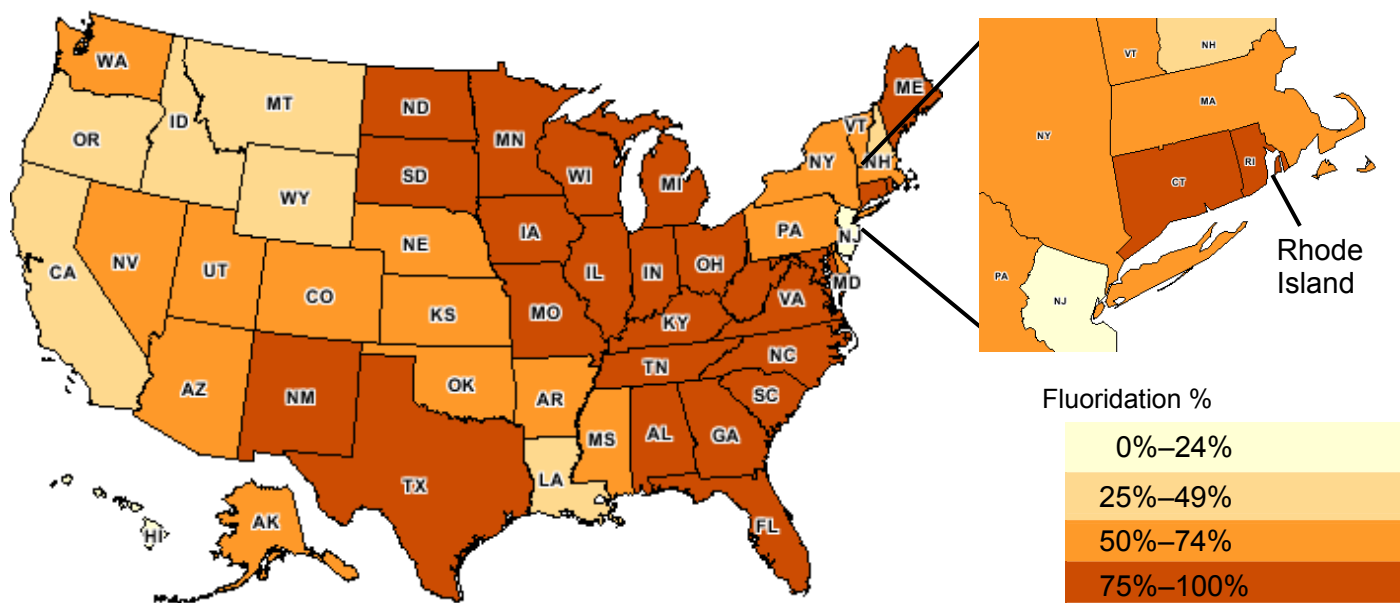


Figure X Source: CDC Oral Health Maps, Water Fluoridation, 2006 National Fluoridation Report. Available at <http://apps.nccd.cdc.gov/gisdoh/waterfluor.aspx>

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.<sup>36</sup> 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.

Rhode Island has enjoyed a highly effective fluoridation program for public water systems: as of 2009, Rhode Island's Community Water Fluoridation program covers 827,000 residents, or 79% of the total population and 88% of the population served by public water systems.<sup>13</sup> More information on the public water systems in Rhode Island communities can be found at the My Water's Fluoride website sponsored by the Centers for Disease Control and Prevention (<http://apps.nccd.cdc.gov/MWF/Index.asp>). The Rhode Island Department of Health participates in the Water Fluoridation Reporting System (WFRS) by uploading monthly public water system data, which is then accessible on the My Water's Fluoride website.

## Topical Fluorides and Fluoride Supplements

Because frequent exposure to small amounts of fluoride each day reduces 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.<sup>37</sup> For communities that do not receive fluoridated water and persons 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, while individual measures include professionally-applied topical fluoride gels or varnish for persons at high risk of caries.

## 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-aged children now occurs in the pits and fissures found on the tooth surfaces of 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. The first set of permanent molars erupts into the mouth at about age six. 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 an appropriate use of fluoride, most tooth decay in children could be prevented.<sup>25</sup>

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% for 8-year-olds and 12-year-olds. Figure XI compares the most recent estimates of Rhode Island children with dental sealants with national data and the *Healthy People 2010* target. Only 36% of Rhode Island third grade children received dental sealants in the 2007-2008 school year, which indicates that the state

needs to make significant progress to meet the *Healthy People 2010* objective of 50%. Comparable data for 14-year-old adolescents are currently not available.

**Figure XI. Dental Sealants among Third Grade Children (8–9 Years Old) in Rhode Island Compared to 8 Year Olds in the United States and to *Healthy People 2010* Targets**

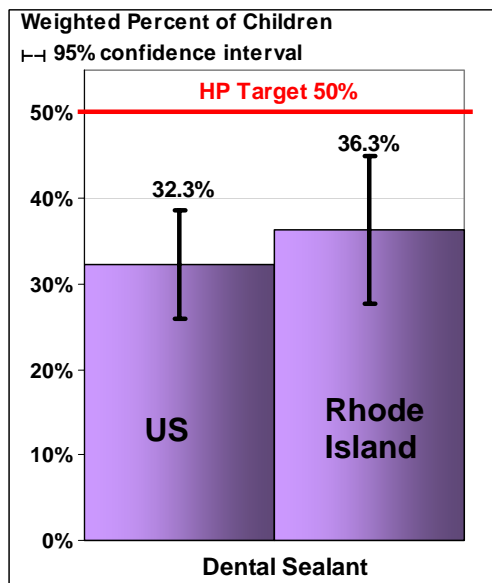


Figure XI Source: US data from the National Health and Nutrition Examination Survey 1999–2004 (Trends in oral health status: United States, 1988–1994 and 1999–2004. National Center for Health Statistics. Vital Health Stat 11(248). 2007.). Rhode Island data from the Oral Health of Rhode Island’s Children. Rhode Island Department of Health, April 2008.

Nationally, the prevalence of sealants varies by race and ethnicity, the education level of the head of household, and family income. Table IV presents the most recent national and state estimates of the proportion of children with dental sealants on one or more molars by selected socioeconomic characteristics. Consistent with national data, disparities still exist in the use of dental sealants on Rhode Island children. Fewer non-Hispanic Black and Hispanic children receive dental sealants than non-Hispanic White children. Children from low-income families are also less likely to receive dental sealants.

Rhode Island uses children’s participation in the free and reduced-price school meals (FRM) program as a proxy indicator of a school’s low-income student concentration. Federal guidelines for family income and size determine FRM program eligibility. Children from families with incomes at or below 130% of the poverty level are eligible for free meals, and children from families with incomes between 130% and 185% of the poverty level are eligible for subsidized meals. About 60% of the lunches in Rhode Island public schools are served free or at the reduced price.<sup>38</sup> The prevalence of dental sealants is lower among Rhode Island children who attend schools with higher proportions of students eligible for FRM.

**Table IV. Children Aged 8 Years in the United States and 3rd Grade Children (8–9 Year Olds) in Rhode Island with Dental Sealants on Molar Teeth by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	32.3 (25.8–38.8)	36.3 (27.7–44.9)
Race/Ethnicity		
Non-Hispanic White	37.7 (28.9–46.5)	39.0 (29.0–49.0)
Non-Hispanic Black	22.6 (16.5–28.7)	28.4 (18.6–38.1)
Hispanic	19.4 (12.1–26.7)	31.3 (15.6–47.0)
Household Income as Percentage of the Federal Poverty Level (FPL)		
< 100% of FPL	21.0 (10.6–31.4)	N/A
100–199% of FPL	25.5 (17.1–33.9)	
≥ 200% of FPL	42.4 (32.6–52.2)	
School's Free and Reduced Meals (FRM) Percentage		
< 33% FRM	N/A	39.5 (27.3–51.7)
33–66.9% FRM		37.4 (19.4–55.3)
≥ 67% FRM		27.2 (5.3–49.0)
Table IV Source: US data from the National Health and Nutrition Examination Survey 1999–2004 (Trends in oral health status: United States, 1988–1994 and 1999–2004. National Center for Health Statistics. Vital Health Stat 11(248). 2007). Rhode Island data from the Oral Health of Rhode Island's Children. Rhode Island Department of Health, April 2008 N/A=Not Available		

## Preventive Visits

Maintaining good oral health takes repeated efforts on the part of the individual, caregivers, and healthcare providers. Daily oral hygiene routines and healthy lifestyle behaviors play an important role in preventing oral diseases. Regular preventive dental care, such as having one's teeth cleaned by a dentist or dental hygienist, can reduce the development of disease and facilitate early diagnosis and treatment.

The Rhode Island Department of Health first collected data on Rhode Island children age 1-17 years who had a dental checkup or teeth cleaning during the 2008 statewide Behavioral Risk Factor Surveillance System survey. Overall, parents reported that 81% of children had a preventive dental visit within the previous 12 months, which indicates that Rhode Island children are receiving preventive dental care more frequently than their national counterparts (Table V). The 2007 National Survey of Children's Health (NSCH) reported that about 78% of children nationally had at least one preventive dental visit in the past year (Table V). Rhode Island children age 1-5 years had the lowest percentage of dental checkup/cleaning visits, a trend that has not changed since 2004.<sup>6</sup> Besides young age, minority status, lower family income levels, public dental insurance coverage, and no dental insurance are strong predictors for fewer preventive dental visits among Rhode Island children (Table V).

**Table V. Children Aged 1–17 Years Who Had a Dental Checkup and Cleaning in the Past 12 Months in the United States and in Rhode Island by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	78.4 (77.6–79.1)	81.1 (78.5–83.8)
<b>Gender</b>		
Male	77.5 (76.5–78.6)	81.5 (77.9–85.0)
Female	79.2 (78.2–80.3)	80.8 (77.0–84.7)
<b>Age (Years)</b>		
1–5	53.5 (51.9–55.2)	48.8 (42.3–55.4)
6–11	89.5 (88.4–90.5)	95.5 (93.4–97.6)
12–17	87.8 (86.8–88.8)	93.9 (91.6–96.1)
<b>Race/Ethnicity</b>		
Non-Hispanic White	80.9 (80.1–81.7)	84.1 (81.3–87.0)
Non-Hispanic Black	78.3 (76.5–80.1)	71.9 (65.7–78.2)
Non-Hispanic Multiracial	77.8 (74.1–81.6)	
Non-Hispanic Other	78.4 (75.4–81.4)	
Hispanic	71.5 (69.2–73.9)	
<b>Parent's Education</b>		
≤ High School	N/A	77.6 (72.5–82.7)
> High School		82.7 (79.7–85.7)
<b>Household Income</b>		
< \$35,000	N/A	72.0 (65.4–78.7)
≥ \$35,000		83.8 (80.9–86.7)
<b>Household Income as Percentage of the Federal Poverty Level (FPL)</b>		
< 100% of FPL	69.2 (67.1–71.3)	N/A
100–199% of FPL	71.9 (70.1–73.8)	
200–399% of FPL	80.7 (79.6–81.8)	
≥ 400% of FPL	86.0 (85.1–87.0)	
<b>Medical Insurance Coverage</b>		
Private insurance	82.4 (81.6–83.2)	87.0 (84.2–89.8)
Medicaid	76.2 (74.7–77.7)	71.7 (62.3–81.1)
Not insured	58.5 (55.4–61.6)	66.3 (56.6–76.0)
Table V Source: US data from the 2007 National Survey of Children's Health. Available at <a href="http://www.nschdata.org/DataQuery/DataQueryResults.aspx">http://www.nschdata.org/DataQuery/DataQueryResults.aspx</a> State data from the Rhode Island Behavioral Risk Factor Surveillance System 2008. N/A=Not Available		

Statewide data indicates that a higher percentage of Rhode Island adults report having had a dental cleaning within the past year, regardless of gender, age, race/ethnicity, education or income level, than adults in the US as a whole (Table VI). Preventive dental visits (measured by the prevalence of teeth cleaning) among Rhode Island adults age 18 years and older remained steady between 1999-2008 (78.9% in 1999 and 78.8% in 2008).<sup>14</sup> Both nationally and in Rhode Island, adults' likelihood of visiting the dentist depends on their dental insurance status, the type of provider they have, and the quality of their plan. For example, Rhode Island adults with Medicare- or Medicaid-covered dental insurance or who lack any type of dental insurance are less likely to have received a preventive dental visit in the past 12 months than those with privately insurance.

**Table VI. Adults Aged 18 Years and Older Who Had Their Teeth Cleaned in the Past 12 Months in the United States and in Rhode Island by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	69.0 (68.7–69.3)	78.4 (76.6–80.3)
<b>Gender</b>		
Male	66.5 (66.0–67.0)	77.8 (74.9–80.8)
Female	71.3 (70.9–71.7)	79.0 (76.8–81.2)
<b>Age (Years)</b>		
18–24	66.2 (64.8–67.6)	71.3 (62.8–79.8)
25–34	62.1 (61.2–63.0)	71.4 (66.0–76.8)
35–44	68.6 (67.9–69.3)	80.0 (76.7–83.3)
45–54	70.1 (69.5–70.7)	82.1 (79.3–84.8)
55–64	73.9 (73.3–74.5)	84.9 (82.3–87.6)
≥ 65	74.2 (73.7–74.7)	80.1 (77.6–82.6)
<b>Race/Ethnicity</b>		
Non-Hispanic White	72.3 (72.0–72.6)	80.8 (78.9–82.8)
Non-Hispanic Black	58.6 (57.4–59.8)	64.7 (57.0–72.5)
Non-Hispanic Multiracial	59.8 (57.0–62.6)	
Non-Hispanic Other	69.1 (67.3–70.9)	
Hispanic	60.8 (59.5–62.1)	63.5 (55.7–71.3)
<b>Education</b>		
Less than High School	48.8 (47.5–50.1)	62.7 (54.5–71.0)
High School Graduate	61.9 (61.2–62.6)	70.0 (66.1–73.9)
Some College	68.7 (68.1–69.3)	80.6 (77.2–84.0)
College Graduate	80.5 (80.0–81.0)	86.1 (83.7–88.6)
<b>Household Income</b>		
< \$15,000	45.6 (44.2–47.0)	50.8 (41.3–60.3)
\$15,000–\$24,999	51.5 (50.5–52.5)	61.4 (55.1–67.8)
\$25,000–\$34,999	59.7 (58.6–60.8)	74.7 (69.0–80.4)
\$35,000–\$49,999	67.1 (66.2–68.0)	71.0 (65.0–76.9)
≥ \$50,000	80.2 (79.8–80.6)	88.0 (86.1–90.0)
<b>Dental Insurance</b>		
Private insurance	N/A	87.5 (85.5–89.5)
Medicare		65.2 (53.4–77.1)
Medicaid		58.9 (41.4–76.4)
Not Insured		62.6 (58.6–66.6)
Table VI Source: CDC Oral Health Resources, National Oral Health Surveillance System. Available at <a href="http://apps.nccd.cdc.gov/nohss/DisplayV.asp?DataSet=2&amp;nkey=10589">http://apps.nccd.cdc.gov/nohss/DisplayV.asp?DataSet=2&amp;nkey=10589</a> State Dental Insurance information was collected from the Rhode Island Behavioral Risk Factor Surveillance System 2008. N/A=Not Available		

## Screening for Oral Cancer

Oral cancer is detected by a thorough examination of the head and neck, including areas of the mouth such as the tongue and the entire oral and pharyngeal mucosal tissues and lips, as well as palpation of the lymph nodes. Although clinical studies have not established the sensitivity and specificity of the oral cancer examination, 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.<sup>39,40,41</sup> If an examination detects suspicious tissues, definitive diagnostic tests, such as biopsies, are needed to confirm diagnosis.

Oral cancer is more common after age 60, and 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.<sup>42</sup> Individuals also should be advised to avoid other potential carcinogens; for example, lip sunscreen and hats are recommended to block sun exposure, which can be a risk factor for lip cancer.<sup>39</sup> Dietary factors (particularly low consumption of fruit) and some types of viral infections may also increase the risk of oral cancer.<sup>43,44,45,46,47,48</sup>

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 aged 40 years and older who, in the past 12 months, report having an examination to detect oral and pharyngeal cancers. In a 2008 national survey, relatively few adults (19%) reported receiving an examination for oral and pharyngeal cancer.<sup>11</sup> During the same year, Rhode Island exceeded the national average, with 41% of Rhode Island adults aged 40 years and older reporting the receipt of an oral cancer examination within the last year (Figure XII, Table VII). Disparities, however, were noted by race/ethnicity, education level, household income, and dental insurance status.

**Figure XII. Adults Aged 40 Years and Older Who Received an Oral and Pharyngeal Cancer Exam within the Past 12 Months in Rhode Island**

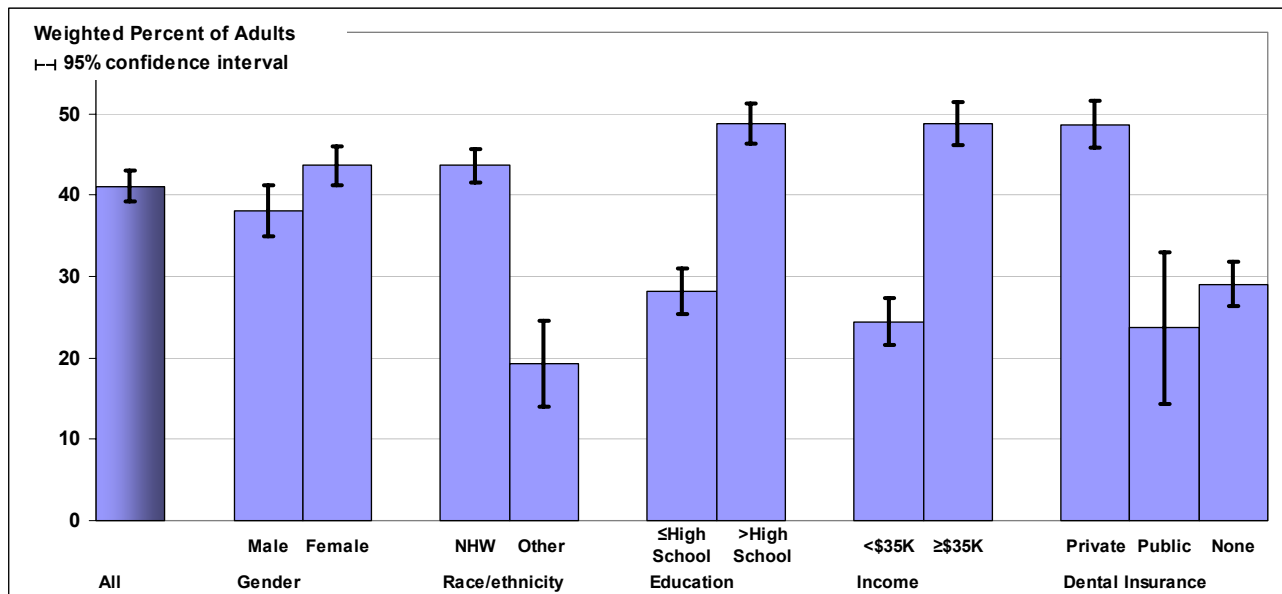


Figure XII Source: Rhode Island Behavioral Risk Factor Surveillance System 2008  
 NHW = Non-Hispanic White

**Table VII. Adults Aged 40 Years and Older Who Reported Having Had an Oral and Pharyngeal Cancer Exam in the Past Year in the United States and Rhode Island by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	18.6 (17.7–19.6)	41.1 (39.1–43.1)
Gender		
Male	17.2 (16.0–18.5)	38.1 (34.9–41.3)
Female	19.9 (18.7–21.0)	43.6 (41.2–46.0)
Race/Ethnicity		
Non-Hispanic White	22.3 (21.0–23.5)	43.6 (41.5–45.7)
Non-Hispanic Black	7.7 (6.1–9.2)	25.4 (17.0–33.7)
Hispanic	6.0 (4.6–7.4)	14.1 (7.2–21.0)
Other	13.2 (10.3–16.1)	
Household Income as Percentage of the Federal Poverty Level (FPL)		
< 100% of FPL	4.4 (3.2–5.7)	N/A
100–199% of FPL	8.2 (6.9–9.5)	
200–399% of FPL	14.1 (12.8–15.3)	
≥ 400% of FPL	28.5 (26.8–30.1)	
Household Income		
< \$35,000	N/A	24.4 (21.5–27.4)
≥ \$35,000		48.8 (46.1–51.4)
Education		
< High School	4.9 (3.8–6.0)	28.2 (25.3–31.0)
High School Graduate	13.3 (12.0–14.6)	
> High School	25.6 (24.2–27.0)	
Dental Insurance		
Yes	27.1 (25.2–29.0)	47.7 (45.1–50.2)
No	15.7 (14.7–16.6)	29.1 (26.3–32.0)
Table VII Source: National data from the National Health Interview Survey 2008. State data from the Rhode Island Behavioral Risk Factor Surveillance System 2008. N/A=Not Available		

## Tobacco Control

Tobacco use has a devastating impact on the health and well-being of the public. Approximately 400,000 Americans die each year as a direct result of cigarette smoking, making it the nation’s leading preventable cause of premature mortality.<sup>49</sup> Additionally, the effects of tobacco use on the economy are alarming: smoking caused \$96 billion in annual federal and state government health care expenditures and \$97 billion of productivity losses in nation.<sup>49</sup> The use of any form of tobacco—including cigarettes, cigars, pipes, and smokeless tobacco—has been established as a major cause of oral and pharyngeal cancer.<sup>42</sup> The evidence is sufficient to consider smoking a causal factor for adult periodontitis; one-half of the cases of periodontal disease in this country may be attributable to cigarette smoking.<sup>50</sup> Tobacco use substantially worsens the prognosis of periodontal therapy and dental implants, impairs oral wound healing, and increases the risk for a wide range of oral soft tissue changes.<sup>51,52</sup>

Rhode Island’s Tobacco Control Program could have a large impact on oral health status. The program works to change the social and physical environment to make it more difficult to start and continue using tobacco, make it easier to quit; and make choosing health the easier choice.<sup>53</sup>

The program's priorities include:<sup>53</sup>

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

## Adolescents

Although Rhode Island has observed a downward trend in tobacco use since 2001, and although a significantly lower percentage of Rhode Island adolescents smoke cigarettes than their national counterparts (Figure XIII), tobacco use is still a serious issue for adolescents. In 2009, 13% of Rhode Island high school students reported smoking at least one cigarette in the past 30 days (Figure XIII, Table VIII), and 19% of those currently used any tobacco product (cigarettes, cigars, chewing tobacco, snuff, or dip). Overall, 17% of middle school students had ever tried cigarette smoking. Rates worsened rapidly as grade levels increased, from 7% for 6th graders to 26% for 8th graders in 2009 (Table IX).

**Figure XIII. High School Students Who Currently Smoked One or More Cigarettes in the Past 30 Days in the United States and Rhode Island, 2001–2009**

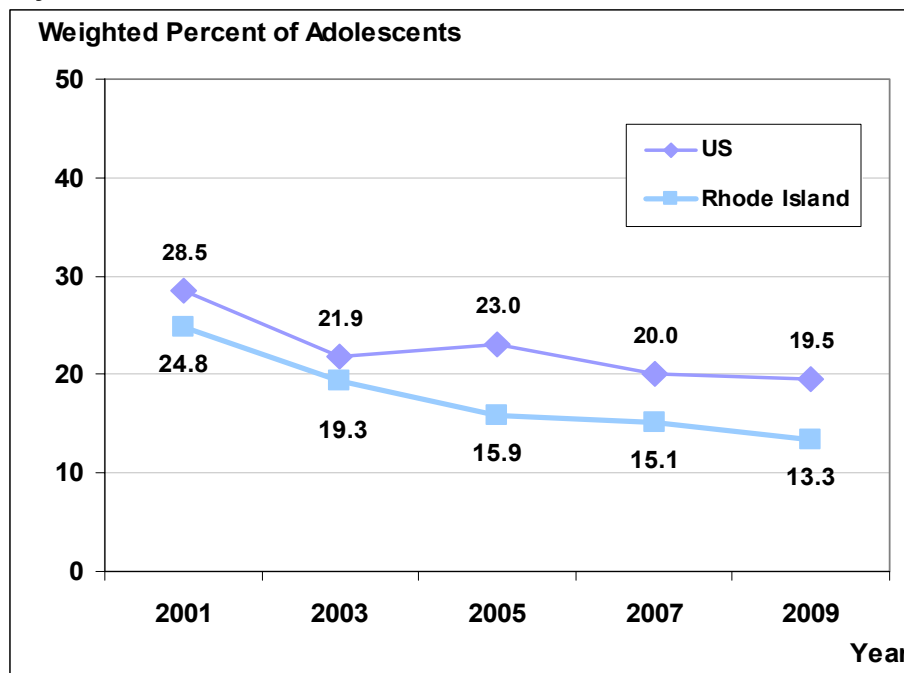


Figure XIII Source: National data from Trends in the Prevalence of Tobacco Use National Youth Risk Behavior Survey: 2001–2009. CDC, National Center for Chronic Disease Prevention and Health Promotion Division of Adolescent and School Health. Available at [http://www.cdc.gov/HealthyYouth/yrbs/pdf/us\\_tobacco\\_trend\\_yrbs.pdf](http://www.cdc.gov/HealthyYouth/yrbs/pdf/us_tobacco_trend_yrbs.pdf)  
State data from the Rhode Island Youth Risk Behavior Survey 2009.

**Table VIII. High School Students Who Smoked One or More Cigarettes in the Past 30 Days in the United States and Rhode Island by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	19.5 (17.9–21.2)	13.3 (10.8–16.3)
<b>Gender</b>		
Male	19.8 (17.8–21.9)	13.3 (11.1–15.9)
Female	19.1 (17.2–21.0)	13.2 (10.0–17.3)
<b>Grade</b>		
9th	13.5 (12.0–15.3)	9.5 (6.4–14.1)
10th	18.3 (15.9–21.0)	11.0 (8.8–13.8)
11th	22.3 (19.6–25.2)	16.5 (11.6–22.8)
12th	25.2 (22.5–28.1)	17.8 (15.0–21.1)
<b>Race/Ethnicity</b>		
Non-Hispanic White	22.5 (20.0–25.2)	15.8 (13.4–18.5)
Non-Hispanic Black	9.5 (8.2–11.1)	6.5 (2.3–16.7)
Hispanic	18.0 (16.0–20.2)	7.7 (4.4–13.3)
Non-Hispanic Other	AI/AN*	37.1 (26.8–48.7)
	Asian	7.5 (5.3–10.5)
	NHOPI†	24.8 (17.4–34.1)
Non-Hispanic Multi-races	19.8 (15.7–24.7)	9.9 (6.2–15.5)

Table VIII Source: National data from Youth Online: High School Youth Risk Behavior Survey. CDC Youth Risk Behavior Surveillance System. Available at <http://apps.nccd.cdc.gov/YouthOnline/App/Results.aspx>  
State data from the Rhode Island Youth Behavior Risk Survey 2009.  
\* AI/AN = American Indian/Alaskan Native  
† NHOPI = Native Hawaiian or Other Pacific Islander (non-Hispanic)

**Table IX. Middle School Students Who Ever Tried Cigarette Smoking in Rhode Island by Selected Characteristics**

	Rhode Island Weighted % (95% CI)*
Total	17.0 (15.0–19.2)
<b>Gender</b>	
Male	17.2 (14.9–19.9)
Female	16.8 (14.4–19.4)
<b>Grade</b>	
6th	7.3 (5.4–9.8)
7th	14.1 (11.4–17.3)
8th	26.1 (22.3–30.3)
<b>Race/Ethnicity</b>	
Non-Hispanic White	13.7 (20.8–34.4)
Non-Hispanic Black	23.4 (17.2–31.0)
Hispanic	25.8 (21.1–31.1)
Non-Hispanic Other	27.1 (20.8–34.4)
Non-Hispanic Multi-races	21.4 (15.2–29.1)

Table IX Source: Rhode Island Youth Behavior Risk Survey 2009  
\*National comparison is not available because not all the states participated in the Middle School YRBS.

## Adults

Both the nation and Rhode Island have observed a significant downward trend in currently-smoking adults (Figure XIV). The percentage of current Rhode Island smokers age 18 years and older (17%) is close to that reported nationally (18%). Rhode Island adults with lower education levels and lower annual household incomes have a higher risk of smoking (Table X).

In Rhode Island, about 64% of adults who are at risk of smoking behavior (i.e., who are current smokers or who have smoked at least 100 cigarettes in their lifetime) report visiting a dentist or dental hygienist during the past 12 months.<sup>8</sup> The dental office provides an excellent venue for providing tobacco intervention services. 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.<sup>54</sup> However, national data from the early 1990s indicated that just 24% of smokers and 18% of smokeless tobacco users who had seen a dentist in the past year reported that their dentist advised them to quit. Since 2009, the Rhode Island Department of Health sponsors a tobacco cessation service in dental offices and facilitates patient referrals to QuitNowRI, the state's tobacco cessation program.

**Figure XIV. Adults Who were Current Smokers\* in the United States and Rhode Island, 2001-2008**

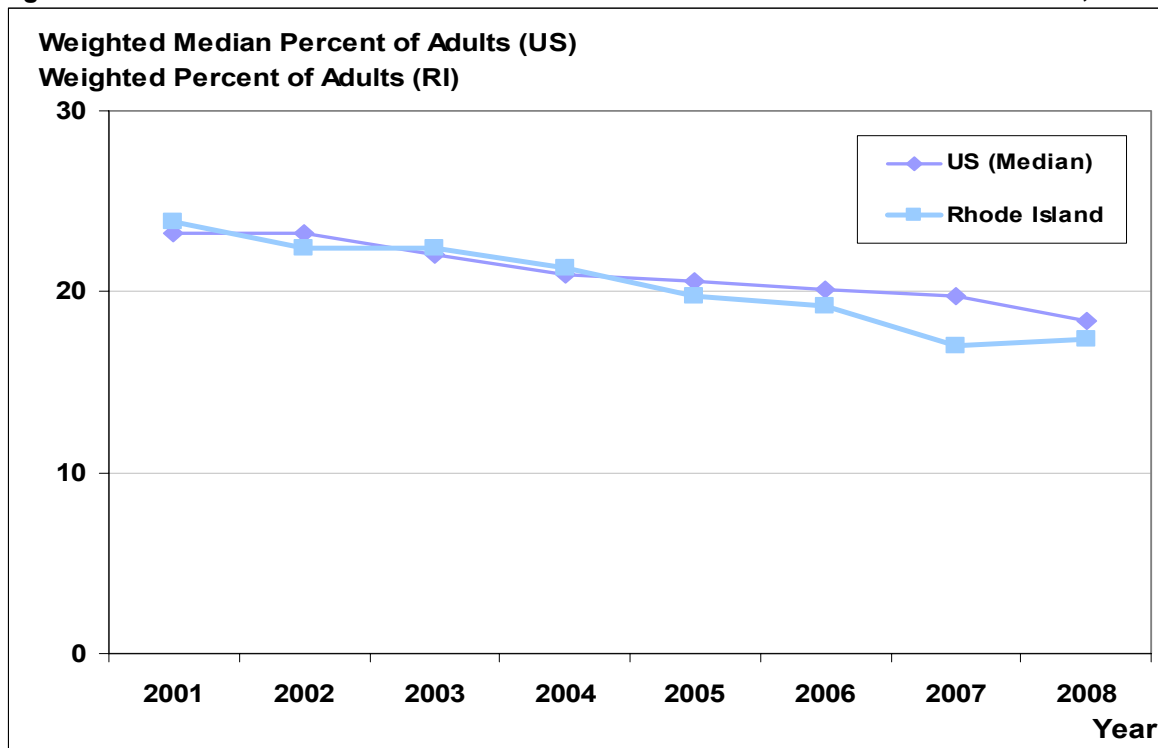


Figure XIV Source: Trends and Data, Nationwide (States and DC) – 2008, CDC Behavioral Risk Factor Surveillance System. Available at <http://apps.nccd.cdc.gov/brfss>

\* Current smokers are defined as adults who have smoked at least 100 cigarettes in their lifetime and who currently smoke.

**Table X. Adults Aged 18 Years and Older) Who are Current Smokers\* in the United States and Rhode Island by Selected Characteristics**

	United States Median %	Rhode Island Weighted % (95% CI)
Total	18.4	17.4 (15.7–19.0)
Gender		
Male	20.3	18.0 (15.2–20.8)
Female	16.7	16.8 (15.0–18.7)
Age (Years)		
18–24	22.3	21.5 (13.4–29.7)
25–34	23.7	20.7 (16.2–25.3)
35–44	20	20.8 (17.4–24.1)
45–54	21	19.2 (16.3–22.0)
55–64	16.8	15.0 (12.5–17.4)
≥ 65	8.2	7.7 (6.2–9.3)
Household Income		
< \$15,000	31	25.5 (18.9–32.2)
\$15,000–\$24,999	27.7	22.4 (17.3–27.5)
\$25,000–\$34,999	22.7	22.7 (17.0–28.4)
\$35,000–\$49,999	20.8	27.2 (21.6–32.8)
≥ \$50,000	13	12.5 (10.6–14.5)
Education		
< High school	30.1	30.0 (22.9–37.1)
High school graduate	24.9	23.9 (20.4–27.4)
Some college	20	20.5 (16.7–24.4)
College graduate	8.8	7.5 (6.1–9.0)
Race/Ethnicity		
Non-Hispanic White	17.9	17.8 (16.0–19.6)
Non-Hispanic Black	21.2	16.5 (9.9–23.1)
Hispanic	15.7	13.1 (8.3–17.9)
Non-Hispanic Other	16	20.3 (11.5–29.0)
Non-Hispanic Multi-races	22.8	
Table X Source: National data from Trends and Data, Nationwide (States and DC) – 2008, CDC BRFSS. <a href="http://apps.nccd.cdc.gov/brfss">http://apps.nccd.cdc.gov/brfss</a> . State data from Rhode Island Behavioral Risk Factor Surveillance System.		
* Current smokers are defined as adults who have smoked at least 100 cigarettes in their lifetime and who currently smoke.		

## 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.<sup>55</sup> Although health information or knowledge alone does not necessarily lead to desirable health behaviors, knowledge may empower people and communities to take action to protect their health.

In 1996, the Rhode Island Department of Education issued *The Rhode Island Health Education Framework Health Literacy for All Students*, which identified a vision for health education in the state as “a comprehensive, sequential, kindergarten through grade 12 program, resulting in students who choose to live healthy lifestyles” and established the following goals:

- Health education is recognized as a core content area in the curriculum;
- Daily health education activities are taught by qualified health educators;
- Schools and communities advocate for the crucial role of health education;
- The school environment is safe and healthy;
- Adults in schools are modeling healthy behaviors;
- Parents are involved in student health education curricula and activities; and
- The community serves as a resource and reinforcement of school health education.<sup>56</sup>

Oral health knowledge and performance are reflected across the K-12 educational continuum in three of the seven recommended standards: Standard 1 (health promotion, disease prevention concepts); Standard 2 (accessing valid health information, products, and services) and Standard 3 (practicing health-enhancing behaviors, reducing health risks). Additionally, the 2003 revision of “Appendix C: Comprehensive Health Instructional Outcomes” to *The Rhode Island Health Education Framework Health Literacy for All Students*, identifies oral health and hygiene and the prevention of oral diseases, such as tooth decay and gingivitis, as instructional standards that students must meet in grade levels K-4 and 5-8.

# Provision of Dental Services in Rhode Island

## Dental Workforce and Capacity

The oral healthcare workforce is critical to society's ability to deliver high-quality dental care in Rhode Island and across 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 workforce.

In the early 2000's, Rhode Island was fortunate to receive federal and foundation funds to support a variety of oral health initiatives. As a result, the Rhode Island Department of Health revitalized the Oral Health Program, the Rhode Island Department of Human Services developed RItE Smiles (the Medicaid Dental Benefit Manager program), community health centers started new or expanded existing dental clinics, and the state developed extensive partnerships focused on improving oral health outcomes for Rhode Islanders, particularly disadvantaged and underserved populations.

Despite these accomplishments, Rhode Island faces oral health workforce challenges along many fronts. First, as of September 2010, more than half (231, or 58%) of actively practicing Rhode Island dentists are approaching retirement age (50 years and older),<sup>57</sup> and the state has a less than optimal supply of dental hygienists, dental assistants, dental laboratory technicians, and expert faculty to train students seeking entry into these professions. Most importantly, these shortages will likely impact the state's most vulnerable populations—families with low income, individuals with special healthcare needs, older adults in nursing facilities, and people of minority race/ethnicity.

Second, Rhode Island does not have a dental school, and 2005 enrollment data indicated that only eight Rhode Islanders were attending out-of-state dental schools.<sup>58</sup> In addition, the University of Rhode Island eliminated its baccalaureate degree program for dental hygienists, and the Community College of Rhode Island remains the only accredited program for dental hygiene and certified dental assistant training in the state.

Third, a significant proportion of the state has insufficient capacity to serve low-income populations. Federal regulation has established criteria to identify geographic areas or population groups that lack dental services. Currently, the federal Bureau of Health Professions has designated all or part of 16 Rhode Island communities as dental health professional shortage areas (DHPSAs) (Figure XV).<sup>59</sup> With no in-state dental school and as more professionals approach retirement age, Rhode Island's dentist shortage will likely grow more critical in the coming years. (Figure XVI).

Figure XV. Dental Health Professional Shortage Areas (DHPSAs) in Rhode Island

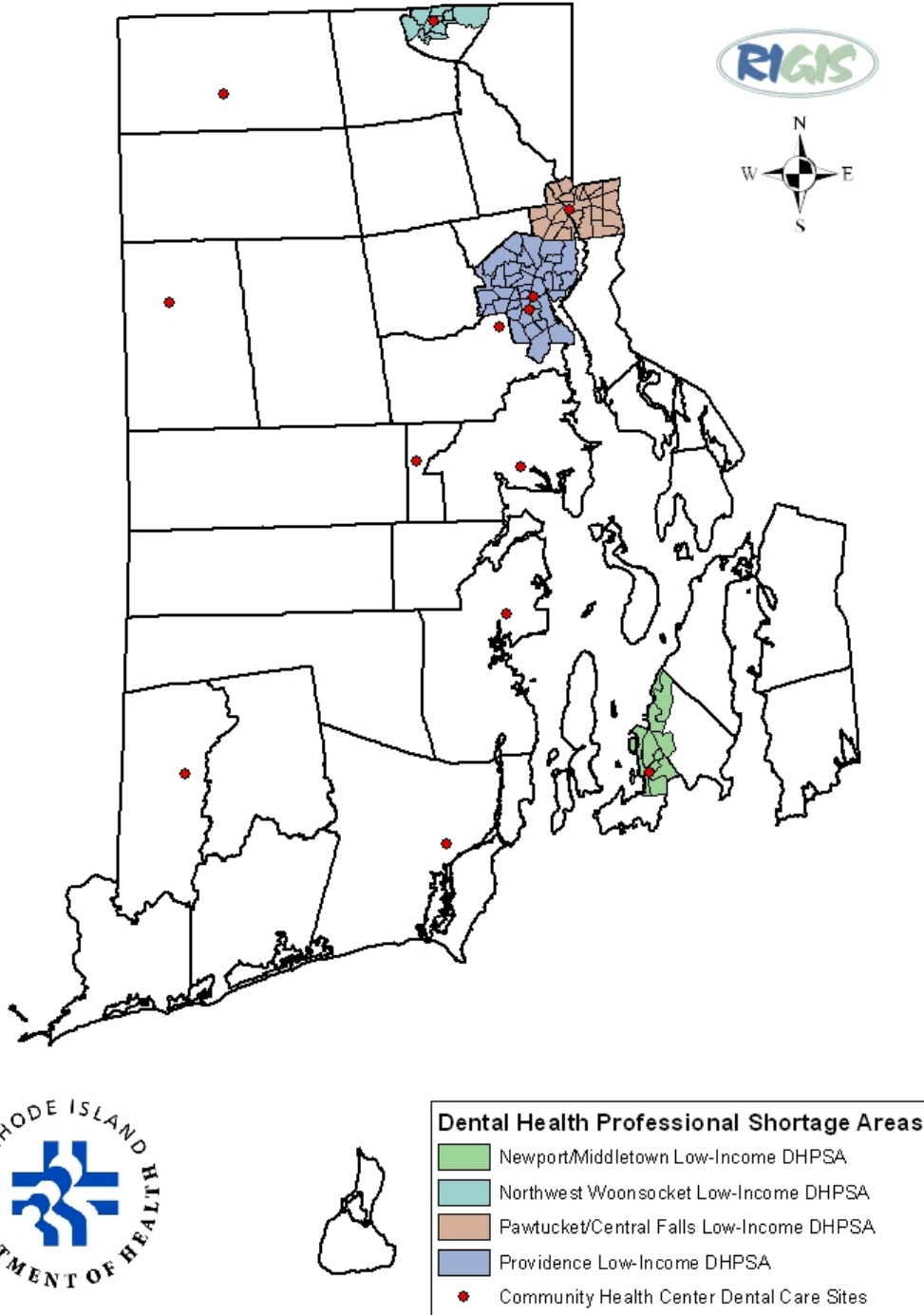


Figure XV Source: Rhode Island Geographic Information System. Mapping based on the current information as of July 2010.

**Figure XVI. Actively Licensed Dentists in Rhode Island by Age (Total dentists\* = 619)**

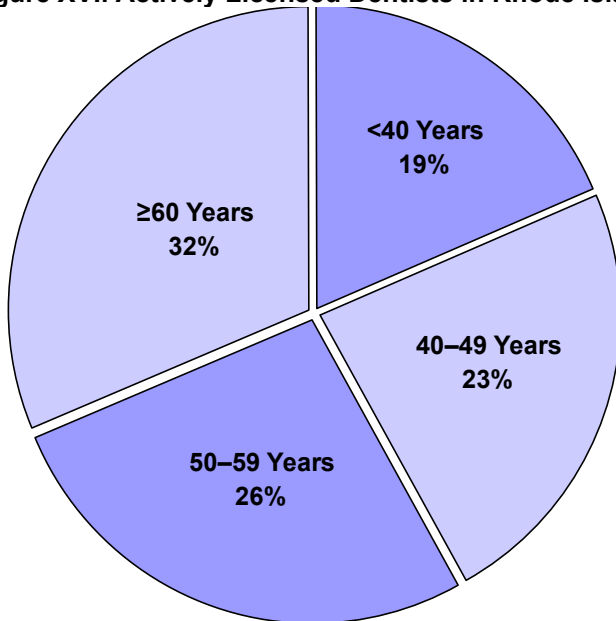


Figure XVI Source: Rhode Island License Database (License2000®) as of September 2010. Rhode Island Office of Health Professions Regulation

\* Dentists whose state licenses are active and who are working in Rhode Island as of September 2010.

## Dentists

As of September 2010, 619 actively licensed dentists were practicing in Rhode Island, or 59 dentists per 100,000 Rhode Island residents. Rhode Island's dentist to population ratio is favorable when compared to the national average (47:100,000).<sup>57</sup> However, dentists are not evenly distributed across the state, and they do not uniformly accept individuals with all types of insurance coverage. The state needs an estimated 35 additional primary care dentists (general and pediatric dentists) to provide oral healthcare to 112,316 underserved residents.<sup>59</sup>

## Registered Dental Hygienists

As of September 2010, 661 actively licensed registered dental hygienists were practicing in Rhode Island.<sup>57</sup> Dental hygienists in Rhode Island practice under "general supervision," which means that a dentist must authorize the procedures to be performed but need not be present while the dental hygienist provides the services. Dental hygienists in other states have less restrictive supervision and can perform expanded functions, such as placement of restorative materials, periodontal dressing, suture removal, and metal restoration polishing. Revisiting regulatory requirements for dental hygienists to expand their roles may allow Rhode Island to improve access to oral healthcare services, particularly for vulnerable populations who are not able to access traditional dental practices, either due to geographical, cultural, or financial barriers.

## Dental Assistants

Rhode Island does not license dental assistants, making it difficult to quantify the number currently practicing in Rhode Island. In 2008, the Rhode Island Department of Labor and Training reported the employment of 1,048 dental assistants in the state.<sup>60</sup> This number is projected to grow to 1,256 by 2018 and include 390 vacancies (208 due to growth and 147 due to replacement). Without licensure, continuing education is not required; therefore, mastery of topics,

such as infection control and radiation health and safety, whose content changes over time, is not a requirement for employment.

## Dental Laboratory Technologists

Rhode Island does not license dental laboratory technologists, making it difficult to quantify the number currently practicing in Rhode Island. The Rhode Island Department of Labor and Training estimated that 80 dental laboratory technologists were working in Rhode Island in 2009. This low number prevents the Department from providing labor projections through 2018.<sup>60</sup>

## Dental Workforce Diversity

One cause of oral health disparities is lack of access to oral health services among under-represented minorities. Increasing the number of dental professionals from under-represented racial and ethnic groups is viewed as an integral part of the solution to improving access to care.<sup>4</sup> Data on the race/ethnicity of dental care providers were derived from surveys of professionally active dentists conducted by the American Dental Association.<sup>61</sup> In 1997, 1.9% of active dentists in the United States identified themselves as Black or African American, although that group comprised 12.1% of the US population. Hispanic/Latino dentists comprised 2.7% of US dentists, compared to 10.9% of the US population.

While the Rhode Island licensure process does not include the reporting of race/ethnicity data, people of minority race/ethnicity are under-represented overall in the state's oral health professions and existing training programs. In addition, only about 30% of currently licensed dentists are women.<sup>57</sup> Limited diversity among the oral health workforce serves as a significant barrier to care for under-served Rhode Islanders, especially racial and ethnic minority populations living in the state's six core cities. (A "core city" is defined as any city where the child poverty level is greater than 15%, according to the 2000 Census.)

## Use of Dental Services

Although appropriate home oral healthcare and population-based prevention are essential, professional care is also necessary to maintain optimal dental health. Regular dental visits provide an opportunity for the early diagnosis, prevention, and treatment of oral diseases and conditions for people of all ages, and for the assessment of self-care practices.

## Children

The American Academy of Pediatric Dentistry (AAPD), the American Dental Association (ADA), and the American Association of Public Health Dentistry (AAPHD) all recommend that the first dental visit should occur by age one year.<sup>62,63,64</sup> Previous studies have shown the benefits of earlier dental visits and having a dental home for children by this age.<sup>65,66,67</sup> Children with an early visit were more likely to have subsequent dental visits and obtain age-appropriate preventive dental care. They also avoided expensive restorative and emergency dental treatment in later years, which ultimately lead to significant savings in dental expenditures.<sup>65,67</sup>

In 2008, 83% of Rhode Island children age 1-17 years reportedly visited a dentist or dental clinic within the previous 12 months (Figure XVII). This makes Rhode Island children more likely than their national counterparts to have visited a dentist in the past year (Table XI); however, disparities remain. Groups of children less likely to have seen a dentist included those 1-4 years

old (43%), those not identified as non-Hispanic White (76%), those with a family income of less than \$35,000 (75%), those enrolled in Medicaid (74%), and those without any dental insurance coverage (Figure XVII).

**Figure XVII. Children Aged 1–17 Years Who Reportedly Visited a Dentist or Dental Clinic in the Past 12 Months in Rhode Island by Selected Characteristics**

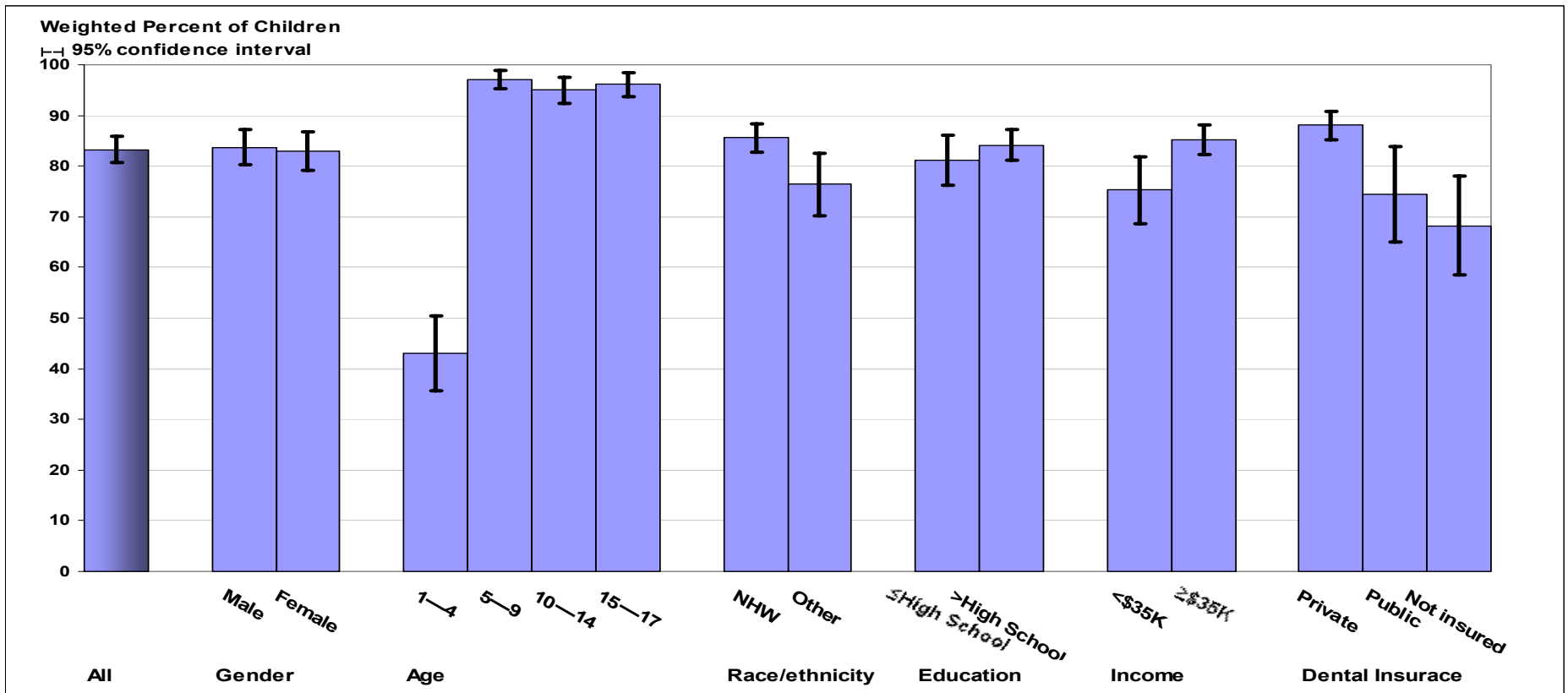


Figure XVII Source: Rhode Island Behavioral Risk Factor Surveillance System 2008.  
 NHW = Non-Hispanic White, Education and Income categories are from parents' information.

**Table XI. Children Aged 2–17 Years Who Reportedly Visited a Dentist or Dental Clinic in the Past 12 Months in the United States and Rhode Island by Selected Characteristics**

	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	77.3 ( 76.1–78.4)	87.8 (85.6–90.0)
<b>Gender</b>		
Male	76.4 ( 74.7–78.1)	88.2 (85.1–91.3)
Female	78.2 (76.7–79.6)	87.4 (84.1–90.7)
<b>Age (Years)</b>		
2–4	49.4 ( 46.4–52.3)	52.5 (44.1–60.9)
5–7	80.6 ( 78.1–83.2)	96.1 (93.6–98.6)
8–10	85.7 ( 83.6–87.7)	97.4 (95.0–99.8)
11–13	85.3 ( 83.3–87.3)	95.4 (92.3–98.5)
14–17	84.0 ( 82.3–85.6)	95.8 (93.8–97.8)
<b>Race/Ethnicity</b>		
Non-Hispanic White	79.9 ( 78.3–81.5)	89.3 (86.9–91.7)
Non-Hispanic Black	76.6 ( 73.8–79.4)	82.6 (76.9–88.3)
Non-Hispanic Other	76.7 ( 72.7–80.7)	
Hispanic	69.8 ( 67.7–71.9)	
<b>Household Income</b>		
< \$35,000	N/A	83.0 (77.1–88.9)
≥ \$35,000		88.8 (86.3–91.3)
<b>Household Income as Percentage of the Federal Poverty Level (FPL)</b>		
< 100% of FPL	69.4 ( 66.4–72.4)	N/A
≥ 100% of FPL	78.6 ( 77.4–79.9)	
<b>Parents' Education Level</b>		
< High School	64.3 ( 60.7–67.9)	87.5 (83.4–91.6)
High School	70.6 ( 67.9–73.2)	87.9 (85.2–90.6)
> High School	81.4 ( 80.0–82.7)	
<b>Dental Insurance</b>		
Private insurance	N/A	91.1 (88.7–93.5)
Medicaid		83.4 (75.4–91.4)
Not Insured		72.9 (63.3–82.5)
Table XI Source: National Data from National Health Interview Survey 2008. NIDCR/CDC, Data Resource Center Oral Health Data Query System. Available at <a href="http://apps.nccd.cdc.gov/dohdrc/dgs/entry2.html">http://apps.nccd.cdc.gov/dohdrc/dgs/entry2.html</a> . State Data from Rhode Island Behavioral Risk Factor Surveillance System N/A=Not Available		

## Adults

Adults who do not receive regular professional care can develop oral diseases that eventually require complex treatment and may lead to tooth loss and health problems. People who have lost all their natural teeth are less likely to seek periodic dental care than those with teeth, which, in turn, decreases the likelihood of early detection of oral cancer or soft tissue lesions from medications, medical conditions, and tobacco use, as well as from poor-fitting or poorly maintained dentures.

Table XII compares the proportions of US and Rhode Island adults who have reported visiting a dentist within the past 12 months. Overall, Rhode Island exceeds the national median (73%), with

79% of Rhode Island adults reporting a dental visit during the last year. Consistent with the national pattern, however, Rhode Island adults with less education, lower household incomes, and of racial and ethnic minority groups are less likely to have visited a dentist or dental clinic within the last year.

Adult dental insurance coverage also is a strong predictor of whether a Rhode Island adult has visited a dentist or dental clinic within the past 12 months. In 2008, Rhode Island adults age 18 years and older with private insurance that covered dental services were more likely to have visited a dentist or dental clinic in the previous year (87.9%) than those who received their dental coverage through Medicaid (63.8%) or Medicare (64.1%), and those without dental insurance (60.3%) (Figure XVIII).

**Table XII. Adults Aged 18 Years and Older Who Reportedly Visited a Dentist or Dental Clinic in the Past 12 Months in the United States and Rhode Island by Selected Characteristics**

	United States Median %	Rhode Island Weighted % (95% CI)
Total	71.3	79.0 (77.4–80.7)
<b>Gender</b>		
Male	68.9	78.3 (75.5–81.0)
Female	72.9	79.8 (77.8–81.8)
<b>Age (Years)</b>		
18–24	70.3	76.3 (68.5–84.1)
25–34	67.4	74.8 (69.5–80.0)
35–44	72.6	82.1 (78.9–85.2)
45–54	73.2	84.5 (81.9–87.1)
55–64	74.6	82.4 (79.7–85.2)
≥ 65	67.8	73.3 (70.7–75.8)
<b>Race/Ethnicity</b>		
Non-Hispanic White	73.5	81.0 (79.3–82.8)
Non-Hispanic Black	62.1	N/A
Hispanic	61.1	70.1 (62.8–77.5)
Non-Hispanic Other	70.5	N/A
Non-Hispanic Multi-racial	68.9	N/A
<b>Household Income</b>		
< \$15,000	47.7	54.6 (46.3–62.9)
\$15,000—\$24,999	53.9	63.7 (58.1–69.3)
\$25,000—\$34,999	61.6	73.3 (68.0–78.6)
\$35,000—\$49,999	70.0	74.0 (68.5–79.6)
≥ \$50,000	82.3	88.8 (86.9–90.6)
<b>Education Level</b>		
< High school	49.2	62.5 (55.6–69.3)
High school graduate	64.4	71.0 (67.5–74.6)
Some college	70.8	81.7 (78.5–84.9)
College graduate	82.0	87.2 (84.8–89.6)
Table XII Source: Behavioral Risk Factor Surveillance System 2008, CDC Oral Health Resources, National Oral Health Surveillance System. Available at <a href="http://apps.nccd.cdc.gov/brfss">http://apps.nccd.cdc.gov/brfss</a>		
N/A = Not available if the unweighted sample size for the denominator was < 50		

**Figure XVIII. Adults Aged 18 and Older Who Reportedly Visited a Dentist or Dental Clinic in the Past 12 Months in Rhode Island by Dental Insurance Type**

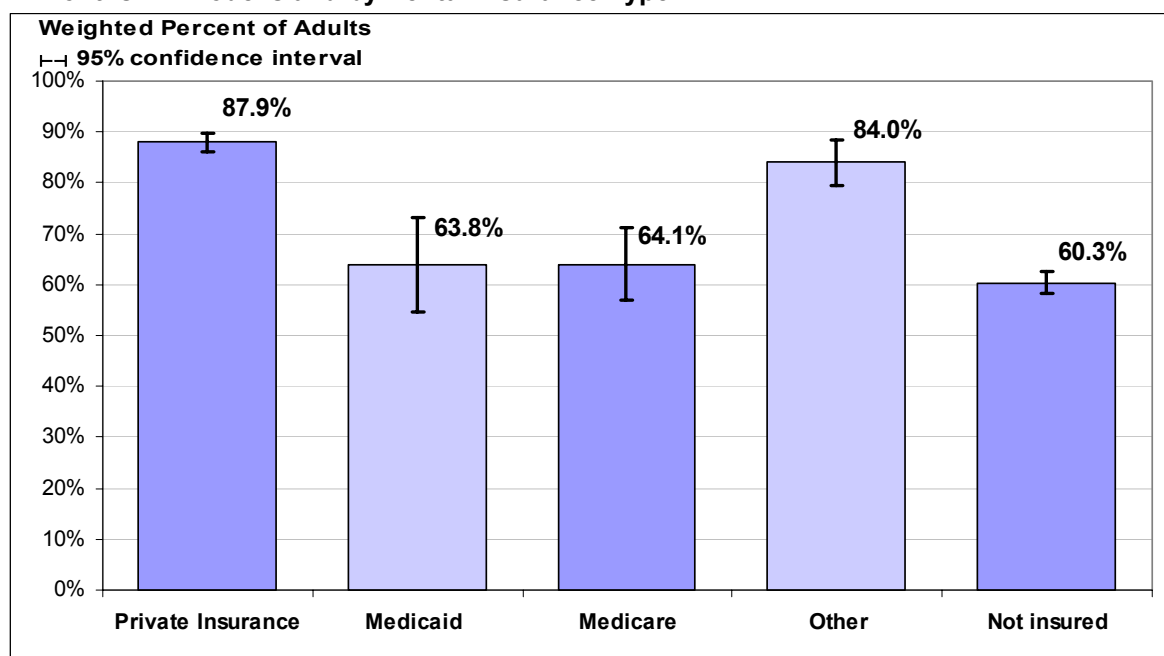


Figure XVIII Source: Rhode Island Behavioral Risk Factor Surveillance System 2008

## Special Populations

### Children with Special Healthcare Needs (CSHCN)

Approximately 10 million US children age 0-17 years have special healthcare needs.<sup>68</sup> Of that number, approximately 42,000 live in Rhode Island.<sup>69</sup> This means that an estimated 17% of Rhode Island children ages 0-17 years have special healthcare needs, as compared with 14% nationally. According to a national survey on children with special healthcare needs, 25% of all households in Rhode Island included one or more CSHCN between 2005 and 2006.<sup>68</sup> The prevalence increased with age: 10% of children younger than the age of five, 20% of children ages 6-11 years, and 21% of children ages 12-17 had special healthcare needs. More than a third (35%) of Rhode Island households with one or more CSHCN had household incomes below 200% of the federal poverty level.

Rhode Island's most vulnerable populations, including CSHCN, have higher disease rates and more limited access to high-quality oral health services. More than 80% of CSHCN needed preventive dental care in the past year nationally. In Rhode Island, about a quarter of them needed other types of dental care, too (Table XIII). Dental care was the health service most often reported as needed but not received; nationally and in Rhode Island, more than 6% and 4% of CSHCN, respectively, needed preventive dental care but did not receive it.<sup>68</sup>

Access to health insurance is especially important for CSHCN. Fortunately, Rhode Island ranks the 19<sup>th</sup> in the country, with 92.3% of children age under 18 were insured between 2007 and 2009.<sup>70</sup> Children who meet certain disability criteria are eligible for Medicaid and/or cash assistance through the federal Supplemental Security Income (SSI) program. As of December 31, 2010, 6,129 Rhode Island children youth under age 21 were receiving Medical Assistance benefits through the SSI program.<sup>70</sup> Additionally, the Katie Beckett eligibility provision provides

Medical Assistance coverage to certain children who have serious disabling conditions to enable care at home rather than in an institution. As of December 31, 2006, 1,138 Rhode Island children younger than age 19 were eligible for and enrolled in Medical Assistance through the Katie Beckett provision.<sup>70</sup>

**Table XIII. Children with Special Healthcare Needs Who Needed Preventive and Other Dental Care in the Past 12 Months in the United States and Rhode Island by Selected Characteristics**

	Preventive Care Needs		Other Dental Care Needs	
	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)	United States Weighted % (95% CI)	Rhode Island Weighted % (95% CI)
Total	81.1 (80.4–81.8)	84.4 (81.3–87.5)	24.2 (23.5–24.9)	26.2 (22.7–29.7)
<b>Age (Years)</b>				
0–5	52.9 (51.0–54.8)	55.4 (45.7–65.0)	8.1 (7.1–9.2)	N/A
6–11	89.1 (88.3–90.0)	93.5 (90.0–96.9)	23.9 (22.8–25.0)	27.8 (21.9–33.6)
12–17	88.1 (87.2–88.9)	88.6 (84.3–93.0)	32.5 (31.3–33.7)	32.5 (27.1–37.9)
<b>Race/Ethnicity</b>				
Non-Hispanic White	84.0 (83.2–84.7)	85.4 (81.8–88.9)	26.9 (26.0–27.7)	27.4 (23.5–31.3)
Non-Hispanic Black	74.6 (72.5–76.6)	95.4 (89.1–100.0)	15.6 (13.9–17.2)	N/A
Hispanic	75.6 (73.2–77.9)	74.4 (64.0–84.8)	20.7 (18.3–23.1)	18.6 (9.8–27.3)
Non-Hispanic Other	78.7 (74.6–82.8)	87.3 (68.2–100.0)	25.7 (21.2–30.3)	N/A
Non-Hispanic Multi-racial	80.2 (76.8–83.6)	76.5 (58.4–94.6)	25.6 (21.9–29.4)	N/A
<b>Household Income as Percentage of the Federal Poverty Level (FPL)</b>				
< 200% of FPL	74.1 (72.9–75.3)	78.8 (73.0–84.6)	18.8 (17.8–19.9)	21.5 (15.7–27.4)
200%–299% of FPL	82.4 (80.8–84.0)	88.1 (82.4–93.8)	24.2 (22.5–25.9)	29.5 (21.4–37.6)
300%–399% of FPL	85.2 (83.7–86.6)	85.2 (77.7–92.7)	25.8 (24.0–27.5)	28.0 (19.7–36.3)
≥ 400% of FPL	88.5 (87.6–89.5)	91.3 (87.5–95.0)	31.1 (29.7–32.5)	31.3 (25.4–37.2)
Table XIII Source: Child and Adolescent Health Measurement Initiative. National Survey of Children with Special Health Care Needs 2005/06, Data Resource Center for Child and Adolescent Health website. Retrieved from <a href="http://www.cshcndata.org">www.cshcndata.org</a>				
N/A = Sample sizes are too small to meet standards for reliability or precision.				

### Adults with Special Healthcare Needs

Nationally, more than 54 million people qualify as disabled under the Americans with Disabilities Act. Several smaller-scale studies show that people with intellectual or developmental disabilities need treatment for dental decay and periodontal disease more frequently than the general population. They also have significantly higher rates of poor oral hygiene.<sup>1</sup> The oral health problems of individuals with special healthcare needs are complex and may be due to underlying congenital anomalies. (For example, they may be less able to understand and physically perform personal preventive practices.) People with special healthcare needs may also have trouble obtaining the personal and professional healthcare services needed to maintain oral health. According to fiscal year 2007 Rhode Island Medicaid enrollment information, 40,600 disabled adults ages 64 years and younger were eligible for Medicaid, which constituted 21% of total Rhode Island Medicaid enrollees.<sup>71</sup> Statewide data are presently not available on oral disease prevalence and oral health access among individuals with disabilities.

### Pregnant Women

Studies documenting the effects of hormones on the oral health of pregnant women suggest that 25-100% of these women experience gingivitis, and up to 10% may develop more serious oral

infections.<sup>72,73</sup> Recent evidence suggests that oral infections such as periodontitis during pregnancy may increase the risk of preterm or low birth weight deliveries.<sup>32</sup> During pregnancy, a woman may be particularly amenable to disease prevention and health promotion interventions that could enhance her health or that of her fetus.<sup>74</sup>

Rhode Island included oral health questions in Phase VI of its 2009 Pregnancy Risk Assessment Monitoring System and collected information on i) if a woman needed to see a dentist for any dental problem, ii) if a woman visited a dentist or dental clinic, and iii) if a dental or other healthcare worker talked about dental care during pregnancy. The analysis and reporting process are in progress.

### **Adults with Diabetes**

Adults with diabetes have a higher prevalence of periodontal disease, as well as more severe forms of the disease. Diabetes is also recognized as an important risk factor for more severe and progressive periodontal disease, resulting in the destruction of tissues and supporting bone around the tooth.<sup>75</sup> Regular dental visits provide opportunities for prevention, early detection, and treatment of periodontal disease among diabetics. One of the Healthy People 2010 diabetes-related objectives is to increase the percentage of diabetes who receive an annual dental examination to 71%.

In 2008, 67% of Rhode Island adults with diabetes reportedly visited dentist, dental clinic, or dental hygienist for any reason during the year, which was significantly lower than that of dental visits reported by adults without diabetic conditions (79%).<sup>8</sup>

### **People with HIV/AIDS**

Mouth symptoms and problems (e.g. thrush, warts, gum/periodontal disease, etc.) are common for the people with HIV/AIDS, but also important clinical indicators of disease development and progression.<sup>76</sup> Thus, access to oral healthcare for routine cleaning and assessment is critical both for people at risk of HIV infection and for people living with HIV. In one study, people living with HIV had twice as many unmet dental needs as unmet medical needs<sup>77</sup>. Oral health status and dental care needs of the HIV/AIDS population have not been monitored at the state level.

### **Older Adults**

Adults older than age 65 have the highest out-of-pocket dental expenses of all age groups. Unfortunately, many elders cannot afford routine dental care, since insurance coverage for dental services through Medicare and Medicaid is virtually non-existent.

Approximately 13% of Americans are age 65 years and older, and similarly 13% of Rhode Islanders (148,449) are age 65 years and older according to the 2005–2009 population estimates.<sup>78</sup> The state ranks eleventh in the nation for individuals age 65 years and older, and seventh for those age 85 years and older. One in four (21.3%) RI senior adults age 65 years and older are living below 150% of the federal poverty level (FPL).

Unfortunately, Rhode Island has a dearth of current elder-specific oral disease data. The Rhode Island Behavioral Risk Factor Surveillance System, an annual telephone survey conducted by the Rhode Island Department of Health, is the primary source of information on the oral health status and needs of the state's older adults, although the survey does not include institutionalized elders.

The decrease in prevalence of edentulism (complete tooth loss) among senior adults indicates an increased adoption of preventive regimens and access to dental care providers. (See details in Section III.) However, 28% of adults 65 years and older reported that their last dental visit was one or more years ago, and 54% reported that they lacked dental insurance coverage in 2008. The indicators have remained relatively unchanged since 2000 (Figure XIX, XX).

**Figure XIX. Older Adults Aged 65 Years and Older Who Visited a Dentist or Dental Clinic in the Past 12 Months in Rhode Island, 2002–2008**

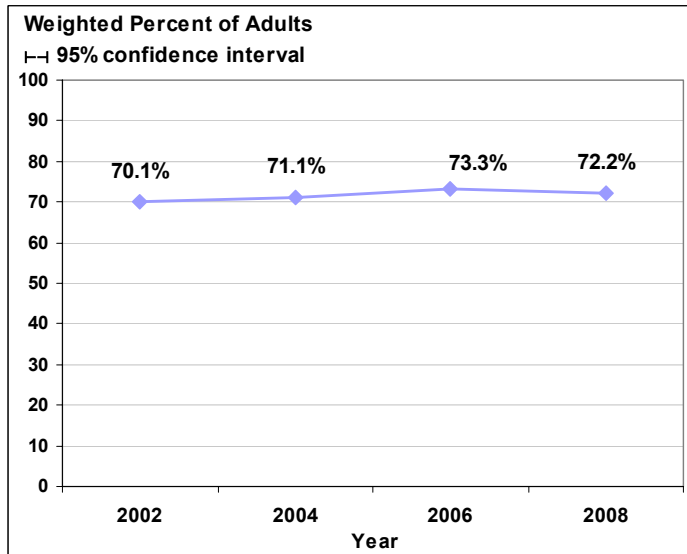


Figure XIX Source: Rhode Island Behavioral Risk Factor Surveillance System, 2002–2008

**Figure XX. Older Adults Aged 65 Years and Older Who Had Dental Insurance in Rhode Island, 2002–2008**

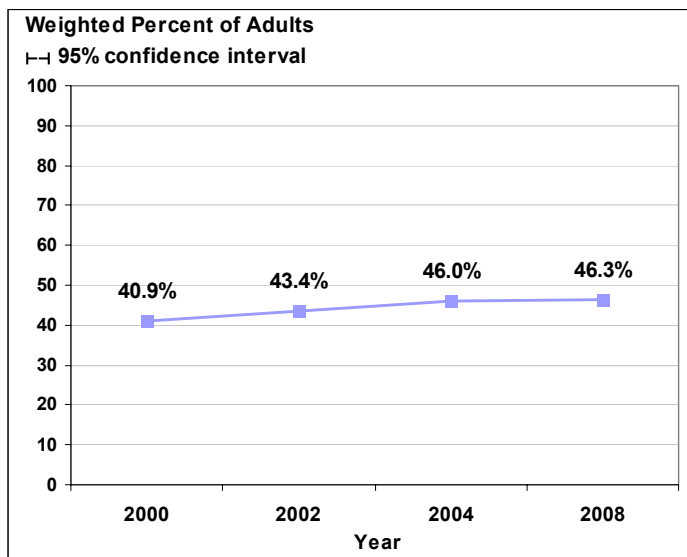


Figure XX Source: Rhode Island Behavioral Risk Factor Surveillance System, 2002–2008  
Dental insurance question was not included in 2006.

## Dental Medicaid Program

Medicaid is the primary source of healthcare for low-income families, the elderly, and people with special needs 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 long-term care assistance to people who meet certain eligibility criteria. Eligibility is determined based on state and national criteria. Dental services are a required service for most Medicaid-eligible individuals younger than age 21, as a required component of the Early and Periodic Screening, Diagnosis, and Treatment (EPSDT) benefit. Services must include a minimum of relief of pain and infections, restoration of teeth, and/or maintenance of dental health. Dental services may not be limited to emergency services for EPSDT recipients.

To increase the access to dental services for the state's children, Rhode Island launched Rlte Smiles, the Medicaid Dental Benefit Manager program, in 2006 to:

- increase access to dental care for children enrolled in Rlte Care,
- promote development of good oral health behaviors focusing on preventive care,
- decrease the need for relatively more expensive restorative and emergency dental care, and
- ultimately save Medicaid expenditures for oral healthcare.

Based upon the Rlte Care Medicaid delivery system, the Rlte Smiles program is administered by UnitedHealthcare Dental and financed through reallocated Medicaid dental funds. Children eligible for the program must have been born on or after May 1, 2000, be eligible for Medical Assistance, and not have other dental coverage. Coverage includes a wide variety of types of care, including preventive (cleaning, fluoride), diagnostic, restorative (fillings and crowns), endodontics (root canals), oral surgery (extractions and mouth surgery), orthodontics, periodontics and prosthodontics (specialized replacement of missing teeth). Since the Rlte Smiles inception, the number of dentists participating in Medicaid statewide has increased from 27 to 180. As of 2011, these 180 dentists provide services at 278 different locations. More encouragingly, every pediatric dentist in Rhode Island is a participating Rlte Smiles provider.<sup>79</sup>

With the implementation of Rlte Smiles in 2006, children's access to both preventive and restorative dental care increased (Figure XXI, Figure XXII). The more notable increase in children's receipt of preventive services is partly attributed to the program's emphasis on the provision of these services. However, a gap still exists between Medicaid-enrolled children and Rhode Island's overall child population, particularly among children age 1-4 years. In this age group, less than 20% of Rlte Smiles beneficiaries received at least one preventive dental service in the past 12 months, compared to about 40% of Rhode Island children overall who reportedly received a routine checkup or cleaning.<sup>8</sup>

The Medicaid fee-for service program covers children outside the targeted Rlte Smiles age group. Although Rlte Smiles reimbursement rates are close to the Preferred Provider Organization (PPO) rates in Rhode Island, the Medicaid fee-for-service program reimburses at lowest level in New England region.<sup>70</sup> Significant participation in Rlte Care at any level is a financial burden for many dentists,<sup>80</sup> and several areas of the state report a limited number of providers serving Rlte Care enrollees and few dental specialists. Dentists who do not participate in Rlte Care cite low reimbursement rates, administrative issues, high "no show" rates, and language barriers as the rationale for non-participation. Rlte Care enrollees cite lack of transportation, inability to find a

participating provider, fear, inadequate coverage, and the attitude of dentists/staff as the most frequent barriers to accessing dental services.<sup>81</sup>

**Figure XXI. Medicaid-Enrolled Children (Age 0–6 Years) Who Received at Least One Preventive Dental Visit a Year in Rhode Island, 2002–2008**

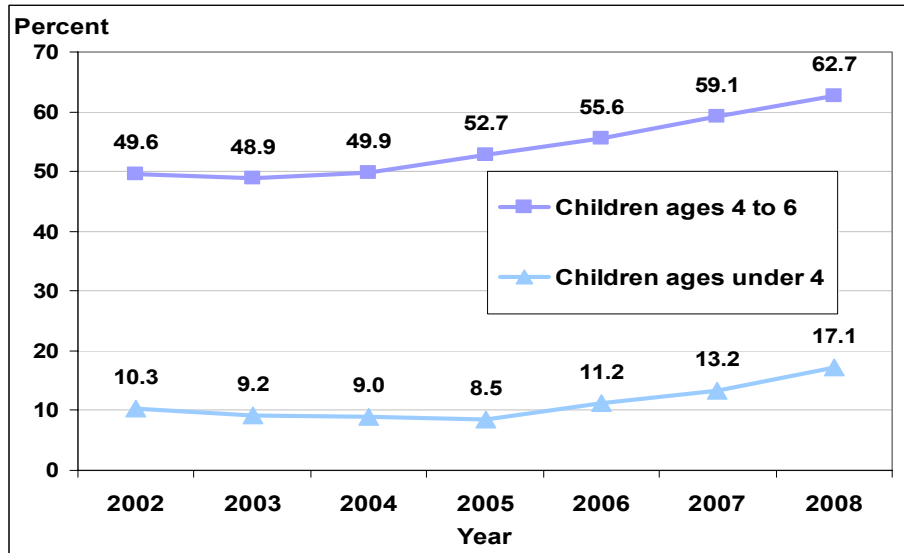


Figure XXI Source: RItE Smiles Evaluation Reports. Rhode Island Department of Human Services, May 2010.

**Figure XXII. Medicaid-Enrolled Children (Age 0–6 Years) Who Received At Least One Restorative Dental Visit a Year in Rhode Island, 2002–2008**

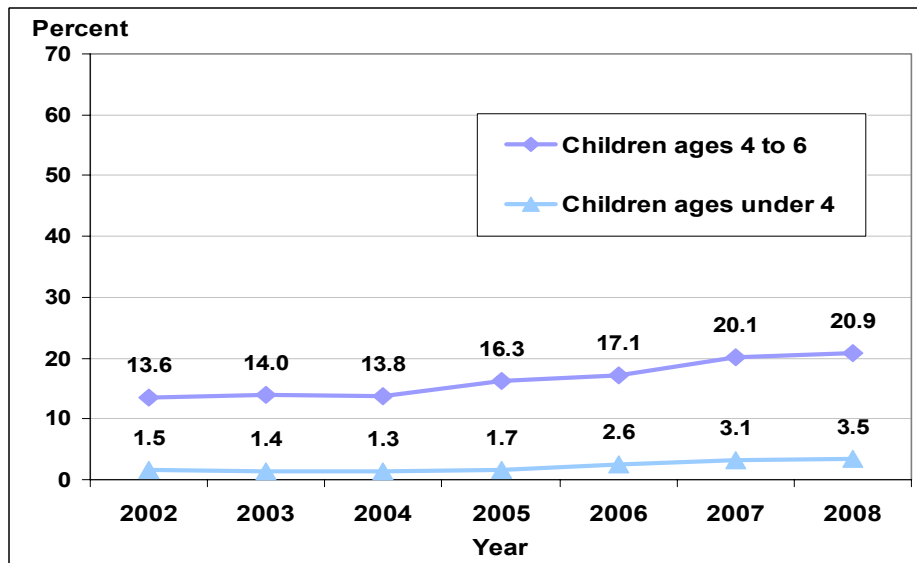


Figure XXII Source: RItE Smiles Evaluation Reports. Rhode Island Department of Human Services, May 2010.

## Community Health Centers and Dental Safety Net Sites

Dental safety net providers are public and private non-profit organizations that provide comprehensive oral healthcare to children, adults, and the elderly, regardless of an individual's insurance status or ability to pay. They are critical to the state's current and future healthcare delivery system. Rhode Island's dental safety net is currently comprised of nine community health centers with dental clinics, three hospital-based dental centers, one Indian Tribal Health Center, and a dental hygiene clinic at the Community College of Rhode Island (Table XIV, Figure XV).

*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". As of 2010, 9 out of 10 Rhode Island Community Health Centers in the state's core cities provide dental services. According to the 2008 Uniform Data System (UDS), seven federally-qualified health centers (FQHCs) in Rhode Island (who are required to submit data to the system) served nearly 31,000 unique patients in more than 102,000 dental service encounters.

The comprehensive dental services offered by dental safety net providers include preventive, diagnostic, restorative, rehabilitative, surgical, and emergency dental services (Figure XXIII). The Dental Hygiene Clinic at the Community College of Rhode Island provides only dental hygiene services and x-rays; patients needing restorative services are referred to dental offices. The clinical case complexity among most safety net providers is limited to procedures that do not require general anesthesia. However, the Samuels Sinclair Dental Center at Rhode Island Hospital provides dental services under general anesthesia for children and adults with special healthcare needs; St. Joseph Hospital's Pediatric Dental Center provides this type of service to children only.

Rhode Island safety net sites were surveyed by Rhode Island Kids Count, the Rhode Island Health Center Association, and the Rhode Island Department of Health in December 2010, providing an in-depth view of the state's dental safety net. To read the May 2011 special report, see [www.health.ri.gov/publications/reports/2011DentalSafetyNet.pdf](http://www.health.ri.gov/publications/reports/2011DentalSafetyNet.pdf).<sup>82</sup>

**Table XIV. Dental Safety Net Providers in Rhode Island**

Name of Organization	City/Town
Blackstone Valley Community Health Care	Pawtucket
Block Island Health Services	Block Island
Comprehensive Community Action Program	Cranston
	Warwick
East Bay Community Action Program	Newport
Providence Community Health Centers	Providence (2 locations)
	Wakefield
	West Warwick
Thundermist Health Center	Woonsocket
	Johnston
Tri-Town Community Action Agency	Foster
	North Kingstown
	Pascoag
Wood River Health Services	Hope Valley
Pediatric Dental Associate/ St. Joseph Hospital	Johnston
Pediatric Dental Clinic/ Fatima Health Center	Pawtucket
Pediatric Dental Center/ St. Joseph Hospital	Providence
Samuels Sinclair Dental Center/ Rhode Island Hospital	Providence
Community College of Rhode Island (CCRI)	Lincoln
Narragansett Indian Health Center	Narragansett Indian Tribe

Table XIV Source: Rhode Island Health Center Association as of December 2010. Available at <http://www.rihca.org/> and Rhode Island Department of Health, Oral Health Program

**Figure XXIII. Number of Encounters and Percentage of Dental Services Provided by the Rhode Island Federally Qualified Health Centers\***

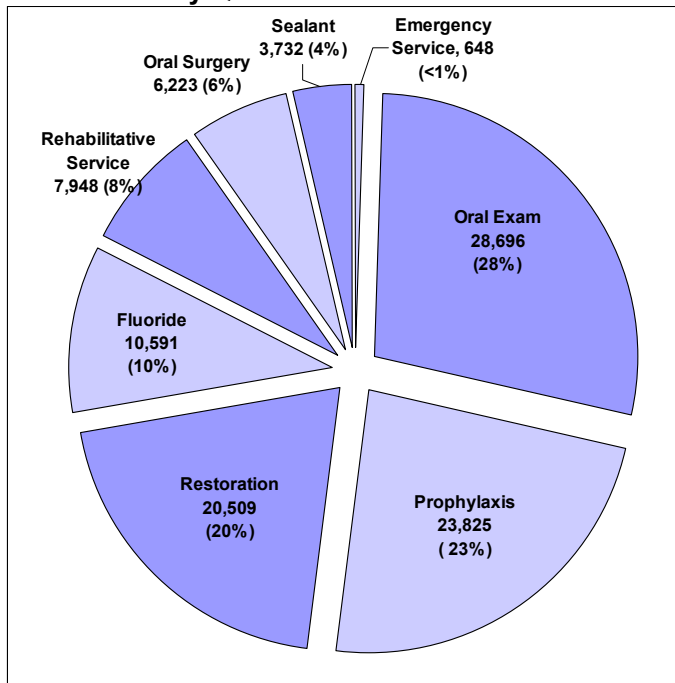


Figure XXIII Source: 2008 Rhode Island Health Center Association Data Book based on the 2008 Uniform Data System (UDS).

\* Seven Federally Qualified Health Centers in Rhode Island are required to submit data to the system. Rehabilitative services include root canal, prosthetic, periodontal, and orthodontic treatments.

## School-Based / School-Linked Services

Current Rhode Island Rules and Regulation for School Health Programs, which were jointly promulgated by the Rhode Island Departments of Education and Health, require that every student receive an annual dental screening by a licensed dentist or dental hygienist in grades K through 5 and at least one screening between the sixth and tenth grades. To meet these requirements, every school contracts with licensed practicing Rhode Island dentist to perform this function. Some schools contract with school-based dental programs.

School-based dental programs provide dental services to children in a school setting, while school-linked programs include public or non-profit dental clinics serving children directed to their clinics by a school program. In Rhode Island, seven dental safety net providers administer all school-based and school-linked dental programs. These programs offer a variety of services including oral screenings and exams, prophylaxis (cleanings), fluoride treatments, dental sealants, individual hygiene counseling, classroom education, and in-service trainings. As of the 2009-2010 school year, these programs service 64 Rhode Island schools with elementary grades in 15 cities and towns, including five of the six core cities (Bristol, Burrillville, Charlestown, East Providence, Exeter, Hopkinton, Middletown, Newport, Pawtucket, Providence, Richmond, Warren, West Greenwich, West Warwick, and Woonsocket). Recent expansion of school-based/school-linked programs can be credited to the Rhode Island Oral Health Access Project, which awarded funds from The Robert Wood Johnson Foundation to four programs for this purpose.

**Table XV. School-Based/School-Linked Programs in Rhode Island**

Community	Program Name	Number of Schools Served (Schools with ≥50% Free and Reduced Meals Enrollment)	Total Number of Students Eligible for the Service
Bristol	E. Bay Smiles	4 (0)	1,521
Cranston	W. Bay Smiles	6 (3)	1,669
East Providence	E. Bay Smiles	8 (5)	2,380
Middletown	E. Bay Smiles	3 (0)	1,504
Newport	E. Bay Smiles	3 (3)	649
Pawtucket	Pawtucket Smiles	7 (7)	3,574
Providence	Providence Smiles	13 (13)	5,860
South Kingstown	Thundermist	2 (0)	827
Warwick	W. Bay Smiles	7 (1)	1,959
West Warwick	Thundermist	4 (1)	1,672
Woonsocket	Thundermist	7 (7)	2,435
Total		64 (40)	24,050

Table XV Source: Rhode Island Department of Health, Oral Health Program

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