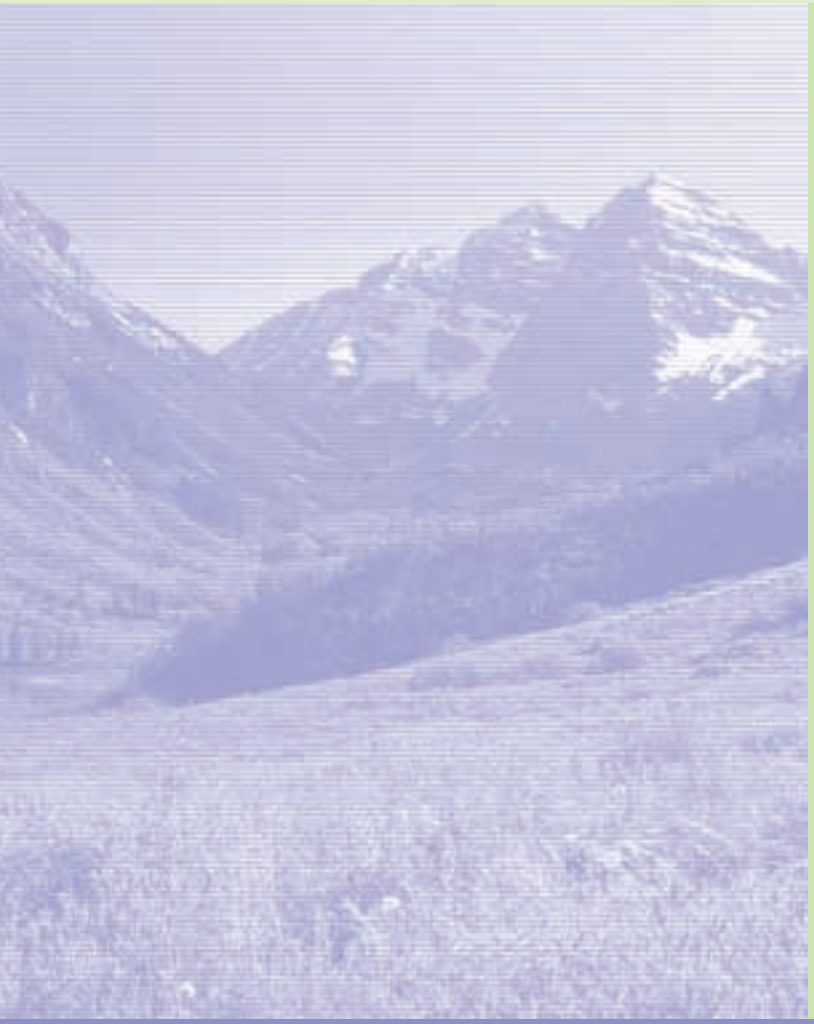
THE

Impact of Oral Disease



ON THE HEALTH OF COLORADANS

Impact of Oral Disease

ON THE HEALTH OF COLORADANS

Colorado Department of Public Health
and Environment
Oral Health Program
4300 Cherry Creek Drive South PSD-OH-A4
Denver CO 80246
Phone 303.692.2470
Fax 303.758.3448

This publication was made possible by grant number H47MC01954 from HRSA's Maternal and Child Health Bureau and grant number U58/CCU822812 from the Centers for Disease Control and Prevention, Division of Oral Health.

STATE OF COLORADO

Bill Owens, Governor
Douglas H. Benevento, Executive Director

Dedicated to protecting and improving the health and environment of the people of Colorado

4300 Cherry Creek Dr. S.
Denver, Colorado 80246-1530
Phone (303) 692-2000
TDD Line (303) 691-7700
Located in Glendale, Colorado

Laboratory Services Division
8100 Lowry Blvd.
Denver, Colorado 80230-6928
(303) 692-3090

http://www.cdphe.state.co.us

Colorado Department
of Public Health
and Environment

May 2005

Dear Interested Parties:

I am pleased to share the results of the *Impact of Oral Disease on the Health of Coloradans 2004* with you. This report highlights oral health data from the new Colorado Oral Health Surveillance System, including screening data from a 2004 random sample of kindergarten and third-grade students in the state, and analysis of data from the Colorado Behavioral Risk Factor Surveillance System over the past several years. This report also addresses the relationship oral diseases have on the overall health of Coloradans, including oral disease effects on pregnancy, tobacco-related illnesses and quality of life.

The report is organized around the three main topic areas: oral health status; risk reduction; and workforce and access. Interwoven throughout are key economic analyses highlighting that while cost-effective measures exist to prevent many oral diseases, Coloradans generally do not take full advantage of these measures.

Colorado has made significant strides in the past decade in improving the oral health of its residents, including appointment of the Governor's Commission on Children's Dental Health in 2000 and participation in the National Governors Association's Oral Health Policy Academy in 2001. Legislation has been enacted in the past three years providing increased opportunities for Coloradans to access dental care and authorizing numerous resources to assist dentists and dental hygienists in providing that care.

However, there are still disparities among our children, adults, and elderly in terms of their oral health and dental treatment. One response to these concerns is that the Colorado Department of Public Health and Environment has placed a strong emphasis on early prevention, through measures such as community water fluoridation and school-based sealant programs.

The Impact of Oral Disease on the Health of Coloradans 2004 supports the development of a state oral health plan to ensure improved health for all Coloradans.

Sincerely,

Douglas H. Benevento
Executive Director

Acknowledgments

Many people deserve thanks for their contributions to this report:

Colorado Department of Public Health and Environment

Oral Health Program
Theresa Anselmo, R.D.H., B.S.
Diane Brunson, R.D.H., M.P.H.
Tessa Crume, M.P.H.

Prevention Services Division
Jillian Jacobellis, Ph.D.
William Letson, M.D., M.P.H.
Carsten Baumann, M.A.
Jack Finch, M.S.

Colorado Responds to Children With Special Needs Program

Valerie Orlando, R.D.H., B.S.
Screening Contractor

University of Colorado School of Dentistry

Colorado Department of Health Care Policy and Financing

Colorado Dental Association

Colorado Dental Hygienists' Association

Joan O'Connell, Ph.D.
Health Economist
University of Colorado Health Sciences Center

Kathy Phipps, Ph.D.
Epidemiologist
Association of State and Territorial Dental Directors

Helene Kent, R.D., M.P.H.
HM Kent Consulting

James Sutherland, D.D.S., M.P.H.
Health Resources and Services Administration Dental Consultant

Colorado Department of Education

Delta Dental Plan of Colorado

Booz Allen Hamilton
Head Start Consultant

Colorado Community Health Network

Table of Contents

Impact of Oral Disease on the Health of Coloradans

Executive Summary

The *Impact of Oral Disease on the Health of Coloradans* provides the most complete compilation of oral health data for Colorado to date from the Colorado Oral Health Surveillance System, with state-specific baseline data for the majority of Healthy People 2010 Oral Health Objectives, including oral health status, risk factors, workforce analysis, and the economic burden of oral diseases. Colorado has had many successful policy initiatives in the past decade, improving access and raising awareness of the importance of oral health. However, oral disease remains a major health issue for the state.

ORAL HEALTH STATUS

Oral diseases, although nearly 100 percent preventable, affect children's ability to concentrate and learn; their speech development and self-esteem; and adults' employability and quality of life. The 2004 Basic Screening Survey (BSS) assessed over 4,000 kindergarten and third-grade children in Colorado for untreated decay, decay experience, urgent dental needs and sealants. The survey found that 46 percent of kindergarten and 57 percent of third-grade children have cavities and/or fillings (decay experience). Twenty-seven percent (27 percent) of kindergarten and 26 percent of third-grade children have untreated dental decay (cavities).

Colorado children in low-income schools have a significantly higher prevalence of both decay experience and untreated decay compared to children from higher-income schools. Of the kindergarten and third-grade children screened, slightly more than 25 percent require one or more quadrants of treatment. Based on an average one-hour appointment per quadrant of treatment, more than 2,000 hours of treatment are currently needed to meet the needs of the children screened.

While oral diseases are significant in themselves, their relationship to overall general health is often overlooked. Emerging research indicates a strong relationship between poor oral health in expectant mothers and pre-term/low birth weight deliveries. The Colorado Pregnancy Risk Assessment Monitoring Survey (PRAMS) in 2000 and 2001 found that 24 percent of mothers experienced a dental problem during their pregnancy, but only half of those sought dental care, increasing their risk for pre-term/low birth weight deliveries.

Many adults in general suffer from unmet dental needs and may not understand that good oral health is essential to general health and well-being. In the 2002 Behavioral Risk Factor Surveillance System (BRFSS) survey, nearly 4 percent reported they had lost all their natural, permanent teeth. Individuals with chronic medical conditions, such as diabetes, cardiovascular disease, and tobacco-related illnesses, are at increased risk for oral disease. The BRFSS estimated that 59 percent of diabetics, and 44 percent of smokers, have lost at least one tooth due to decay or gum disease compared to 35 percent in the general adult population.

Cancers of the oral cavity also affect overall health and well-being. The five-year survival rate of oral/pharyngeal cancers is only 55 percent, lower than that for prostate, cervical and breast cancers. Surgery and treatment of oral cancer is one of the most debilitating and disfiguring, affecting appearance, speech, ability to eat, and quality of life. An average of 342 new cases of oral cancer are diagnosed each year in Colorado, resulting in 75 deaths. Tobacco and alcohol use are the major risk factors and, working together, are thought to account for 75 percent to 90 percent of all oral and pharyngeal cancers.

The percent of the population age 65 years and older is increasing; therefore, a greater number of seniors in Colorado will be in need of oral health services in the coming years. Colorado ranks in the top three states for seniors retaining their natural teeth; however, many seniors remain at high risk for periodontal disease and tooth loss, due, in part, to loss of dental insurance coverage after retirement. Only 30 percent of seniors over age 65 currently have any type of dental insurance. Medicare, the primary source of medical coverage for seniors, does not include dental benefits, and Colorado Medicaid covers only those dental procedures that are directly related to a concurrent medical condition. For low-income seniors, maintaining a healthy dentition may be cost prohibitive, resulting in poor nutritional status and decreased quality of life.

RISK REDUCTION, PREVENTION, AND COST SAVINGS

The most cost-effective preventive measures for reducing dental decay are community water fluoridation and dental sealants. Fluoridation safely and inexpensively benefits both children and adults, regardless of socioeconomic status or access to dental care. Colorado is fortunate to have many water supplies with naturally optimal (0.9–1.1 parts per million) levels of fluoride serving 14 percent of the population. An additional 74 communities adjust their fluoride levels, bringing the total population on community water systems with optimal fluoride to 74.6 percent. However, 25 percent of Coloradans do not have access to fluoridated community water supplies. If fluoridation programs were implemented in these communities, the net savings for Colorado would be $22.6 million, based on the current population, cost of fluoridation equipment, and average lifetime costs of dental restorations.

Dental sealants, a thin coating bonded into the pit and fissures of the chewing surface of permanent molars, are nearly 100 percent effective in preventing tooth decay. In 2004, only 35 percent of Colorado third-graders had sealants on their first molars. The prevalence of dental sealants is significantly lower in Hispanic third-grade children compared to similar white non-Hispanic children. If sealants were available to children when their first molars erupt, particularly in Colorado schools with 50 percent or more of their students on free and reduced school lunch programs (Center for Disease Control guidelines), the Healthy People 2010 goal for sealants (50 percent) would be met and oral health disparities reduced. The estimated net savings of a statewide school sealant program would be approximately $1.2 million in one year alone.

WORKFORCE AND ACCESS

Colorado is ranked sixth highest in dentists per capita in the nation, with a dentist-to-population ratio of 56.5 per 100,000 in 1998. However, this represents a 15 percent decrease since 1991, which may indicate a future shortage trend, particularly as the population in Colorado is expected to exceed five million by 2010. Conversely, the dental hygienist-to-population ratio in Colorado was 61.0 per 100,000 in 1998, with an anticipated major increase of 50.7 percent by 2008. Colorado has one dental school and four dental hygiene programs, graduating 120 dental professionals each year with plans to increase by 20 percent in the next five years in anticipation of these future trends.

A diverse dental workforce, and one able to service low-income populations, is key to addressing the unmet needs of minority patients in Colorado. Only 11 percent of the dental workforce is non-white compared to 25 percent of the state population. Less than 12 percent of Colorado licensed dentists participate in Medicaid, due to a variety of factors, with only 3 percent of Medicaid providers classified as "significant providers."

SUCCESSES

Many innovative policies have been initiated in the state to improve access to oral services. The results of these efforts have included an increase from 26.4 percent in 1999 to 34.0 percent in 2003 in the number of Medicaid children receiving a dental visit. This is significant in light of a 32 percent increase in the number of eligible children during those five years. A comprehensive dental benefit was added to the Child Health Plan Plus program in March 2002 for low-income children not eligible for Medicaid. Administered by Delta Dental Plan of Colorado with a network of over 800 dentists, more than 21,000 children received dental services in the first year of the program, equaling a 34 percent utilization rate.

Programs such as the Dental Loan Repayment Program; allowing dental hygienists to bill Medicaid directly; state health professional tax credit incentives; and dental infrastructure grants have all contributed to improved oral health of Coloradans.

FUTURE CONSIDERATIONS

While Colorado has made substantial progress in improving the oral health of its residents, significant disparities remain, including access to known preventive measures, recognition of the importance of oral health as it relates to general health, knowledge of the impact of various risk behaviors on optimal oral health, and utilization of benefits. There is still more to learn about Coloradans' oral health status and behaviors, including the use of hospital emergency rooms for acute dental problems and the related costs to the public; and oral health status and disease rates of special populations, including migrant farm workers, Native Americans, and institutionalized elderly.

Developing strategies to improve oral health and raising awareness of the importance of oral health is the mission of the statewide coalition Oral Health Awareness Colorado!, which involves professionals representing public, private, and non-profit organizations interested in advancing oral health statewide. The development of a state oral health plan will provide strategic guidance to government, health professions, education, business, and communities in improving the oral health, and thereby the overall health, of Coloradans. The Colorado Oral Health Surveillance System will track trends in oral disease rates, providing one measure of evaluation for the strategies prioritized in the state oral health plan. It is hoped that readers of *The Impact of Oral Disease on the Health of Coloradans* will find these data useful as they continue their efforts to understand the factors influencing oral health in Colorado.

For a copy of the full report go to:
http://www.cdphe.state.co.us/pp/oralhealth/impact.pdf

Introduction

The Colorado Department of Public Health and Environment is pleased to present ***Impact of Oral Disease on the Health of Coloradans****.*

This report provides the most complete compilation of oral health data for Colorado to date, with state-specific baseline data for the majority of Healthy People 2010 Oral Health Objectives, including oral health status, risk factors, workforce analysis, and economic burden of oral diseases. This is a culmination of the new Colorado Oral Health Surveillance System, which will track oral disease trends in the decades to come and provide a glimpse into the effects of oral disease on the general health of Coloradans.

This document is not the "beginning," however. Many positive changes in oral health policy in Colorado have occurred over the last decade, resulting in greater access to oral care services. Policy changes at the state and local levels, as well as increased public-private partnerships, have raised public awareness of the importance of oral health. In addition, the development of the Colorado Oral Health Surveillance System allows monitoring of improvements in oral health that have led up to this report.

In 1994, the first oral health needs "assessment" was completed as a joint effort between the Oral Health Program at the Colorado Department of Public Health and Environment and the Department of Applied Dentistry at the University of Colorado School of Dentistry. More than 1,300 individuals, accessing dental offices throughout the state, were screened for decayed, missing and filled teeth. The results provided a rough baseline for comparison to Healthy People 2000 Objectives as they were "best case scenario" of oral health in Colorado, because the assessment involved people who already had access to dental care. Even here, however, oral health disparities were evident, particularly for children. The "Oral Health of Coloradans 1994" resulted in the Governor's Office support of legislation to create a preventive dental program for children. The Dental Care Act of 1997 passed, without accompanying appropriation, just in time for passage of the federal legislation creating the State Children's Health Insurance Program (SCHIP), which accomplished many of the same objectives in the state legislation.

However, dental benefits were not included in the first few years of the Colorado SCHIP program, the Child Health Plan Plus (CHP+). It became evident that the oral health of low-income children was not going to improve without resources for improving access to dental care.

In May 2000, with the support of Anthem Blue Cross Blue Shield Foundation, Governor Bill Owens appointed the members of the Colorado Commission on Children's Dental Health. This commission, co-chaired by Jane Norton, previous executive director of the Colorado Department of Public Health and Environment, and James Rizzuto, previous executive director of the Colorado Department of Health Care Policy and Financing—with representation from dental providers, academia, health policy and the legislature—met for six months to craft nine recommendations for improving the oral health of children. These recommendations, "Addressing the Crisis of Oral Health Access for Colorado's Children," presented to the Governor and General Assembly in December 2000, resulted in five successful legislative initiatives in 2001, including:

- A dental benefit in the Child Health Plan Plus (CHP+) program, provided there was an adequate dental workforce;
- $2 million in dental infrastructure funds, administered by the Colorado Department of Health

Care Policy and Financing, to support dental practices in increasing their number of Medicaid and CHP+ patients;

- Addition of unsupervised dental hygienists as recognized providers with Medicaid;
- Addition of dentists and dental hygienists to the State Income Tax Program for Health Professionals, allowing a full tax credit to health professionals living and practicing in rural areas of the state with outstanding educational loans; and
- The creation of the Dental Loan Repayment Program for dentists and hygienists serving low-income populations throughout the state, and who had outstanding professional educational loans.

The results of these policy changes have been significant. In 2001, Colorado was one of the first states to participate in the National Governors Association's Oral Health Policy Academy. The Colorado team, led by Jane Norton, over the next year developed a workplan for implementation of the nine commission recommendations and legislative initiatives. Through the work of this team, and a number of separate initiatives from the philanthropic community, business, education, and government entities, significant strides in oral health have been made.

- More than 34 percent of CHP+ enrolled children received dental services in the first year of the program benefit.
- More than 20,000 Medicaid and CHP+ children have received oral health care due to the increased infrastructure and capacity of 19 dental practices and clinics receiving infrastructure grants.
- More than 35,000 under-served Coloradans have received dental care from 24 dentists and hygienists participating in the State Dental Loan Repayment Program.
- Nearly 2,800 Medicaid children have received preventive services from dental hygienists enrolled as Medicaid providers.
- New fixed, mobile and portable dental models have been implemented in many areas throughout the state.

- Three local oral health coalitions have formed to address the immediate oral health needs at the community level.

In 2002, Colorado was one of 13 recipients of a "Support for State Oral Disease Prevention Programs" cooperative agreement from the Division of Oral Health at the Centers for Disease Control and Prevention (CDC). This agreement has allowed the Oral Health Program at the Colorado Department of Public Health and Environment to increase its infrastructure and capacity for oral health surveillance and policy development. The initial result of the increased surveillance capacity was the publishing of oral health data in the "Snapshot of Oral Health in Colorado," highlighting 2001–2002 oral health data from school screenings, statewide telephone surveys and community water fluoridation databases. Mailed to key stakeholders throughout the state, the data clearly indicated that Colorado still had work to do to reduce significant oral health disparities. This document, presenting a more comprehensive documentation of oral disease in Colorado, and including an economic assessment of oral health burden in addition to the cost-savings of preventive strategies, highlights the increased capacity afforded by the new surveillance system.

Colorado has made substantial gains in improving the oral health of its residents. However, oral disease, nearly 100 percent preventable, is still a major health issue for the state. Knowledge of "baseline" and trend data, and increasing awareness of the linkages between oral health and general health, are the first steps in evaluating community efforts to improve the overall health of Colorado's residents.

There are many oral health initiatives currently ongoing throughout the state, solidifying unique public-private partnerships and securing non-traditional funding sources. A statewide oral health coalition has formed, engaging providers, business representatives, educators, third-party payers, and community leaders. Oral Health Awareness Colorado! (OHAC!) has a mission: "to develop and promote strategies to achieve optimal oral health for all Coloradans." The primary goals of OHAC! include raising awareness of the relationship between oral health and general health through its media campaign, "Be A Smart Mouth" (**www.beasmartmouth.com**), and developing the state oral health plan with broad stakeholder input.

The Impact of Oral Disease on the Health of Coloradans is presented in sections with supporting data addressing health status and risk reduction by life cycle, access to care, and a final section on what is not known, offering opportunities for further research. By providing a launching point for the development of a comprehensive state oral health plan, including subsequent monitoring of oral disease burden, Colorado will have a clear strategic vision on improving the health of all Coloradans.

Demographics

Geographically, Colorado is the eighth largest state in the United States, covering over 104,000 square miles, with a population density of 39 persons per square mile, compared with the national average of 77. Colorado is primarily a rural state with approximately 4.5 million people, an increase of 37 percent since the 1990 census, with 80 percent residing in 10 metropolitan counties on the eastern side of the Rocky Mountains, known as the "front range."

Twenty-three of Colorado's 64 counties are frontier (less than six people per square mile) and an additional 24 counties are rural. Also known as the "highest" state because of its altitude, Colorado's numerous mountain passes often create geographical barriers in accessing oral health care services.

The population in Colorado is primarily white/non-Hispanic (75 percent Census 2000), but the proportion of minorities has increased significantly in the last decade (Figure 2). Once making up only 13 percent of Colorado's population in 1990, Hispanic populations have increased to over 17 percent. Many of this population are also Spanish speaking, especially among the more than 40,000 migrant and seasonal farmworkers in Colorado each year. The percentage of Black and Asian/Pacific Islander populations remains fairly low. Colorado's Ute Mountain and Southern Ute reservations, in the southwest corner of the state, are home to a portion of the state's one percent Native American population.

The percentage of Hispanic populations in Colorado has increased from 13% to 17% in the last decade.

Figure 2: Colorado's Population by Race/Ethnicity, U.S. Census 2000

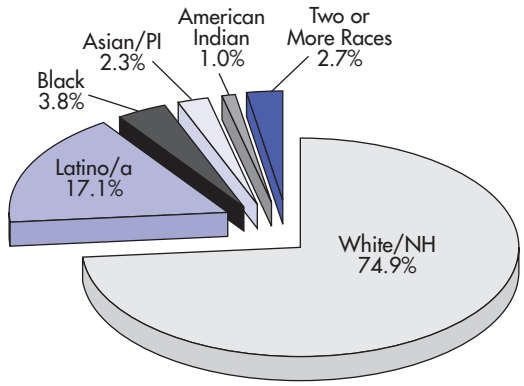
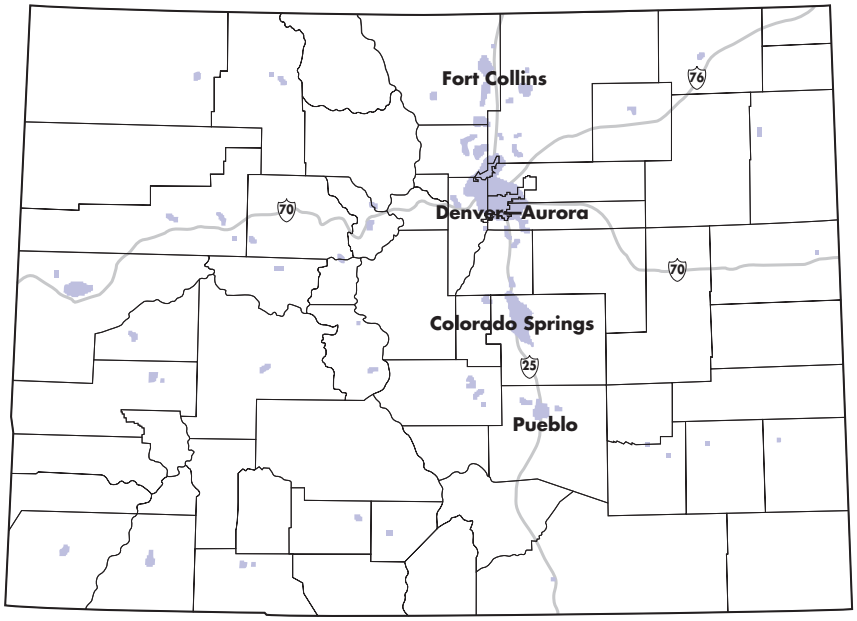


Figure 1: Colorado Urban Areas, U.S. Census 2000



More than 80% of Colorado counties are rural or frontier.

Oral Health Status of Coloradans

Oral diseases and their consequences continue to be a silent burden that many Coloradans face daily.

"What amounts to a 'silent epidemic' of dental and oral diseases is affecting some population groups. This burden of disease restricts activities in school, work, and home, and often significantly diminishes the quality of life" stated Surgeon General David O. Satcher, MD, in "Oral Health in America: A Report of the Surgeon General" in 2000.

Good oral health means being free of chronic oral-facial pain, oral and pharyngeal (throat) cancers, oral soft tissue lesions, birth defects such as cleft lip and palate, and conditions that affect the oral, dental and craniofacial tissues. Safe and effective preventive strategies for maintaining oral health have lead to marked improvements in the oral health of Americans in the past 50 years and, as a result, most middle-aged and younger Americans can expect to retain their natural teeth over their lifetimes and not have any serious oral health problems. However, these benefits are not available to all Americans.[1]

The Colorado Oral Health Surveillance System, developed in 2004, tracks a series of key oral health indicators across the lifespan. This system allows for various analyses of factors contributing to the significant oral health disparities in Colorado, and will enable the state to track oral disease trends and evaluate the effectiveness of implemented strategies. The data presented here is the result of the first year of this system.

CHILDREN

Oral diseases affect children's ability to concentrate and learn, as well as their speech development, eating habits, activity levels and self-esteem. Nationally, dental decay is five times more common than childhood asthma and seven times more common than hayfever. An estimated 96,000 children ages 0–12 have asthma in Colorado, which indicates Colorado has similar data.[2]

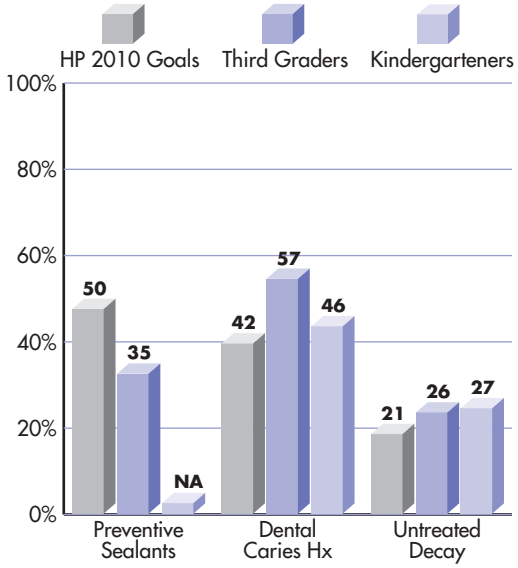
An estimated 7.8 million hours of school are lost annually in Colorado due to acute oral pain and infection.

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

The 2004 Basic Screening Survey (BSS) assessed more than 4,000 kindergarten and third-grade children in Colorado for untreated decay, caries experience, urgent dental needs and sealants. Figure 3 illustrates that 46 percent of kindergarten and 57 percent of third-grade children have cavities and/or fillings (decay experience). Twenty-seven percent of kindergarten and 26 percent of third-grade children have untreated dental decay (cavities). Less than 35 percent of third-graders had dental sealants, a protective measure to prevent tooth decay, compared to the Healthy People 2010 goal of 50 percent.[3]

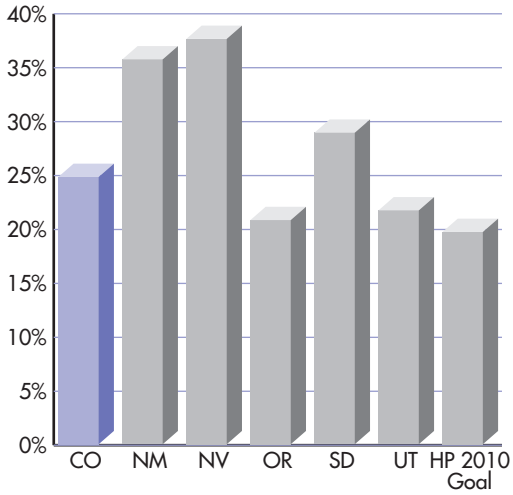
The percentage of Colorado children with untreated decay is unevenly distributed in the state, with the greatest unmet needs in areas of the state with a high percentage of low-income populations.[4] Using free and reduced lunch eligibility as an approximate measure for socioeconomic status,[5]

Figure 3: Oral Health Status of CO Kindergarten and Third-Grade Children Compared to Healthy People 2010 Goals



children in low-income schools (greater than 50 percent eligible for free or reduced price meals) have a significantly higher prevalence of both decay experience and untreated decay compared to children from higher income schools (less than 25 percent eligible for free or reduced price meals). Children from low-income schools, however, have a significantly lower prevalence of dental sealants. [4]

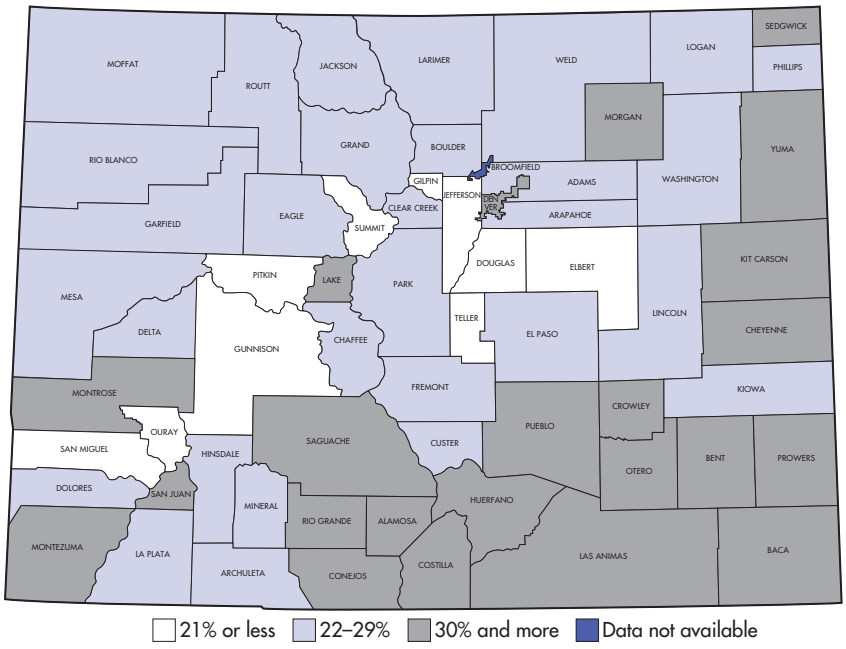
Figure 5: Prevalence of Untreated Decay in Third-grade Children Stratified by State



In comparing Colorado to neighboring states and the Healthy People 2010 goal of 21 percent, the state ranks closely to Oregon and Utah in nearing attainment of the Healthy People goal for untreated decay. However, the eventual goal is to minimize, and ultimately prevent, all untreated decay in Colorado's children.

In addition, children at low-income schools had a significantly higher mean number of quadrants in need of dental care. Of the kindergarten and third-grade children screened, slightly more than 25 percent required one or more quadrants of treatment. Based on an average one-hour appointment per quadrant of treatment, more than 2,000 hours of treatment are currently needed to meet the needs of the children screened.

Figure 4: Percent of Third-Graders with Untreated Decay, 2003–2004



As the screening sample represented 4 percent of all the Colorado kindergarten and third-grade children, the estimated amount of treatment needed for Colorado's children exceeds half a million hours.

Oral health disparities are evident from the 2004 Basic Screening Survey. For both kindergarten and third-grade children, Hispanic children, compared to white children,

Figure 6: Percent of Colorado Children with Untreated Decay by Free and Reduced Lunch Status of School—2004

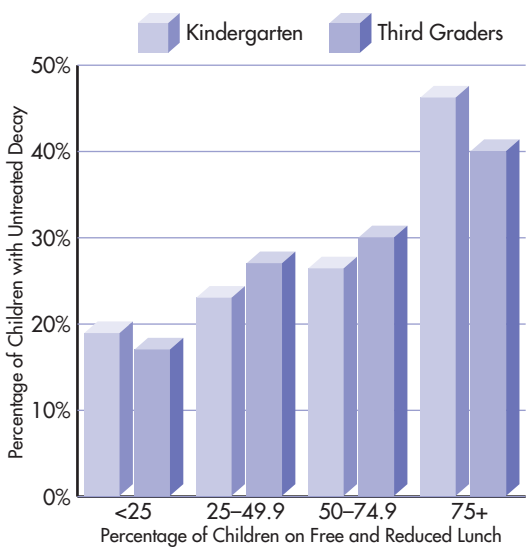
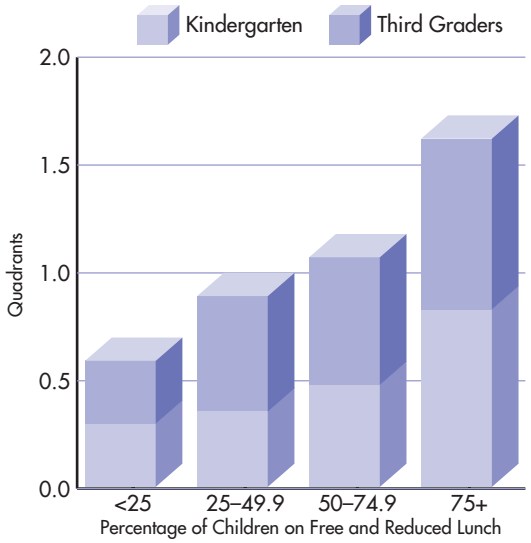


Figure 7: Mean Quadrants of Decay Stratified by Free and Reduced Lunch Status of School—2004



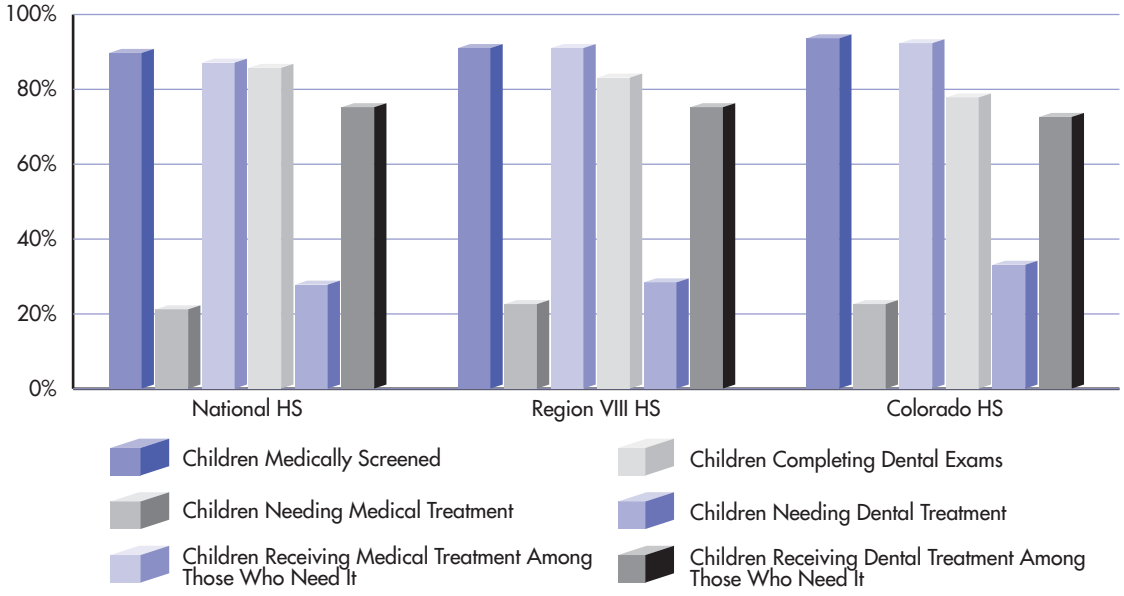
have a significantly higher prevalence of caries experience and untreated decay ($p<<0.01$). Conversely, the prevalence of dental sealants is significantly lower in Hispanic third-grade children compared to similar white non-Hispanic children ($p<<0.01$). (Note: The racial/ethnic disparities noted may be associated with differences in socioeconomic status.)

Tooth decay begins early in a child's life. Rampant decay is often found among low-income toddlers and preschoolers. Head Start, serving children 5 years old and younger, in addition to pregnant women, is one program that can identify oral disease early and increase the school readiness of young children from families with low incomes.[6] In Colorado, 11,333 children ages 3–5 were enrolled in Head Start in 2002–2003. Head Start Program Performance Standards state that programs, in collaboration with parents, must determine each child's oral health status within 90 days of entry into the program. Nationally, the percent of Head Start children completing the dental exam is 88 percent; whereas, in Colorado, the percentage is 79 percent. Figure 8 illustrates how Colorado measures up compared to the nation and the Region VIII states of South Dakota, North Dakota, Montana, Utah, and Wyoming, collectively and individually.

Table 1: Oral Health of Colorado's Kindergarten and Third-Grade Children Stratified by Race/Ethnicity

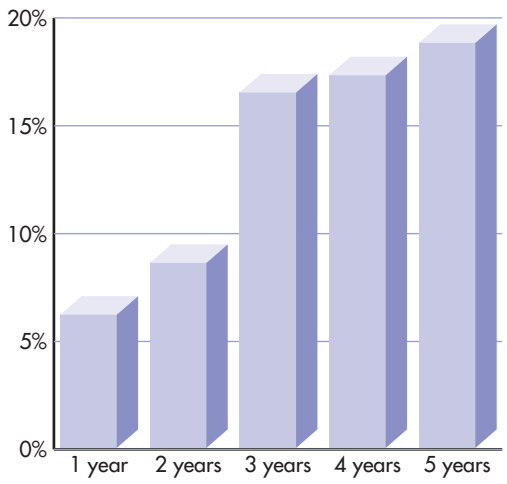
	White		Hispanic	
	Kindergarten	Third-grade	Kindergarten	Third-grade
Caries experience (%) (95% CI)	35.8	53.3	62.9	67.3
Untreated decay (%) (95% CI)	21.5	22.2	38.7	37.4
Treatment Urgency No obvious problem (%)	76.0	64.9	56.7	48.4
Early care (%)	19.6	31.0	34.0	41.9
Urgent care (%)	4.4	4.1	9.3	9.7
Sealants	Not Measured	38.1	Not Measured	25.7

Figure 8: Colorado, National and Region VIII Medical and Dental Services Comparison
Colorado Head Start (HS) Medical and Dental Services



A convenience sample of 2,935 Head Start children throughout the state was screened to determine the percentage with decay experience and untreated tooth decay, using the Basic Screening Survey tool. Results indicate significant oral health needs among this low-income population. All children had poor oral health regardless of race or ethnicity, with the level of dental disease more than three times higher than the Healthy People 2010 goal of 9 percent.

Figure 9: Percentage of Head Start Children with Early Childhood Caries (ECC)



Forty-two percent of the children had decay experience. Thirty-two percent of the children had untreated decay with 7 percent having decay in all four quadrants. Eighteen percent had a pattern of decay known as early childhood caries (ECC).

CLEFT LIP AND CLEFT PALATE

While dental decay is the most common oral disease in children, cleft lip/cleft palate is one of the most common and visible congenital anomalies, affecting more than 120 newborns every year in Colorado. Children born with craniofacial defects, such as cleft lip and palate, require surgical treatment of these defects and extensive reconstruction that involves many health specialists. Colorado Responds to Children with Special Needs (CRCSN) identifies children, up to age 3, that have been diagnosed as having a cleft lip and/or a cleft palate and refers them to the Health Care Program for Children and Youth with Special Needs for follow up and referral. Currently, two craniofacial anomaly teams are located in Denver and Colorado Springs and enlist the expertise of at least 12 multidisciplinary health professionals and surgeons. Other cleft lip/cleft palate clinics, which refer to providers in the community, are located in Pueblo, Larimer, Weld, and Mesa counties.

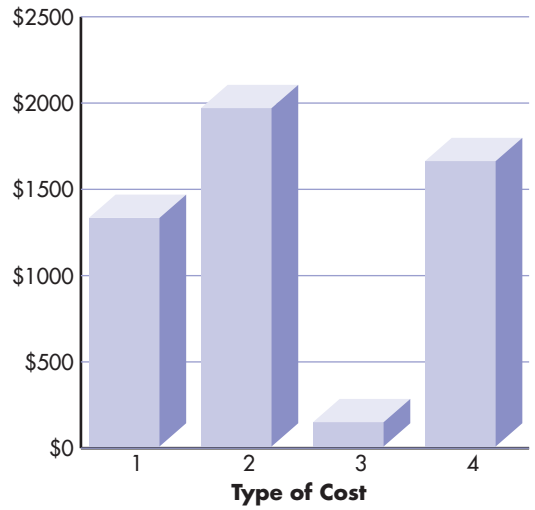
Table 2: Rates of Cleft Lip with/without Cleft palate, Colorado, 1997–2001

YEAR OF BIRTH	Count	Rate
1998	113	18.99
1999	118	18.99
2000	115	17.58
2001	136	20.30
2002	117	17.10

The economic burden of cleft lip/palate in Colorado is estimated to be nearly $14 million each year. These costs include direct medical costs in addition to those associated with lost wages due to morbidity and mortality, and educational costs associated with developmental delays. This estimate is conservative since it does not include costs associated with lower quality-of-life.[8]

Productivity losses due to mortality, excluded from the graph, are included in the cost estimate and amount to approximately half of all the costs. In addition, parent productivity losses associated with limited employment or not working and family psychosocial costs such as pain and suffering are excluded from the cost estimate.

Figure 10: Colorado Costs for Cleft Lip and Palate



1: Productivity losses due to morbidity, limited employment
2: Productivity losses due to morbidity, not employed
3: Costs due to developmental delays
4: Medical costs

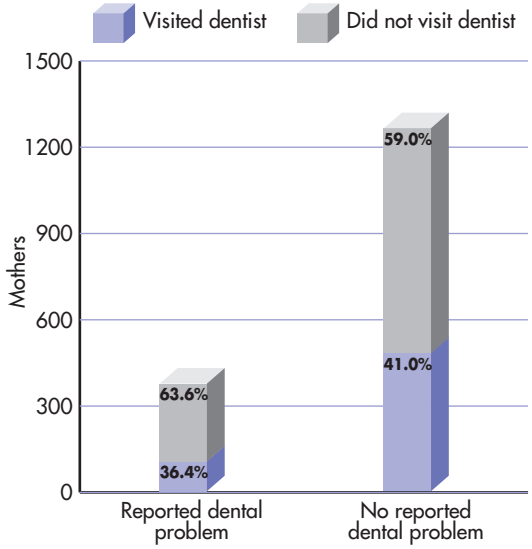
PREGNANCY

Emerging research indicates a strong relationship between poor oral health in expectant mothers and pre-term/low birth weight deliveries.[1] The National Institutes of Health reports that as many as 18 percent of pre-term low birth weight infants born in the U.S. may be attributed to infectious oral disease. Studies have implicated oral disease infections stimulate uterine contraction, cervical dilation, labor and miscarriage.[9] Evidence is promising that there may be an association between treating periodontal disease during pregnancy and improved birth outcomes.

For a variety of reasons, including concerns of how dental treatment may affect the unborn child on the part of both dentists and the expectant mothers, many pregnant women are not receiving needed dental care.[10]

The 2000 and 2001 combined analysis (conducted by the Centers for Disease Control and Prevention) of data from the Colorado Pregnancy Risk Assessment Monitoring Survey (PRAMS) indicate that 24 percent of mothers experienced a dental problem during their pregnancy but only half of those sought dental care.[11]

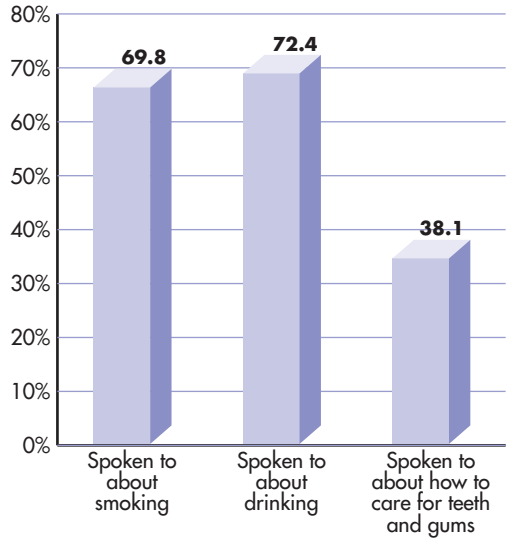
Figure 11: Dental Utilization During Pregnancy Among Mothers in Colorado, PRAMS 2000–2001



The importance of oral health care is not being discussed with pregnant women at the same frequency as other behaviors. While 70 percent of pregnant

women were counseled by their prenatal provider on smoking and 72 percent were counseled on alcohol use, less than 40 percent received counseling on dental care.[11]

Figure 12: Counseling Received by a Health Care Professional During Pregnancy

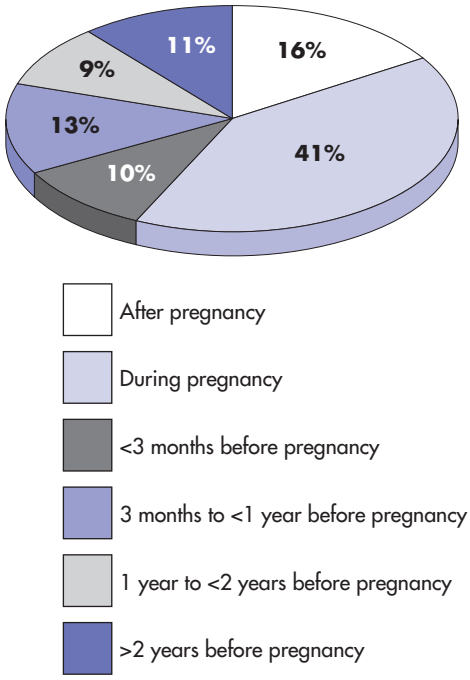


Research indicates that pregnant women with gum disease who receive a thorough cleaning significantly reduce their risk for pre-term/low birth weight deliveries. Figure 13 illustrates that 41 percent of pregnant women in Colorado had their teeth cleaned during pregnancy, 16 percent had a cleaning after giving birth, 9 percent had not had their teeth cleaned in 1–2 years before getting pregnant, and 11 percent had neglected to have their teeth cleaned for more than 2 years.[9]

The PRAMS analysis also revealed that privately insured pregnant women accessed dental care more frequently than Medicaid eligible women, and over 40 percent of Medicaid eligible women had not received dental care in more than 24 months.[11] PRAMS also collects data from patients who receive care at Community Health Centers in Colorado, who serve a disproportionate share of low-income, uninsured or publicly insured women. Although some Health Centers offer dental care, in 2003 they only had the resources to provide dental services to 15 percent of the total patient population. PRAMS data showed that mothers who received their prenatal care from a Community Health Center were 66 percent less likely than women covered by an HMO or private physician to seek dental care; this is likely due to the exclusively poor population served by Community Health Centers, a group at higher risk for not accessing dental services.

Additional maternal risk factors for not seeking dental care include: mothers between the ages of 20–29 years old, mothers with incomes less than $40,000/year, women who had two or more offspring at one birth (twins, triplets), and those who initiated prenatal care late (after the third trimester).[11]

Figure 13: Dental Cleanings Among Pregnant Women in Colorado



ADULTS

Many adults suffer from unmet dental needs and may not understand that good oral health is essential to general health and well-being. In 2002, 35 percent of Colorado adults reported that they had lost a permanent tooth due to decay or gum disease, and nearly 4 percent reported they had lost all their natural, permanent teeth.[12] Slightly less than one-third of adults over the age of 18 reported that they had not visited the dentist in the previous year and 35 percent had not had their teeth cleaned.[12] Data from the 1999 Behavioral Risk Factor Surveillance Survey (BRFSS) indicated that for adults ages 18–54, a greater percentage access dental care than medical care. (1999 data was used as this is the most recent year that access to dental and medical care was asked in the

same year.) However, after age 55 the trend reverses, with a greater percentage accessing medical care. While further analysis is warranted, this trend may be due to loss of employer-based dental insurance and the fact that Medicare does not include dental health coverage.

Table 3: BRFSS Dental and Health Visits in the Last Year by Age, 1999

Age Group	Dental Visit (1999)	Medical Visit (1999)
18–24	68.1	60.0
25–34	62.1	55.3
35–44	70.5	57.9
45–54	71.0	61.8
55–64	71.2	73.9
65 +	63.8	81.4

HEALTH DISPARITIES

Health disparities include the disproportionate burden of oral disease that occurs among under-represented racial and ethnic minority groups, low-income Coloradans, elderly adults, migrant and seasonal farm workers, and those in rural areas.

Social, economic and cultural factors affect how oral health services are delivered and how people access and utilize services.[13] In the 2002 BRFSS, there were significant racial disparities among adults who had lost six or more teeth due to decay or periodontal disease (Figure 14).

INCOME AND EDUCATION

Income and education are strong predictors of a person's future health and serve as an approximate measure for socioeconomic status. Results from 2002 BRFSS illustrate the relationship between oral health access and education level.

Figure 15 illustrates that Coloradans with a college education were three times more likely to have visited the dentist in the past year compared to those with elementary school as the last grade completed. Lack of private or employer-paid dental insurance coverage, and less oral health literacy, may also contribute to these figures.

Figure 15: Percentage of Adults That Visited the Dentist Within the Last Year by Education Level, BRFSS 2002

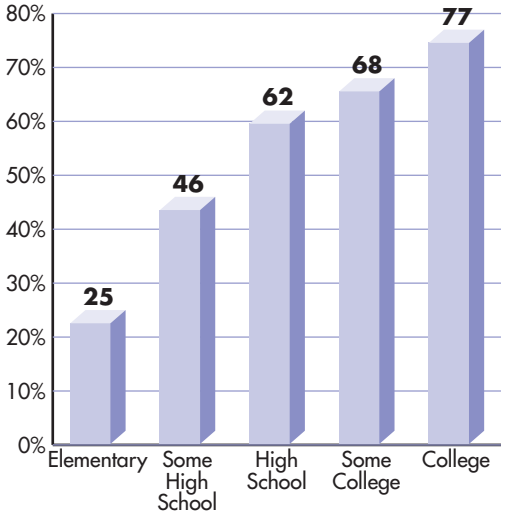
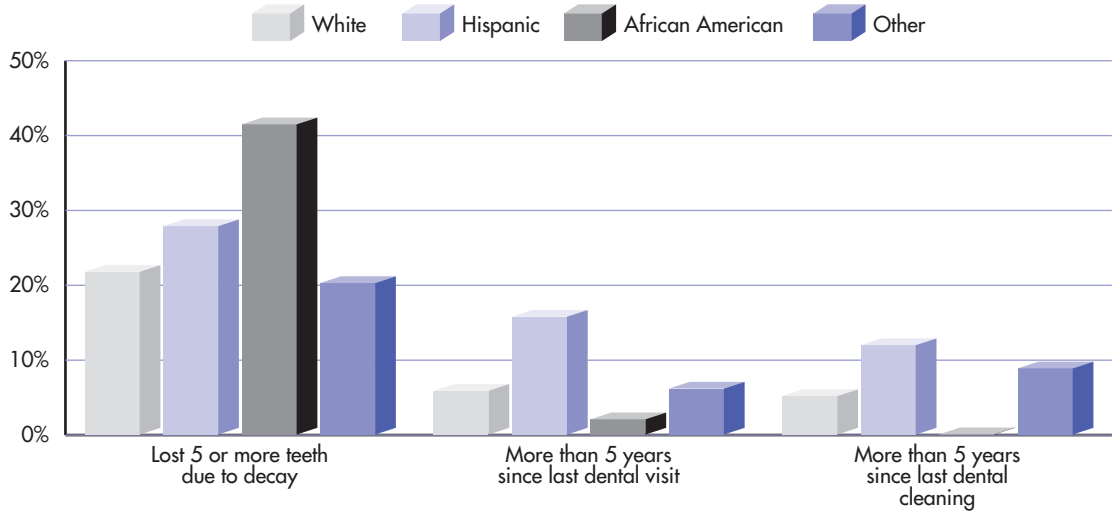


Figure 14: Oral Health Status of Colorado Adults, BRFSS 2002

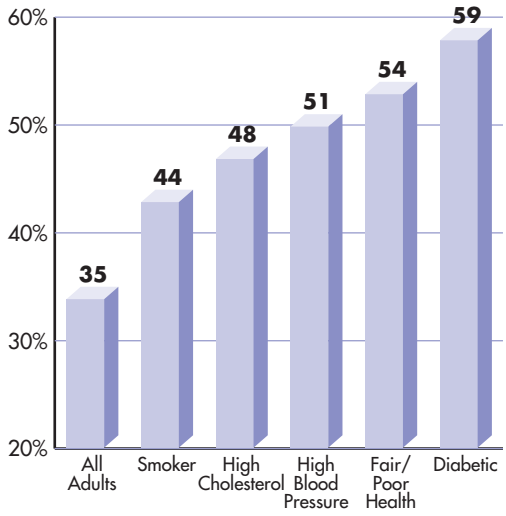


"Those who suffer the worst oral health are found among the poor of all ages, with poor children and poor older Americans particularly vulnerable."

Oral Health in America:
A Report of the Surgeon General, 2000.

Individuals with chronic medical conditions, such as diabetes, cardiovascular disease and tobacco-related illnesses, are also at increased risk for oral disease. Conversely, some chronic conditions further aggravate oral disease. Many systemic diseases, such as HIV and AIDS, have adverse oral health effects and result in greater prevalence of oral diseases. The 2002 Colorado BFRSS estimated that 59 percent of diabetics, and 44 percent of smokers, have lost at least one tooth due to decay or gum disease (Figure 16) compared to 35 percent in the general adult population.[12]

Figure 16: Percentage of Adults with Chronic Disease Who Have Lost Teeth Due to Decay or Gum Disease, BRFSS 2002



ELDERLY

The elderly are at high risk for periodontal disease and tooth loss, due, in part, to lack of access to preventive measures when they were young, and loss of dental insurance coverage. The percent of the population age 65 years and older is increasing; therefore a greater number of persons age 65 years and older in Colorado will be in need of oral health services in the coming years. Nationally, the cost of restorations in 2002 for new tooth decay among the elderly was estimated to be $23.8 million.[8] While Americans paid out-of-pocket for approximately one-half of all dental care expenses in 2000, people age 65 and older paid more than 75 percent of their dental expenses.[14]

Table 4: Dental and Health Insurance by Age, BRFSS 1997

Age Group	Health Insurance (1997)	Dental Insurance (1997)
18–24	72.8	54.9
25–34	84.4	61.9
35–44	85.2	67.3
45–54	93.3	66.4
55–64	92.9	52.6
65 +	100.0	30.0

Colorado ranks in the top three states with the greatest percentage of seniors retaining their natural teeth at 60.5 percent.[15] However, 18 percent of Coloradans over age 65 have lost ALL their natural teeth. Only 30 percent of seniors have any type of dental insurance, Table 4. Medicare, the primary source of medical coverage for seniors, does not include dental benefits, and Colorado Medicaid covers only those dental procedures that are directly related to a concurrent medical condition. The increasing number of seniors with fixed incomes and without dental insurance reduces the likelihood of accessing dental care. For low-income seniors, maintaining a healthy dentition may be cost prohibitive, resulting in poor nutritional status and decreased quality of life.

This results in significant economic burden for the elderly in Colorado. In addition to costs associated with tooth loss and repairing previous restorations, the annual cost of restorations for new decay are estimated to be $23.8 million. [8]

Colorado is fortunate to have one of the few dental programs dedicated to seniors in the U.S. The Dental Assistance Program for the Elderly provides grants to dental providers and Area Agencies on Aging to serve low-income seniors' dental needs. Nearly 25,000 seniors in Colorado are eligible for the program; however, due to capacity constraints, only 4 percent of those eligible receive services on a yearly basis. While the majority of funds are spent on dentures and related services, 34 percent of participating seniors receive preventive services, indicating a shift in the oral health needs of seniors toward maintenance of natural teeth. A study is currently underway to analyze the past 15 years of dental claims data in this program to better describe this shift and to determine the adequacy of the current scope of benefits.

60% of Colorado seniors still have their natural teeth

ORAL AND PHARYNGEAL CANCERS

In 2001, there were 342 new cases of oral cancer diagnosed and 75 oral cancer deaths in Colorado.[20] More than 90 percent of these cancers are squamous cell carcinomas—cancers of the epithelial cells.[1] The most common sites are the tongue, the lips and the floor of the mouth.[1]

Cancers of the oral cavity are among the most debilitating and disfiguring, as surgery and treatment of oral cancer often affect appearance, speech, ability to eat and quality of life. However, oral cancer is one of the most preventable malignancies. Tobacco and alcohol use are the major risk factors and, working together, are thought to account for 75 percent to 90 percent of all oral and pharyngeal cancers in the United States.[17,18] Colorado data appears to be similar. [16] "Alcohol is thought to act as a solvent that facilitates the penetration of tobacco carcinogens into oral tissue."[1] In Colorado, nearly 2 percent of adults report drinking everyday.[12] More than 18 percent of adults are cigarette smokers, and approximately 9 percent use tobacco products other than cigarettes, including spit tobacco, cigars, and pipes.[22]

The cumulative risk of cancers of the oral cavity for Coloradans is 1 in 61 for men and 1 in 136 for

Table 5: Oral Cavity and Pharynx—Number of Diagnosed Cancers and Average Annual Age-Adjusted Incidence per 100,000 by Sex, Geographic Area, Race/Ethnicity, and Time Period, USA 1996–2000 and Colorado 1996–2000 and 2001

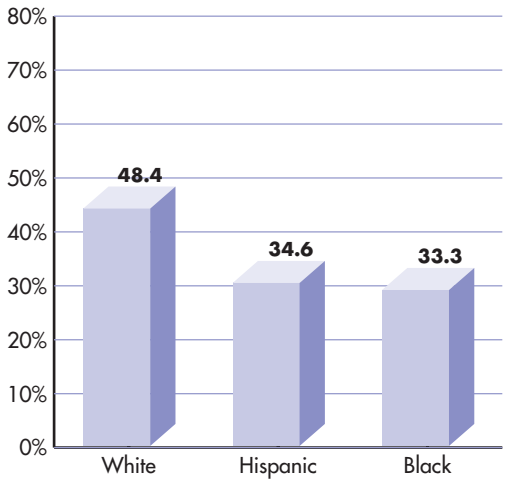
	USA 1996–2000		Colorado 1996–2000		Colorado 2001	
	N	Rate	N	Rate	N	Rate
Male						
All Races	67382	16.2	1107	13.8	219	12.2
White/Non-Hispanic	57220	15.8	956	14.1	193	12.9
White/Hispanic			102	13.2	20	11.1
Black	6978	20.0	35	11.9	4	7.2
Female						
All Races	33008	6.4	527	5.5	123	6.0
White/Non-Hispanic	28421	6.3	476	5.9	107	6.3
White/Hispanic			36	3.7	12	5.0
Black	2888	6.4	9	2.9	1	2.5

women.[20] The annual incidence rate of oral cavity and pharynx cancer is significantly lower in Colorado (15 percent lower) than the national average.[20] The incidence rates of oral cancers for non-Hispanic whites has generally been higher than those for Hispanics and African Americans.[20] Table 5 combines five years of oral cancer incidence data in Colorado and shows the significantly lower rates among Hispanic and African-American females compared to white females. Though not statistically significant, the same trends are reflected among males.[20]

In Colorado over the last 10 years, rates of oral cancer and mortality have decreased.

Early stage of disease detection is a significant key to oral cancer survival. Blacks and Hispanic groups are significantly less likely to receive early diagnosis than whites in Colorado (Figure 17).[20]

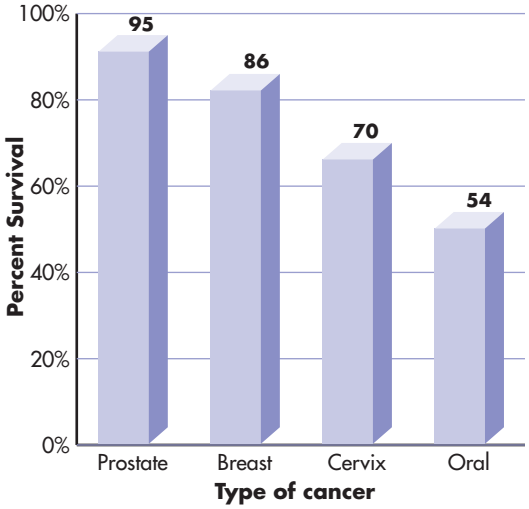
Figure 17: Percent of Oral and Pharyngeal Cancers Detected Early in Colorado, by Race/Ethnicity, 2001



In addition, the five-year survival rate of oral/pharyngeal cancers for all races is only 54 percent. Survival rates are substantially worse for blacks (43 percent) and Hispanics (46 percent) than for whites (55 percent), and lower than that for prostate, cervical, and breast cancers. [20]

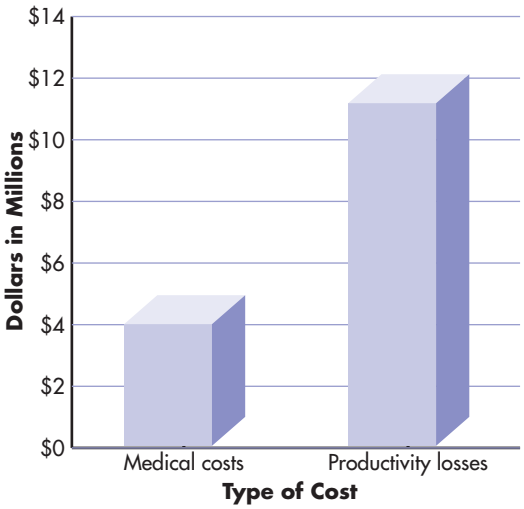
The economic burden of oral cancer in Colorado is estimated to be $62,800 per case; the total for all cases in Colorado approximately $20 million per year.[8] These estimates include valuation of lost productivity due to morbidity or disfigurement, other pain and suffering due to side effects of treatment or lower quality of life.[8] This figure is conservative as it does not include costs associated with lower productivity due to morbidity or lower quality of life.

Figure 18: 5-Year Relative Survival Rates by Stage: 1994–1997



Prevention programs such as smoking cessation and education about chewing tobacco could lower the incidence of oral cancers in Colorado and the costs associated with treating them.[6]

Figure 19: Economic Burden of Oral Cancer



TOBACCO USE

Tobacco use, a known risk factor for periodontal disease and oral cancer, is higher among Colorado youth than national averages. [21] More than 25 percent of Colorado students in grades 9–12 reported smoking in the past month, and many had their first cigarette before they were 10 years old.[21] Overall, 18.5 percent of Colorado's adult residents currently smoke, which is less than the 22 percent nationally.[22,41] The highest prevalence is among 18–24 years olds, of which 22.5 percent smoke, lower than the national figure of 28.5 percent.[22,41]

Use of snuff or chewing tobacco is almost exclusively a male behavior, especially among adults.

Smokeless tobacco is associated with leukoplakia, oral cancer, decay and periodontal disease. Colorado's youth also report using smokeless tobacco at a rate higher than the national average with approximately 24 percent of high school youth reporting ever using it compared to the national rate of 18.3 percent (Figure 20).[21] Fewer than one in 20 adult women has ever used smokeless tobacco, and only one in a thousand currently uses it. However, among high school, young adult, and adult populations, spit tobacco use is higher in Colorado than the national average.[21]

Figure 20: Youth Who Ever Used Smokeless Tobacco (Chewing tobacco, snuff or dip), Colorado 2001

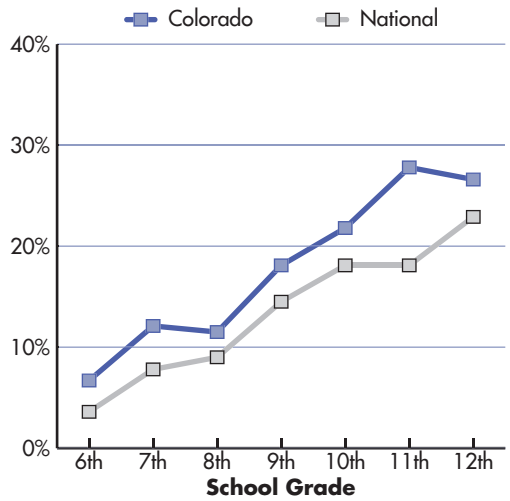
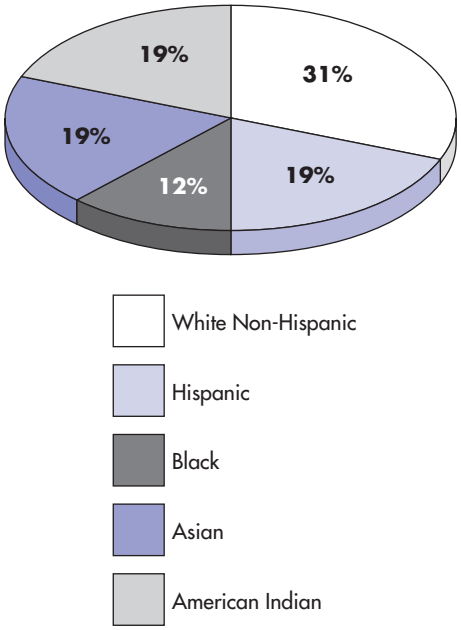


Figure 21: Current Use of Smokeless Tobacco, Men Aged 18–44, by Race/Ethnicity, 2001



Current use of smokeless tobacco also varies widely among Colorado's ethnic populations. Among men aged 18–44, smokeless tobacco use is more common among white non-Hispanic men than among Hispanic or black non-Hispanic men (Figure 21).[19]

Colorado is making significant strides in reducing tobacco use. In 2003, nearly 53 percent of Colorado adults had tried to quit smoking in the previous 12 months.[42] Seventy-three percent of adult smokers reported being advised to quit by a medical provider.[42]

"Tobacco Use Cessation Tools for Oral Health Providers" is a tool kit developed by the Colorado Department of Public Health and Environment's State Tobacco Education and Prevention Partnership and the Oral Health Program. The kit contains patient brochures and posters, information for dental providers, and toothbrushes preprinted with the Colorado Quitline (a toll-free telephone counseling service that connects people who want to quit smoking with trained counselors). More than 3200 kits have been sent to dental providers in the state to assist them in counseling their patients about tobacco use.

Risk Reduction

Safe and effective prevention measures exist that reduce the prevalence of oral diseases.

Individuals, health care providers and communities all have a role in implementing these measures to improve oral health and prevent disease.

COMMUNITY WATER FLUORIDATION

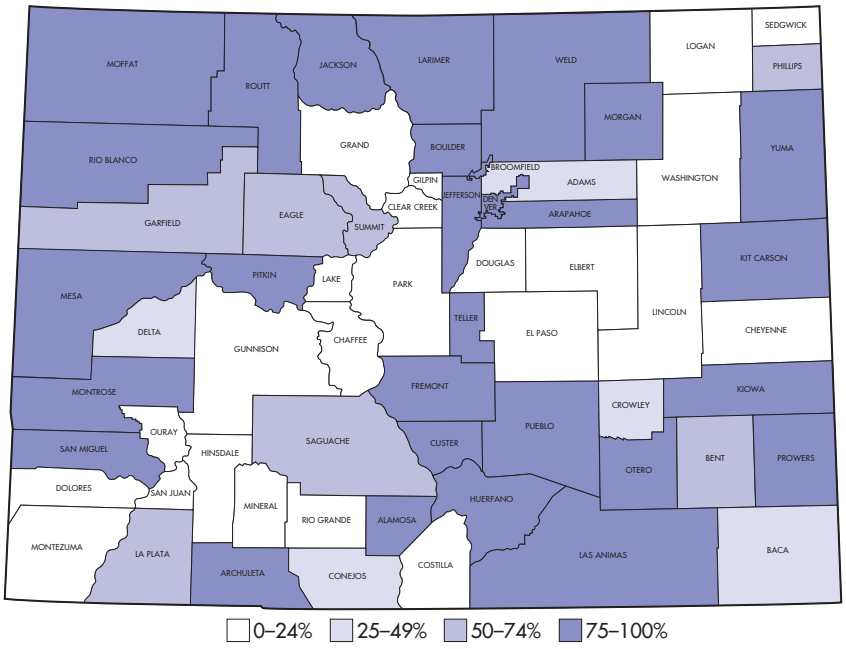
The most cost-effective preventive measure for reducing dental decay is community water fluoridation.[3] Fluoridation is the adjustment of fluoride in community drinking water supplies up to the optimal level for prevention of decay. Since its inception in the second half of the 20th century, fluoridation of community water supplies is responsible for major reductions in tooth decay (40–70 percent in children) and tooth loss in adults (40–60 percent).[2,3] The Centers for Disease Control and Prevention estimates the per capita cost of water fluoridation over a person's lifetime is less than the cost of one dental filling.[3] Fluoridation safely and inexpensively benefits both children and adults, regardless of socioeconomic status or access to dental care.[1]

Colorado is fortunate to have many water supplies with naturally occurring optimal levels of fluoride.

Colorado is fortunate to have many water supplies with naturally optimal (0.9–1.1 parts per million) levels of fluoride serving 14 percent of the population. An additional 74 communities adjust their fluoride levels, bringing the total population on community water systems with optimal fluoride to 74.6 percent.

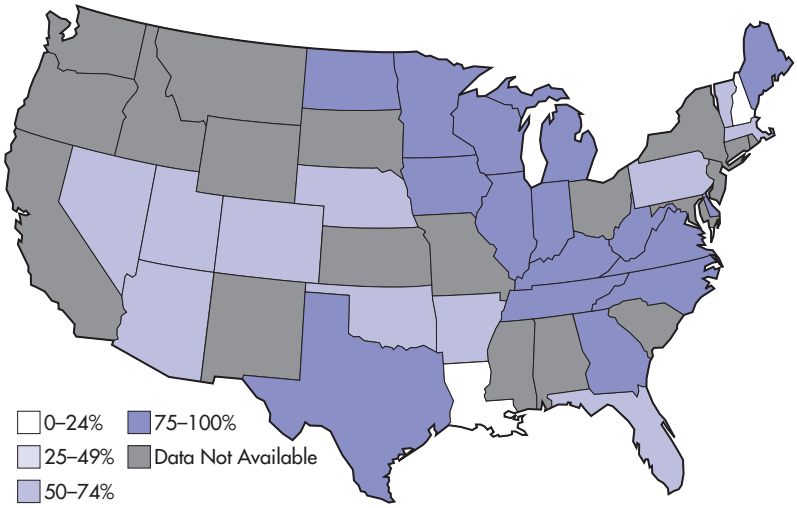
Ongoing education of individuals, health care providers and community leaders is needed to assure continual progress in maintaining and increasing access to this preventive measure.

Figure 22: Percent County Population on Public Water Systems Served by Optimal Fluoride 2004



The estimated net savings for Colorado, if community water fluoridation programs were implemented, would be $22.6 million.[8]

Figure 23: Percentage of State PWS Population Receiving Fluoridated Water, 2004



The cost per person of instituting and maintaining a water fluoridation program in a community decreases with an increase in population (Figure 24).[8] Fluoridation benefits all residents on the community water system and is particularly important to addressing oral health disparities in vulnerable populations that have limited access to dental care services.

In Colorado, 25 percent of residents do not have access to fluoridated community water supplies. Six communities account for two-thirds of this unserved population (Figure 25). If fluoridation programs were implemented in these communities, the net savings for Colorado, in 2004 dollars, would be $22.6 million. (Fluoridation program savings are due to reductions in dental decay.) This would increase the percentage of Coloradans on community systems with optimal levels of fluoride to 90 percent.[24, 8]

Figure 24: Community Water Fluoridation Programs Program Cost per Capita

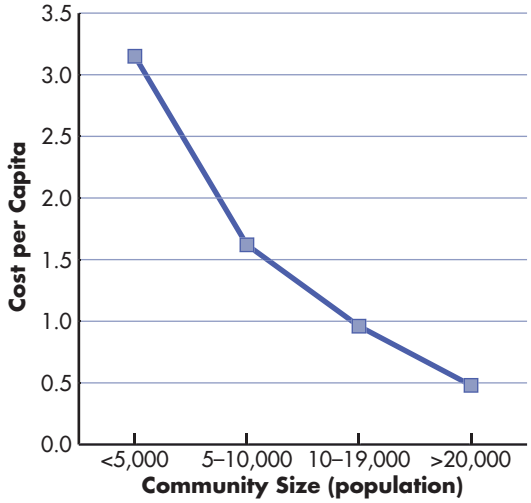
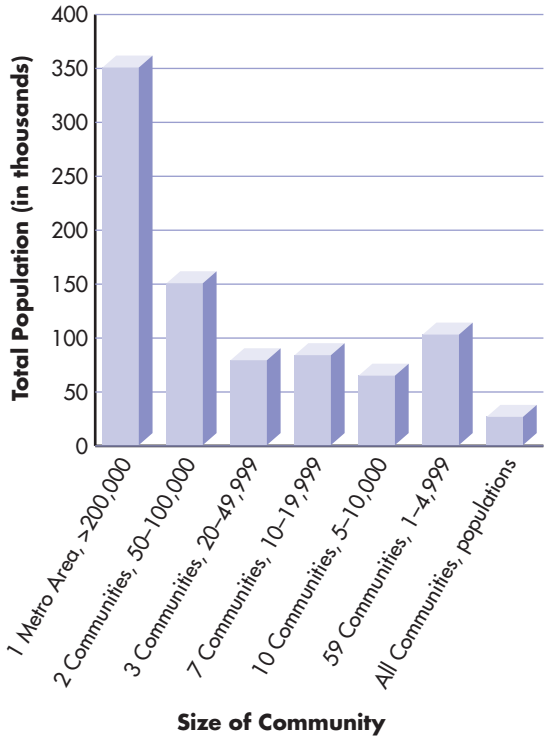


FIGURE 25: Communities Without Fluoridation Programs, Total Population by Community Size

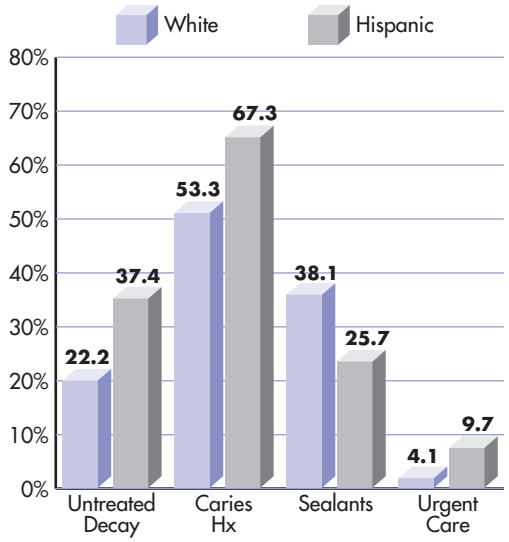


DENTAL SEALANTS

Dental sealants, a thin coating bonded into the pit and fissures of the chewing surface of permanent molars, are nearly 100 percent effective in preventing tooth decay.[1] When properly placed and retained, dental sealants are a highly effective primary preventive measure. The Task Force on Community Preventive Services recommends that sealant programs be included as part of a comprehensive population-based strategy to prevent and control dental decay in communities.[25]

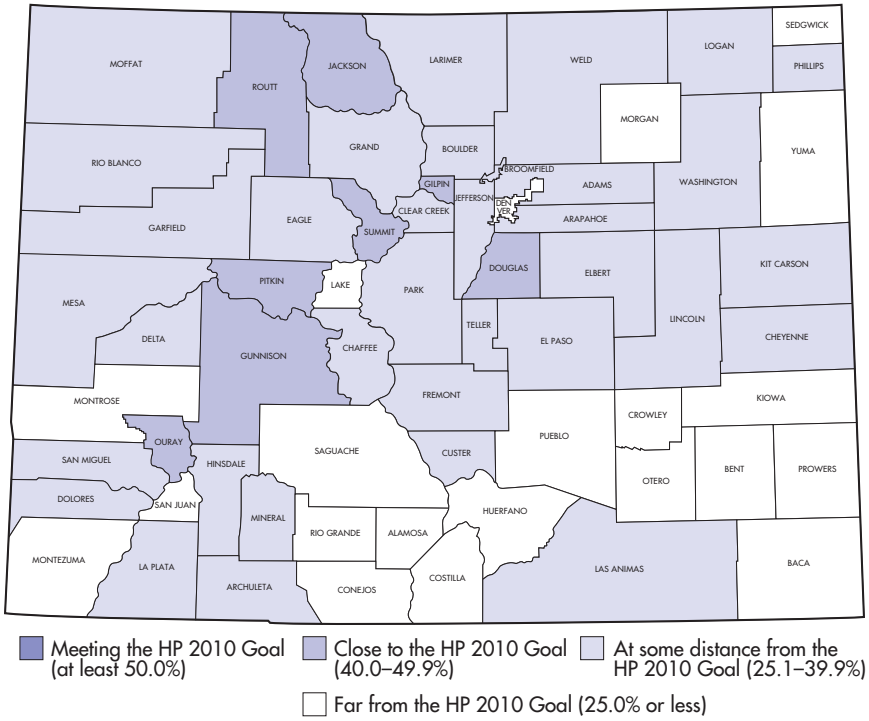
Many children in Colorado have not had access to dental sealants. The Healthy People 2010 goal is for 50 percent of third-grade children to have sealants on at least one of their first permanent molars.[3] In 2004, only 35 percent of Colorado third-graders had sealants on their first molars; that proportion decreasing to 25.7 percent for Hispanic students (Figure 26).[4] The Colorado Department of Public Health and Environment's Oral Health Program and Kids in Need of Dentistry co-sponsor the "Chopper Topper" sealant program, providing sealants to more than 1,100 low-income second graders in 34 Denver metropolitan elementary schools each year.

Figure 26: Oral status in Colorado Third-Grade Children by Race/Ethnicity, 2004



Reaching the Healthy People 2010 goal varies by county throughout the state. From the third-grade screening data, county estimates were derived. Counties categorized as close to the goal are within 80 percent of the goal. Counties at some distance from the goal are between 51 percent and 79 percent of the goal. Counties far from the goal are 50 percent or less of the desired goal (Figure 27).

Figure 27: Sealant Prevalence in Colorado Third-Grade Children, 2002



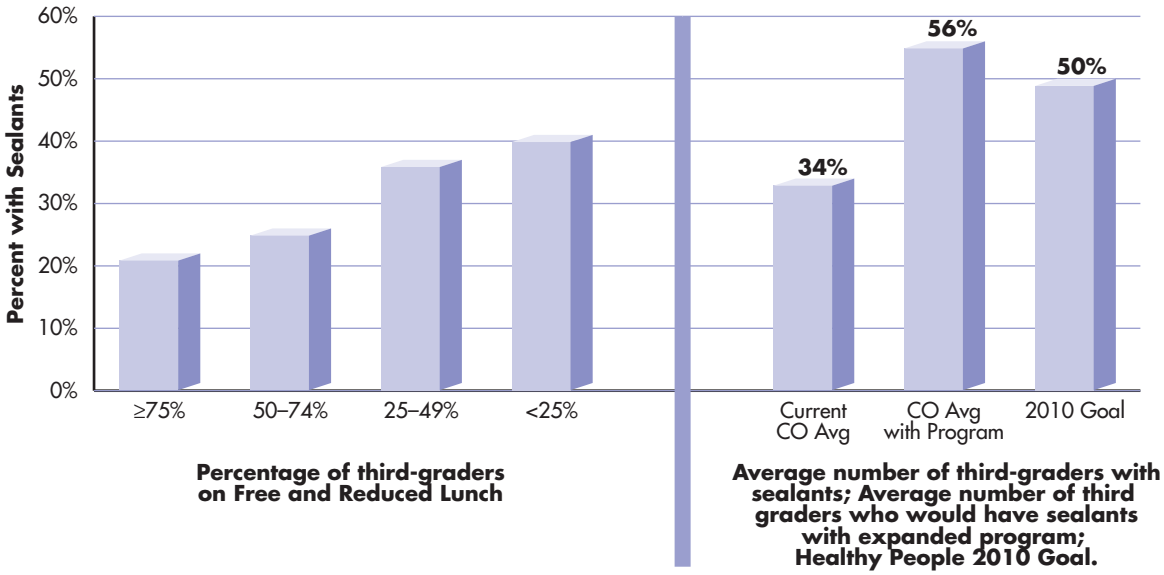
Colorado's Basic Screening Survey found that children estimated to be "at risk" for tooth decay, by free and reduced lunch status, have fewer sealants compared to those who are at lower risk[2] (Figure 28). The Task Force on Community Preventive Services found school-based/school-linked sealant programs to be cost effective, and that the median decrease in decay in permanent molars among children 6–17 years of age was 60 percent, regardless of socioeconomic status and risk of decay.[25]

If the existing school-based sealant model were expanded to provide sealants to all second graders in Colorado schools with 50 percent or more of their students on free and reduced school lunch programs, the Healthy People 2010 goal for sealants would be met and oral health disparities reduced.[8]

School-based/school-linked sealant programs are extremely cost effective.

The estimated net savings of a statewide school sealant program (program savings minus costs) would be approximately $1.2 million in one year alone.[8] In other words, for every dollar spent for a school sealant program two dollars are saved, based on a decrease in dental decay and sealant retention rates over time. Potential savings could be much greater if a portion of sealant program costs are covered through donations of volunteer dental professional time and supplies.[8]

Figure 28: Percent of Children in Third-Grade with First Molar Sealants by Income, Estimated State Average with Program, and Healthy People 2010 Goal



Workforce and Access to Dental Services

ORAL HEALTH WORKFORCE

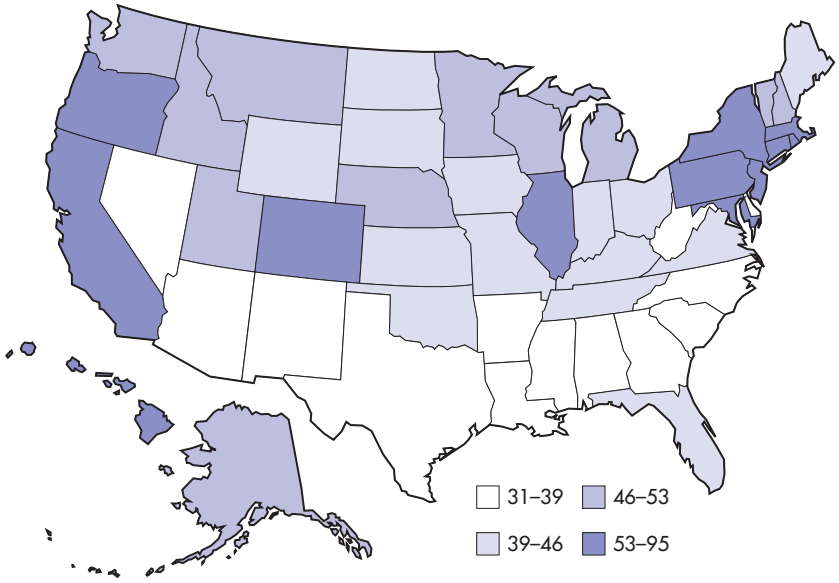
Workforce, to be considered sufficient, must have an adequate capacity to provide care that is accessible and acceptable to address the oral needs and wants of Coloradans.[1]

Colorado is ranked sixth highest in dentists per capita in the nation, with a dentist-to-population ratio of 56.5 per 100,000 in 1998 (Figure 29).[26] However, this represents a 15 percent decrease since 1991.[27]

Nationally, the ratio of dentists-to-population is also declining. Estimates predict a significant shortage by 2020 due to the number of retiring dentists outpacing the number of dental graduates.[28] Conversely, the dental hygienist-to-population ratio in Colorado was 61.0 per 100,000 in 1998, with an anticipated major increase of 50.7 percent by 2008.[27]

"Clinical oral health care is predominantly provided by a private practice dental workforce"[1]

Figure 29: Dentists Per 100,000 Population, 1998

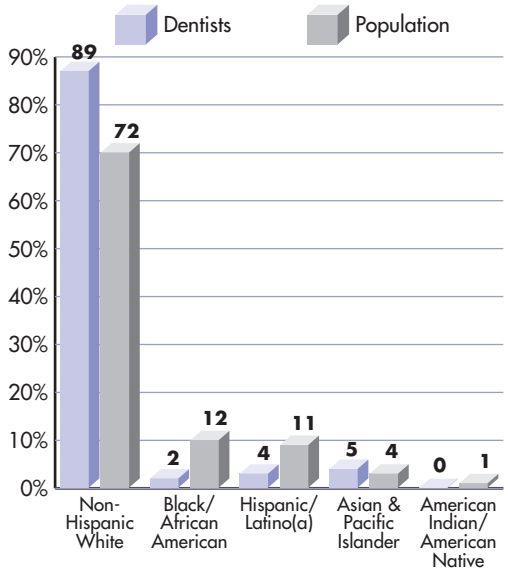


US: 48.4 **Region VIII: 51.6** **Colorado: 56.5**

Table 6: Ratio Dental Assistant and Dental Hygienists to Dentist and per 100,000 Population

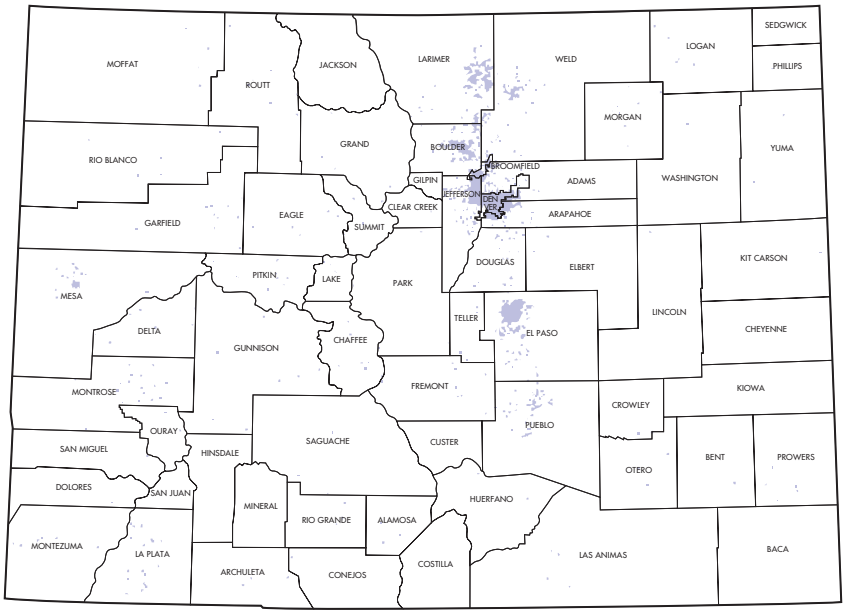
	Colorado	Region VIII	US
Dental Assistants 1998	4,150	9,190	231,380
Per dentist	1.9	2.0	1.8
Per 100, 000 pop.	104.6	104.5	85.6
Dental Hygienists 1998	2,420	4,760	140,750
Per dentist	1.1	1.0	1.1
Per 100,000 pop.	61.0	54.1	52.1

Figure 31: Race/Ethnicity of Dentists and the Population, U.S. 1999



The distribution of dentists is concentrated along the Front Range, in the major population centers. Many rural populations face excessive distances to obtain dental care. Communities with a shortage of dental professionals have limited access across all age strata, from children to seniors. In 1999, a dentist survey was conducted by the Colorado State Board of Dental Examiners and the University of Colorado School of Dentistry in conjunction with licensure renewals. The results indicate that the majority of dentists practice in metropolitan areas, primarily along the Front Range, which corresponds with high-density population centers. In contrast to medicine where only 26 percent of physicians are in family or internal medicine practices, 74 percent of the dentists responding indicate general practice as their primary specialty, with an additional 4 percent in pediatrics and less than 1 percent in public health.[29]

Figure 30: Dental Practice Sites by Zip Code in Colorado



African-American, Latino, and Native-American dentists are underrepresented in Colorado. A quarter of Colorado's population is nonwhite, but only 11 percent of the dental workforce is nonwhite.[26] A diverse dental workforce is key to addressing the unmet needs of minority patients in Colorado.[1]

"Traditionally, Colorado has depended upon dentists migrating into the state to supply its dental manpower needs. The University of Colorado School of Dentistry (UCSD) ameliorates this situation by providing about one-fourth of the new

dentists in the state."[30] The University of Colorado School of Dentistry, the only dental school in Colorado, currently has the capacity to graduate 35 students each year, but will be increasing to 50 in the next few years. The four dental hygiene programs in the state collectively graduate just over 80 dental hygienists each year. In addition, there are five accredited dental assisting programs in the state with 100 graduates per year.

While only 13 counties are designated as HPSAs, it does not represent those that may qualify.

The state Primary Care Office collaborates with the federal Division of Shortage Designation to designate counties and/or specific census tracts as dental Health Professional Shortage Areas (HPSA). In order for an area to be designated, one of the following criteria must be met: 1) a dentist-to-population ratio of 1:5,000 or greater; or 2) a dentist-to-population ratio of 1:4,000 or greater in areas with less than half the population on fluoridated water or where greater than 20 percent of the population is at 200 percent or below the federal poverty level.[31]

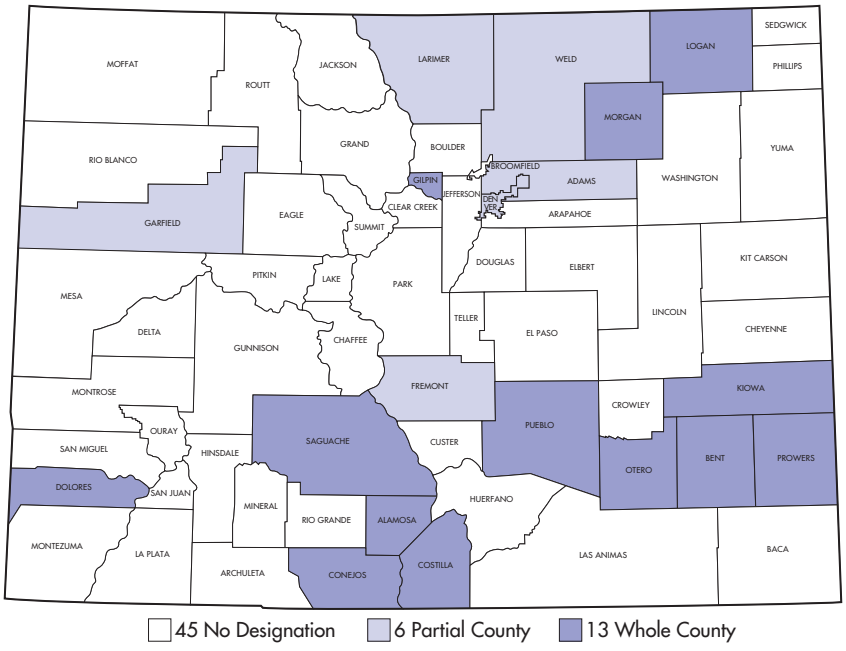
Sixty-nine percent of Colorado counties are currently designated as primary care Health Professional Shortage Areas or Medically Underserved Areas. While only 13 counties are designated as either geographic or low-income dental Health Professional Shortage Areas, it is not an accurate representation of those that may qualify (Figure 32). Colorado traditionally relies on communities to prepare the application to assure support for the designation. Efforts are currently underway to identify and designate all areas that would potentially qualify.

For dentists and dental hygienists that are willing to work in underserved areas and/or serve underserved populations, there are state and federal professional incentive programs including scholarships, education loan repayment and state health professional tax credit programs.

According to the Children's Dental Health Project in Washington, D.C., an estimated 90 percent of the nation's dentists, including specialists, provide services in the private sector of the dental care delivery system.[27] The remaining 10 percent provide services in the public sector, including community and migrant health centers, school-based health centers, private non-profit clinics, and county health departments. There are 16 federally funded community health centers in Colorado, 10 of which have an on-site dental program serving 18 rural sites.[32] There are 17 school-based health centers in the state, four of which have an oral health component, providing 847 dental visits in 2002-2003.[33] In addition, there are eight private non-profit dental clinics contributing to the dental safety net capacity in Colorado.

Fifteen counties in Colorado have organized health departments; the remaining counties are served by public health nursing offices. However, only two health departments, Denver Health Medical and Tri-County Health Department, have a dental component.

Figure 32: Dental Health Professional Shortage Areas in Colorado



ACCESS TO DENTAL SERVICES

Access barriers include lack of dental insurance and limited availability of dental providers accepting publicly funded programs, as well as lack of knowledge about the importance of oral health as it relates to general health and well-being.

While an estimated 43 million Americans currently are without medical insurance, there are more than 150 million Americans with limited or no dental insurance. The most vulnerable populations are those least likely to receive preventive and restorative dental services, such as the low income, the least educated, racial and ethnic minorities, immigrants, the elderly, persons with HIV, the developmentally and medically disabled, and the uninsured.[1] In Colorado, 42 percent of adults reported not having dental insurance,[12] and 30.5 percent of Colorado children are estimated to be without coverage.[9]

Many people do not understand the importance of preventive dental care.

Another contributing factor is the utilization of available resources. In a recent Behavioral Risk Factor Surveillance System survey, 33 percent of Coloradans had not visited the dentist in the past year; of those, 40 percent responded that they did not see a reason to go, while only 26 percent stated cost as the primary reason. Other reasons included fear and pain, and not having a dentist (Figure 33).[12]

Figure 33: Reasons Coloradans Did Not Visit the Dentist Within the Last Year, 1997

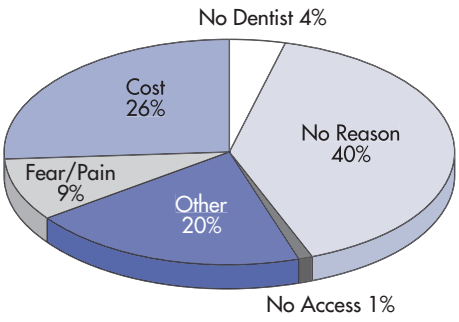
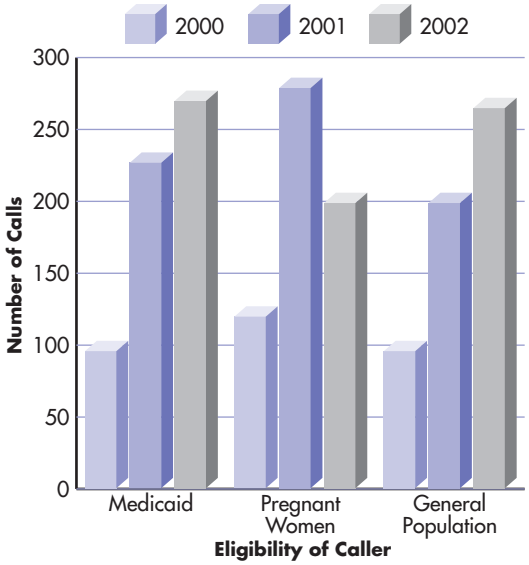


Figure 34: Dental-Specific Calls to the Title V Family Health Line



It is estimated that 51.4 percent of Colorado's children, under age 19, did not have a dental visit in 2000–2001. Of those who had a dental visit in the same time period, estimated average expenditures were $539 million dollars.[34]

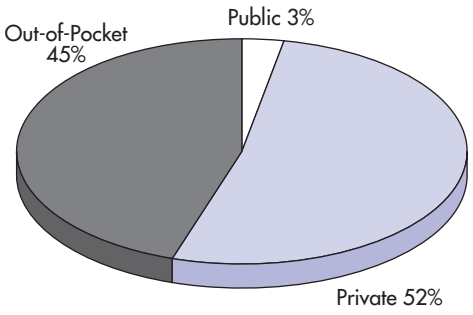
Many Coloradans have difficulty finding dental care as evidenced by calls received by the Family Health Line at the Colorado Department of Public Health and Environment, which tracks calls requesting information and referral to health care services. The number of dental-specific calls has steadily increased over the 2000–2002 period, averaging slightly more than 200 calls per year (Figure 34).

ORAL HEALTH FINANCING

The National Centers for Medicare and Medicaid Services estimate that in 2002 Americans paid 45 percent of their total dental costs out-of-pocket. Additionally, the Medical Expenditure Panel Survey (MEPS) reported that the mean annual dental expense among persons that visited the dentist in 2000 was $497.19.[14]

In Colorado, more than $1 billion is spent on dental services each year. The economic burden of oral disease far surpasses that amount due to costs associated with untreated disease, related adverse health effects, productivity losses and reduced quality of life. The economic burden is difficult to measure because oral needs are met in different settings,

Figure 35: Sources of Payment for Dental Services in the United States, 2002



including dental offices, physician offices, and hospitals. Dental decay is primarily treated in dental offices with the costs of these services estimated to average more than $250 per person per year. [8]

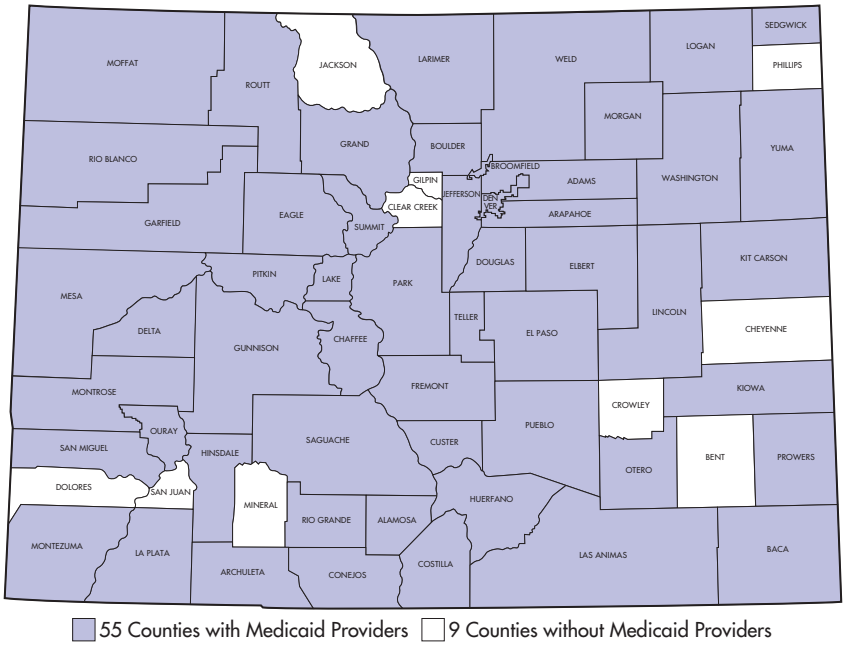
Medicaid is the primary funder of health care for low-income families, elderly and disabled people in the United States. Eligibility is based on state and national criteria, and in Colorado, children ages 6–17 who are from families of four with incomes below $18,400 are eligible.[35] Medicaid serves 19 percent of all children in Colorado, but access to oral health services is limited by several factors, including Medicaid beneficiaries not fully understanding their dental benefits, the availability of dentists who accept new or any Medicaid clients, and low reimbursement rates.

There are an estimated 258,748 children currently eligible (2004) for Medicaid, but less than 12 percent of Colorado licensed dentists participate in Medicaid. Only 3 percent of Medicaid providers are classified as "significant providers"[38]. This is an especially acute problem in rural counties where there may not be any dentists that accept Medicaid. [37]

Nationally, only 1-in-5 Medicaid-eligible children received any dental service the preceding year.[39] However, Colorado has made significant progress in improving access to oral health care services for Medicaid-enrolled children. The implementation by the Department of Health Care Policy and Financing of streamlining processes have increased provider participation from 431 providers in 2002 to 530 in 2003. These processes included:

- Simplification of the provider application;
- Elimination of most prior authorization requirements for children;
- Faster claims payments;
- Adoption of American Dental Association procedure codes;
- Training of provider staff;
- Simplification of eligibility determinations;
- Allowing unsupervised dental hygienists to become Medicaid providers.

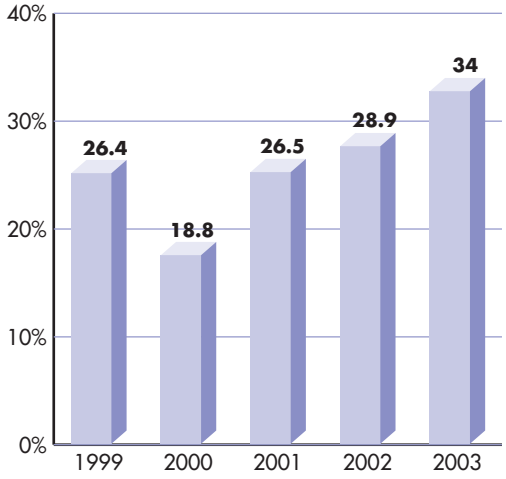
Figure 36: Counties Without a Medicaid-Participating Dentist



In addition, the implementation of many of the recommendations of the Colorado Commission on Children's Dental Health has also increased the availability of oral health services to the Medicaid population. The Dental Loan Repayment Program has allowed 24 dentists and hygienists the ability to serve more than 10,000 Medicaid children. The dental infrastructure grants, administered by the Department of Health Care Policy and Financing, supported the expansion of 13 dental practices and clinics so that they may see additional Medicaid and other underserved patients.

The results have been a significant increase in the number of Medicaid children seen (Figure 38). The percent of Colorado Medicaid-eligible children that received any kind of dental care increased from 26.4 percent in 1999 to 34.0 percent in 2003. [40] This is even more significant in light of a 32 percent increase in the number of eligible children during the past five years.

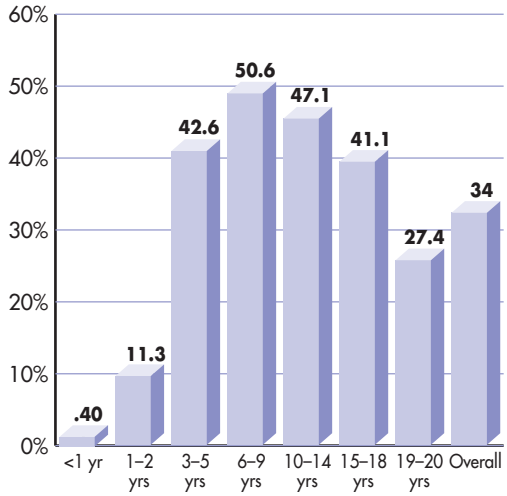
Figure 37: Percent of Colorado Medicaid-Eligible Children Receiving any Dental Service, Colorado 1999–2003



Breaking down these percentages by age group illustrates significant differences and opportunities to improve access to dental services. With the current emphasis on seeing children under the age of 3, the overall percentage of Medicaid utilization will most likely increase (Figure 38).

The Child Health Plan Plus (CHP+) is a public/private partnership providing subsidized medical and dental insurance for children from low-income families who are not eligible for Medicaid, and is Colorado's State Children Health Insurance Program (SCHIP). A comprehensive dental benefit, including preventive, restorative, oral surgery, and endodontics, was added to CHP+ in March 2002. Preventive services have no co-pay, and other services have co-pays of $5.00 or less.[40] Administered by Delta Dental Plan of Colorado with a network more than 800 dentists, more than 21,000 children received dental services in the first year of the program, which equaled a 34 percent utilization rate.[40]

Figure 38: Percent of Medicaid-Eligible Children Receiving Any Dental Service by Age, Colorado 2003



A significant percentage of Colorado dentists donate dental services to underserved and disabled populations. In the Give Kids a Smile Day (American Dental Association) and Smile-A-Bration (Delta Dental Plan of Colorado) in the two-year period 2003–2004, more than 5,700 children received free dental services from nearly 400 participating dentists and dental hygienists. Further the Colorado Foundation of Dentistry for the Handicapped reached the $10 million mark in 2004 in the value of services provided to developmentally disabled Coloradans.

Future Considerations

GAPS AND NEXT STEPS

Colorado has made substantial progress in improving the oral health of its residents. However, significant disparities remain, including access to known preventive measures, recognition of the importance of oral health as it relates to general health, knowledge of the impact of various risk behaviors on optimal oral health, utilization of benefits, and projected workforce shortages.

While the information presented here is the most comprehensive to date, it is by no means complete. There is still more to learn about Coloradans' oral health status and behaviors, including:

- Percentage of children visiting the dentist by age 1, consistent with the American Academy of Pediatric Dentistry recommendation;
- Oral hygiene practices in daycare settings;
- Actual, and perceived, oral health of adolescents and prevalence of risk behaviors including oral piercing;
- Use of hospital emergency rooms for acute dental problems and the related costs to the public;
- Fluoride levels in private well systems;
- Oral health status and disease rates of special populations, including migrant and native populations; and
- Oral health status of institutionalized elderly.

Developing strategies to improve oral health and raising awareness of the importance of oral health is the mission of the statewide coalition Oral Health Awareness Colorado! (OHAC!) The coalition involves professionals representing a wide range of public, private, and non-profit organizations interested in advancing oral health in Colorado. Its mission is to develop and to promote strategies that achieve optimal oral health for all Coloradans, including the development of a state oral health plan, with broad stakeholder input, to be released in summer 2005.

The state oral health plan will provide strategic guidance to government, health professions, education, business and communities in improving the oral health and, thereby, the overall health of Coloradans. The Colorado Oral Health Surveillance System will track trends in oral disease rates, providing one measure of evaluation for the strategies prioritized in the state oral health plan.

It is hoped that readers of *"The Impact of Oral Disease on the Health of Coloradans"* will find these data useful as they continue their efforts to understand the factors influencing oral health in Colorado.

Index to Figures and Tables

FIGURE 19: **Economic Burden of Oral Cancer.** SOURCE: Colorado Department of Public Health and Environment, Oral Health Program, Economic Analysis of the Burden of Oral Disease in Colorado, 2004.

FIGURE 20: **Youth Who Ever Used Smokeless Tobacco (Chewing tobacco, snuff or dip), Colorado 2001.** SOURCE: Colorado Department of Public Health and Environment, State Tobacco Education and Prevention Partnership, Youth Tobacco Use in Colorado, 2001

FIGURE 21: **Current Use of Smokeless Tobacco, Men Aged 18–44, by Race/Ethnicity, 2001.** SOURCE: Levinson, A. Use in Colorado Non-Cigarette Tobacco. Colorado Tobacco Attitudes and Behaviors Surveys, 2001.

FIGURE 22: **Percent County Population on Public Water Systems Served by Optimal Fluoride 2004.** SOURCE: Centers for Disease Control, Division of Oral Health Water Fluoridation Reporting System, May 2004.

FIGURE 23: **Percentage of State PWS Population Receiving Fluoridated Water, 2004.** SOURCE: Oral Health Maps, Water Fluoridation. Centers for Disease Control, Division of Oral Health. Retrieved October 31, 2004 from: http://apps.nccd.cdc.gov/gisdoh/map.asp

FIGURE 24: **Community Water Fluoridation Programs Program Cost per Capita.** SOURCE: CDC Water Fluoride Reporting System, 2003, and the Colorado Department of Public Health and Environment, Oral Health Program, Economic Analysis of the Burden of Oral Disease in Colorado, 2004.

FIGURE 25: **Communities Without Fluoridation Programs Total Population by Community Size.** SOURCE: CDC Water Fluoride Reporting System, 2003 and the Colorado Department of Public Health and Environment, Oral Health Program, Economic Analysis of the Burden of Oral Disease in Colorado, 2004.

FIGURE 26: **Oral status in Colorado Third-Grade Children by Race/Ethnicity, 2004.** SOURCE: Colorado Department of Public Health and Environment, Oral Health Program. Basic Screening Survey, 2004

FIGURE 27: **Sealant Prevalence in Colorado Third-Grade Children, 2002.** SOURCE Colorado Department of Public Health and Environment. Maternal and Child Health Indicator County Data Sets, 2003.

FIGURE 28: **Percent of Children in Third-Grade with First Molar Sealants by Income, Estimated State Average with Program, and Healthy People 2010 Goal.** SOURCE: Colorado Department of Public Health and Environment, Oral Health Program, Economic Analysis of the Burden of Oral Disease in Colorado, 2004.

FIGURE 29: **Dentists Per 100,000 Population, 1998.** SOURCE: American Dental Association. Bureau of the Census.

TABLE 6: **Ratio Dental Assistants and Dental Hygienists to Dentists and per 100,000 Population.** SOURCE: Bureau of Labor and Statistics. American Dental Association. Bureau of the Census Accessed May 2004 ftp://ftp.hrsa.gov/bhpr/workforceprofiles/CO.pdf

FIGURE 30: **Dental Practice Sites by Zip Code in Colorado.** SOURCE: Prepared by Colorado Area Health Education Center/ University of Colorado Health Sciences Center

FIGURE 31: **Race/Ethnicity of Dentists and the Population, U.S. 1999.** SOURCE: HRSA State Health Workforce Profiles. Bureau of Health Professions National Center for Health Workforce Information and Analysis, 2000. Bureau of Labor Statistics. Bureau of the Census FTP://FTP.HRSA.GOV/BHPR/WORKFORCEPROFILES/CO.PDF

FIGURE 32: **Dental Health Professional Shortage Areas in Colorado.** SOURCE: Colorado Department of Public Health and Environment, Primary Care Office, 2004

FIGURE 33: **Reasons Coloradans Did Not Visit the Dentist Within the Last Year, 1997.** SOURCE: Colorado Department of Public Health and Environment. Behavioral Risk Factor Surveillance System 1997–1999 Combined Analysis

FIGURE 34: **Dental-Specific Calls to the Title V Family Health Line.** SOURCE: Colorado Department of Public Health and Environment, Family Healthline, 2004

FIGURE 35: **Sources of Payment for Dental Services in the United States, 2002.** SOURCE: Agency for Healthcare Research and Quality, 2004. Medical Expenditure Panel Survey Research Findings No. 20. Agency for Healthcare Research and Quality Pub. No. 04-0018

FIGURE 36: **Counties Without a Medicaid-Participating Dentist.** SOURCE: Colorado Department of Health Care Policy and Financing

FIGURE 37: **Percent of Colorado Medicaid-Eligible Children Receiving any Dental Service, Colorado 1999–2003.** SOURCE: Centers for Medicare and Medicaid Services, Form 416

FIGURE 38: **Percent of Medicaid-Eligible Children Receiving Any Dental Service by Age, Colorado 2003.** SOURCE: Centers for Medicare and Medicaid Services, Form 416

References

1. U.S. Department of Health and Human Services, *Oral Health in America: A Report of the Surgeon General*. Rockville, MD: U.S. Department of Health and Human Services, National Institute of Dental and Craniofacial Research, National Institutes of Health, 2000.
2. Colorado Department of Public Health and Environment, Asthma Program. Retrieved October 31, 2004, from: http://www.cdphe.state.co.us/ps/asthma/asthmahom.asp
3. Centers for Disease Control and Prevention, National Center for Health Statistics, *Healthy People 2010, Oral Health*. Available at: http://www.healthypeople.gov/document/HTML/Volume2/21Oral.htm
4. Colorado Department of Public Health and Environment, Oral Health Program, Basic Screening Survey, 2004.
5. Association of State and Territorial Dental Directors. *Best Practice Approaches for State and Community oral Health Programs: School-Based Sealant Programs*. Retrieved August 28, 2003, from: http://www.astdd.org/bestpractices/pdf/BPASchoolSealantPrograms.pdf
6. Administration for Children and Families, Headstart Bureau. Retrieved October 21, 2004 from: www.acf.hhs.gov/programs/hsb/about/index.htm
7. Lidral AC, Murray JC, Buetow KH, Basart AM, Schearer H, Schiang R, Naval A, Layda E, Magee K, Magee W. *Studies of the candidate genes TGFB2, MSX1, TGFA, and TGFB3 in the etiology of cleft lip and palate in the Philippines*. Cleft Palate Craniofacial J 1997 Jan;34(1):1–6.
8. O'Connell, Joan. University of Colorado Health Sciences Center, *Economic Burden of Oral Health in Colorado*, 2004.
9. Children's Dental Health Project. "Periodontal Disease Association With Poor Birth Outcomes: State of the Science and Policy Implications," June 4, 2003, www.cdhp.org
10. Lydon-Rochelle M, Krakowiak P, Hujoel P, Peters R. *Dental Care Use and Self-Reported Dental Problems in Relation to Pregnancy*. American Journal of Public Health 2004;94:765–771.
11. Colorado Department of Public Health and Environment. Pregnancy Risk Assessment Monitoring Survey Combined Analysis, 2000–2001. Performed by Lilah Besser at CDC Division of Oral Health.
12. Colorado Department of Public Health and Environment. Behavioral Risk Factor Surveillance System, 2002 analysis.
13. Hunsaker, Jill A. (2001). *Profiles of Health Disparities Among Communities of Color.* Colorado Department of Public Health and Environment, Turning Point Initiative.
14. Brown E, Manski R. *Dental services: use expenses, and sources of payment, 1996–2000.* Rockville (MD): Agency for Healthcare Research and Quality, 2004. MEPS Research Findings No. 20. AHRQ Pub. No. 04-0018.
15. Gooch BF, Eke PI, Malvitz DM. **Public Health and Aging: Retention of Natural Teeth Among Older Adults—United States, 2002**. *MMWR*;52(50)
16. Colorado Central Cancer Registry, Colorado Department of Public Health and Environment, Personal Communication, 11/16/04.
17. Rothman K, Keller A. *The effect of joint exposure to alcohol and tobacco on risk of cancer of the mouth and pharynx*. J Chronic Dis 1972 Dec;25(12):711–6.
18. Blot WJ, McLaughlin JK, Winn DM, Austin DF, Greenberg RS, Preston-Martin S, Bernstein L, Schoenberg JB, Stemhagen A, Fraumeni JF Jr. *Smoking and drinking in relation to oral and pharyngeal cancer.* Cancer Research 1988; 48:3282–7.
19. Colorado Department of Public Health and Environment, State Tobacco Education and Prevention Partnership. Tobacco Attitudes and Behaviors Survey, 2001.
20. Colorado Department of Public Health and Environment. Colorado Central Cancer Registry. *Cancer in Colorado, 1996–2001: Incidence, Mortality and Survival 2004*. Available at: http://www.cdphe.state.co.us/pp/cccr/1996-2001
21. Colorado Department of Public Health and Environment, State Tobacco Education and Prevention Partnership, Tobacco Use in Colorado, 2001.
22. MMWR—*Cigarette Smoking Among Adults—United States, 2002*. May 28, 2004 / Vol. 3 / No. 20.
23. Centers for Disease Control and Prevention. *Achievements in Public Health, 1900–1999: Fluoridation of Drinking Water to Prevent Dental Caries*. MMWR, October 22, 1999; 48(41):933–940.
24. Colorado Department of Public Health and Environment, Association of State and Territorial Dental Directors, Centers for Disease Control, Water Fluoride Reporting System 2003
25. Guide to Preventive Community Services. School-Based or School-Linked Pit and Fissure Sealant Delivery Programs are Effective in Reducing Tooth Decay in Children and Adolescents. December 2002. http://www.thecommunityguide.org/oral/oral-int-seal.pdf
26. HRSA State Health Workforce Profiles. Bureau of Health Professions National Center for Health Workforce Information and Analysis, 2000. ftp://ftp.hrsa.gov/bhpr/workforceprofiles/co.pdf

27. Burton, E. Colorado—*The STATE of ORAL HEALTH: Profiles of Children's Dental Care, Insurance, Dental Workforce & Financing*. The Children's Dental Health Project, April 2003.

28. Valachovic, Richard W. *"Dental Education and Emerging Trends: Challenges for U.S. Dental Schools."* Presentation at Primary Care Symposium, 2000.

29. Peregrine Database

30. Solomon, E. The Colorado Report: A Study of the Relationship Between the University of Colorado School of Dentistry and the Supply of Dentists in Colorado. University of Colorado School of Dentistry. Denver, January 2001.

31. Health Professional Shortage Area Dental Designation Criteria, Health Resources and Services Administration. http://bhpr.hrsa.gov/shortage/hpsacritdental.htm

32. http://www.cchn.org/health_centers/ Accessed 11/10/04

33. CDC and ASTDD. Synopsis of State and Territorial Dental Public Health Programs. Colorado 2004. Retrieved October 31, 2004, from http://www2.cdc.gov/nccdphp/doh/synopses/StateDataV.asp?StateID=CO&Year=2004

34. Colorado Department of Public Health and Environment. Behavioral Risk Factor Surveillance System, 1997 analysis.

35. American Academy of Pediatrics and the National Association of Children's Hospitals and Related Institutions. Colorado Medicaid Facts. Aug 2003.

36. Elliot-Anderson, P. *Staff Salaries levels are down for 1993*. Dental Economics, 1985;(75):46–51.

37. Personal Communication with Colorado Department Health Care Policy and Financing, 11/10/04.

38. Colorado Department of Health Care Policy and Financing, 2003.

39. Burton, E. At-a-Glance Dental Delivery Systems. Children's Dental Health Project.

40. Children's Basic Health Plan, Annual Report, Fiscal Year 2003

41. State of Colorado Child Health Plan (CHP+) Dental Plan Analysis: February 1, 2002–January 31, 2003. Executive Summary. October 28, 2003

42. MMWR—*State Specific Prevalence of Current Cigarette Smoking Among Adults—United States, 2003*. November 12, 2004/Vol. 53/ No. 44.

43. Rosenblatt, Rebecca. "*Tobacco Use in Colorado: Results from the Behavioral Risk Factor Surveillance System, 2003*. Health Watch. June 2004/ No. 56.

For additional copies of this report go to:
http://www.cdphe.state.co.us/pp/oralhealth/impact.pdf

Colorado Department of Public Health and Environment
Oral Health Program
4300 Cherry Creek Drive South PSD-OH-A4
Denver CO 80246
Phone 303.692.2470
Fax 303.758.3448