

COLORADO ORAL HEALTH SURVEY 2003-2004 SCHOOL YEAR

**PRELIMINARY RESULTS
JULY 6, 2004**

Prepared by:
Kathy Phipps, DrPH
ASTDD Data Coordinator
PO Box 1006
Morro Bay, CA 93443
Tel: 805-771-9788
Fax: 805-771-9843
Email: krp123@charter.net

SUMMARY

During the 2003-2004 school year, the Colorado Department of Public Health and Environment conducted a statewide oral health survey of kindergarten and third grade children enrolled in Colorado's public elementary schools. Fifty public schools were included in the probability sample and 44 agreed to participate. Forty volunteer dental hygienists screened those children who returned a positive consent form. Within the 44 participating schools, the response rate was 74 percent for kindergarten and 68 percent for third grade children.

Key Findings

- ⇒ Dental decay is a significant public health problem for Colorado's children.
 - 46 percent of the kindergarten and 57 percent of the third grade children had cavities and/or fillings (decay experience)
 - 27 percent of the kindergarten and 26 percent of the third grade children had untreated dental decay (cavities)
- ⇒ While dental sealants are a proven method for preventing decay, most of Colorado's children do not have access to this preventive service.
 - Only 35 percent of the third grade children had dental sealants
- ⇒ Children from low-income schools have poorer oral health.
 - Compared to children from higher income schools (<25% eligible for free or reduced price meals), children in low-income schools ($\geq$ 75% eligible for free or reduced price meals) have a significantly higher prevalence of both decay experience and untreated decay; in addition to a higher mean number of quadrants in need of dental care. Children from low-income schools, however, have a significantly lower prevalence of dental sealants.
- ⇒ Hispanic children have poorer oral health.
 - Compared to white non-Hispanic children, a significantly higher proportion of Hispanic children had decay experience and untreated decay, while a lower proportion had dental sealants.
- ⇒ Considerable improvements in the oral health of Colorado's children must be made in order to meet the Healthy People 2010 objectives for caries experience, untreated decay and dental sealants.

Methods

Sampling: The 2002-2003 electronic list of all public elementary schools in Colorado with third grade children was obtained from the Department of Education (936 schools and 55,975 third grade students). All schools with at least 10 children in third grade were included in the sampling frame (884 schools and 55,724 students). Using probability proportional to size sampling along with implicit stratification by percent of children eligible for the free and/or reduced price meal program; 50 elementary schools were selected. If a school refused to participate, a replacement school within the same sampling strata was selected. If the sample school plus two replacement schools refused to participate, no data were collected in that sampling stratum. Of the 50 strata, data is available for 44.

Data Management and Analysis: Data entry and analysis was completed using Epi Info Version 3.2. Epi Info is a public access software program developed and supported by the Centers for Disease Control and Prevention. To account for differences in response rates between schools, the data were adjusted for non-response. The number of children enrolled in each school was divided by the number of children screened to obtain the non-response sampling weight for each school.

Screening Methods: All children in both kindergarten and third grade were screened; if they returned a positive consent form. Forty volunteer dental hygienists completed the screenings using gloves, flashlights, and disposable mouth mirrors supplied by the Department of Health. The diagnostic criteria outlined in **Basic Screening Surveys: An Approach to Monitoring Community Oral Health** were used. The volunteer hygienists attended a training session and watched the Basic Screening Survey training video.

Results

Of the 50 selected schools, 44 agreed to participate in the oral health survey. In terms of eligibility for the free and/or reduced price meal program, the participating schools did not differ substantially from either the 50 schools in the original sample or the 884 schools in the sampling frame.

Comparison of Participating Schools to All Colorado Schools			
	Participating Schools (n=44)	Schools in Sample (n=50)	All Schools with ≥ 10 3 rd Grade Students (n=884)
% Eligible for F/R Lunch	33.8	31.2	33.3

Kindergarten Children (Table 1): The 44 participating schools had a kindergarten enrollment of 2,962; of which 2,192 completed a dental screening (74% response rate). The children ranged in age from 4-7 years with a mean of 5.5 years. About half of the children were male (49%) and slightly more than half were white non-Hispanic (53%).

Forty-six percent of the children screened had decay experience (untreated decay or fillings) in their primary and/or permanent teeth while 27 percent had untreated decay at the time of the screening.¹ Of the children with untreated decay (n=570), the mean number of quadrants with decay was 1.98. Almost 31 percent of the children needed dental treatment including six percent in need of urgent dental care because of pain or infection.

Third Grade Children (Table 3): The 44 participating schools had a third grade enrollment of 2,987; of which 2,031 completed a dental screening (68% response rate). The children ranged in age from 7-11 years with a mean of 8.6 years. About half of the children were male (52%) and slightly more than half were white non-Hispanic (56%).

Fifty-seven percent of the children screened had decay experience (untreated decay or fillings) in their primary and/or permanent teeth while 26 percent had untreated decay at the time of the screening. Of the children with untreated decay (n=516), the mean number of quadrants with decay was 1.82. Almost 40 percent of the children needed dental treatment including six percent in need of urgent dental care because of pain or infection.

Thirty-five percent of the children had a dental sealant on at least one permanent molar. Dental sealants provide an effective way to prevent decay on the chewing surfaces of molars (back teeth), which are most vulnerable to caries. A clear resin is used to cover the “pits and fissures” on the top of the teeth so that cavity-causing bacteria cannot reach areas that are difficult to clean and for fluoride to penetrate.

Impact of Socioeconomic Status (Tables 5B and 6B): Eligibility for the free and/or reduced price lunch (FRL) program is often used as an indicator of overall socioeconomic status. To be eligible for the FRL program during the 2003-2004 school year, annual family income for a family of four could not exceed \$34,040.² While information on eligibility for the FRL program is not available at the student level it is available at the school level. The schools taking part in the oral health survey were categorized into four income levels based on the percentage of children eligible for the FRL program.

- High income: Less than 25% of students eligible.
- Moderate income: 25% - 49.9% of students eligible.
- Middle-low income: 50% - 74.9% of the students eligible.
- Low income: 75% or more of the students eligible.

For both kindergarten and third grade, children at low-income schools had a significantly higher prevalence of both caries experience and untreated decay compared to children at high-income school. In addition, children at low-income schools had a significantly

¹ The percent of children with untreated decay is assumed to be an under estimation because radiographs (x-rays) were not taken.

² U.S. Department of Agriculture, Child Nutrition Programs, School Lunch Program, Income Eligibility Guidelines SY 2003-2004, www.fns.usda.gov/cnd/governance/notices/iegs/IEGs03-04.pdf (06/16/04).

higher mean number of quadrants in need of dental care. For third grade children, the prevalence of dental sealants was significantly lower in low-income schools compared to higher-income schools.

Impact of Race and Ethnicity (Tables 7 and 8): Tables 7 and 8 compare the oral health of white non-Hispanic children with Hispanic children. For both kindergarten and third grade children, Hispanic children, compared to white children, have a significantly higher prevalence of caries experience and untreated decay. The prevalence of dental sealants is significantly lower in Hispanic third grade children compared to similar white non-Hispanic children. NOTE: The racial/ethnic disparities noted may be associated with differences in socioeconomic status.

Healthy People 2010 Objectives (Table 9): The National Oral Health Objectives for the Year 2010 (Healthy People 2010) outline several oral health status objectives for young children. For six- to eight-year-old children there are three primary oral health status objectives:

- To decrease the proportion of children who have experienced dental caries in permanent or primary teeth to 42 percent.
- To decrease the proportion of children with untreated dental caries in permanent or primary teeth to 21percent.
- To increase the proportion of eight-year-olds receiving protective sealing of the occlusal surfaces of permanent molar teeth to 50 percent.

While the Colorado Oral Health Survey was not designed to be representative of 6-8 year old children in Colorado, it does provide some information that can be compared to the Healthy People 2010 objectives. Of the kindergarten and third grade children screened, 1873 were between 6-8 years of age (with the majority of these being either age 6 or age 8). Based on information from these 1,873 children, the State of Colorado needs to make considerable progress if the Healthy People 2010 objectives are to be met. Almost 52 percent of the 6-8 year old children screened in Colorado had experienced dental caries – substantially higher than the HP2010 objective of 42 percent. Twenty-eight percent of the Colorado 6-8 year old children had untreated caries compared to the HP2010 objective of 21 percent. Thirty-two percent of eight-year-old children screened (n=833) had dental sealants compared to the HP2010 objective of 50 percent.

Comparison to Other States (Figures 1-3)

Figures 1-3 compare the oral health of Colorado's third grade children with the oral health of children from several other states. Each of the states represented in the figure gathered oral health status information using the same protocols as Colorado. Overall, third grade children in Colorado tend to be in the "middle" in terms of oral health status.

Table 1
Oral Health of Colorado's Kindergarten Children
Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,192		
Age			
Mean age (years)	2,129	5.5 (SE 0.03)	
Age range		4-7 years	
Gender			
% Male	2,192	49.4	46.2-52.7
% Female		50.6	47.3-53.8
Race/Ethnicity			
% White	2,192	52.7	43.7-61.7
% African-American		4.1	1.9-6.3
% Hispanic		32.5	23.3-41.6
% Asian		2.0	1.1-2.9
% Native American		0.3	0.0-0.6
% Pacific Islander		0.2	0.0-0.5
% Multi-racial		1.4	0.3-2.5
% Other		0.4	0.0-0.7
% Unknown		6.4	1.4-11.3
Caries Experience			
% with caries experience	2,192	45.7	40.0-51.5
% caries free		54.3	48.5-60.0
Untreated Decay			
% with untreated decay	2,192	26.9	22.2-31.7
Quadrants with Decay			
% with 0 quadrants	2,192	73.1	68.3-77.8
% with 1 quadrant		12.0	9.7-14.4
% with 2 quadrants		7.3	5.7-8.8
% with 3 quadrants		3.7	2.5-4.9
% with 4 quadrants		3.9	2.4-5.5
Quadrants with Decay			
All children (mean)	2,191	0.53	0.41-0.66
Children with decay (mean)	570	1.98	1.82-2.14
Treatment Urgency			
% with no obvious problem	2,191	69.5	63.9-75.1
% needing early care		24.2	20.2-28.3
% needing urgent care		6.3	3.8-8.7

Table 2
Oral Health of Colorado's Kindergarten Children
Not Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,192		
Age			
Mean age (years)	2,129	5.5 (SD 0.52)	
Age range		4-7 years	
Gender			
% Male	2,192	49.4	47.3-51.5
% Female		50.6	48.5-52.7
Race/Ethnicity			
% White	2,192	54.9	52.8-57.0
% African-American		3.7	3.0-4.6
% Hispanic		30.5	28.6-32.5
% Asian		2.1	1.6-2.8
% Native American		0.3	0.1-0.7
% Pacific Islander		0.3	0.1-0.6
% Multi-racial		1.2	0.8-1.8
% Other		0.4	0.2-0.8
% Unknown		6.5	5.5-7.7
Caries Experience			
% with caries experience	2,192	44.4	42.3-46.5
% caries free		55.6	53.5-57.7
Untreated Decay			
% with untreated decay	2,192	26.0	24.2-27.9
Quadrants with Decay			
% with 0 quadrants	2,192	74.0	72.1-75.8
% with 1 quadrant		11.5	10.2-12.9
% with 2 quadrants		7.4	6.3-8.6
% with 3 quadrants		3.6	2.8-4.4
% with 4 quadrants		3.6	2.8-4.4
Quadrants with Decay			
All children (mean)	2,191	0.51	0.40-0.62
Children with decay (mean)	570	1.97	1.84-2.10
Treatment Urgency			
% with no obvious problem	2,191	70.0	68.0-71.9
% needing early care		24.1	22.3-25.9
% needing urgent care		5.9	5.0-7.0

Table 3
Oral Health of Colorado's Third Grade Children
Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,031		
Age			
Mean age (years)	1,956	8.6 (SE 0.04)	
Age range		7-11 years	
Gender			
% Male	2,031	51.6	47.7-55.4
% Female		48.4	44.6-52.3
Race/Ethnicity			
% White	2,031	56.0	47.2-64.8
% African-American		3.3	1.6-5.1
% Hispanic		27.2	18.5-35.9
% Asian		2.5	1.1-4.0
% Native American		0.2	0.1-0.5
% Pacific Islander		0.3	0.0-0.1
% Multi-racial		1.1	0.3-1.8
% Other		0.5	0.1-0.9
% Unknown		9.0	1.8-16.2
Caries Experience			
% with caries experience	2,031	57.2	52.5-61.9
% caries free		42.8	38.1-47.5
Untreated Decay			
% with untreated decay	2,028	26.1	22.1-30.0
Quadrants with Decay			
% with 0 quadrants	2,028	73.9	70.0-77.9
% with 1 quadrant		13.7	11.4-16.0
% with 2 quadrants		6.7	5.0-8.4
% with 3 quadrants		2.2	1.4-3.1
% with 4 quadrants		3.4	1.9-5.0
Quadrants with Decay			
All children (mean)	2,028	0.48	0.37-0.58
Children with decay (mean)	516	1.82	1.65-2.00
Treatment Urgency			
% with no obvious problem	2,031	60.4	54.0-66.8
% needing early care		34.0	27.8-40.1
% needing urgent care		5.6	3.7-7.5
Dental Sealants			
% with dental sealants	1,958	35.2	30.1-40.2

Table 4
Oral Health of Colorado's Third Grade Children
Not Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,031		
Age			
Mean age (years)	1,956	8.6 (SD 0.56)	
Age range		7-11 years	
Gender			
% Male	2,031	50.5	48.3-52.7
% Female		49.5	47.3-51.7
Race/Ethnicity			
% White	2,031	57.5	55.3-59.6
% African-American		3.1	2.4-3.9
% Hispanic		25.4	23.5-27.3
% Asian		2.6	1.9-3.4
% Native American		0.2	0.1-0.6
% Pacific Islander		0.0	0.0-0.3
% Multi-racial		1.1	0.7-1.7
% Other		0.6	0.3-1.1
% Unknown		9.6	8.4-11.0
Caries Experience			
% with caries experience	2,031	57.1	54.9-59.2
% caries free		42.9	40.8-45.1
Untreated Decay			
% with untreated decay	2,028	25.4	23.6-27.4
Quadrants with Decay			
% with 0 quadrants	2,028	74.6	72.6-76.4
% with 1 quadrant		13.5	12.1-15.1
% with 2 quadrants		6.5	5.5-7.7
% with 3 quadrants		2.4	1.8-3.2
% with 4 quadrants		3.0	2.3-3.9
Quadrants with Decay			
All children (mean)	2,028	0.46	0.36-0.56
Children with decay (mean)	516	1.8	1.64-1.96
Treatment Urgency			
% with no obvious problem	2,031	60.3	58.1-62.4
% needing early care		34.8	32.7-36.9
% needing urgent care		5.0	4.1-6.0
Dental Sealants			
% with dental sealants	1,958	36.0	33.9-38.2

Table 5A
 Oral Health of Colorado's Kindergarten Children Stratified by
 Free and Reduced Price Meal Status of School (3 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch		
	< 25% (n=962)	25-49% (n=542)	≥ 50% (n=688)
Caries experience (%) (95% CI)	35.2 (29.8-40.6)	42.6 (34.0-51.2)	60.2 (50.5-70.0)
Untreated decay (%) (95% CI)	20.3 (15.1-25.4)	24.4 (17.9-30.9)	36.5 (27.5-45.5)
Quadrants with decay (mean) (95% CI)	0.395 (0.29-0.51)	0.466 (0.31-0.62)	0.744 (0.49-1.00)
Treatment Urgency			
No obvious problem (%) (95% CI)	78.2 (73.8-82.7)	71.2 (61.7-80.7)	58.0 (47.7-68.3)
Early care (%) (95% CI)	18.6 (14.5-22.7)	21.5 (17.1-25.8)	32.8 (24.8-40.8)
Urgent care (%) (95% CI)	3.1 (1.7-4.6)	7.3 (1.7-13.0)	9.2 (4.5-13.8)

Table 5B
 Oral Health of Colorado's Kindergarten Children Stratified by
 Free and Reduced Price Meal Status of School (4 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch			
	< 25% (n=962)	25-49.9% (n=542)	50-74.9% (n=435)	≥ 75% (n=253)
Caries experience (%) (95% CI)	35.2 (29.8-40.6)	42.6 (34.0-51.2)	50.5 (39.1-61.8)	72.7 (61.5-83.9)
Untreated decay (%) (95% CI)	20.3 (15.1-25.4)	24.4 (17.9-30.9)	27.8 (17.2-38.3)	47.6 (37.1-58.2)
Quadrants with decay (mean) (95% CI)	0.395 (0.29-0.51)	0.466 (0.31-0.62)	0.577 (0.31-0.85)	0.959 (0.56-1.36)
Treatment Urgency				
No obvious problem (%) (95% CI)	78.2 (73.8-82.7)	71.2 (61.7-80.7)	67.9 (57.7-78.1)	45.4 (31.0-59.7)
Early care (%) (95% CI)	18.6 (14.5-22.7)	21.5 (17.1-25.8)	24.1 (17.6-30.7)	43.9 (33.0-54.8)
Urgent care (%) (95% CI)	3.1 (1.7-4.6)	7.3 (1.7-13.0)	8.0 (2.2-13.7)	10.8 (3.2-18.3)

Table 6A
 Oral Health of Colorado's Third Grade Children Stratified by
 Free and Reduced Price Meal Status of School (3 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch		
	High SES < 25% F/R Lunch (n=960)	Middle SES 25-49% F/R Lunch (n=491)	Low SES ≥ 50% F/R Lunch (n=580)
Caries experience (%) (95% CI)	52.1 (46.0-58.1)	55.8 (45.1-66.4)	66.5 (58.9-74.2)
Untreated decay (%) (95% CI)	18.4 (14.7-22.2)	28.4 (22.5-34.4)	36.0 (27.9-44.0)
Quadrants with decay (mean) (95% CI)	0.305 (0.23-0.38)	0.534 (0.38-0.69)	0.691 (0.46-0.93)
Dental Sealants (%) (95% CI)	40.8 (34.0-47.7)	36.7 (25.7-47.8)	23.8 (17.1-30.5)
Treatment Urgency			
No obvious problem (%) (95% CI)	67.0 (58.7-75.4)	61.8 (51.3-72.3)	48.6 (35.7-61.6)
Early care (%) (95% CI)	29.9 (21.2-38.6)	31.9 (22.4-41.5)	42.2 (29.2-55.2)
Urgent care (%) (95% CI)	3.1 (1.7-4.5)	6.3 (3.2-9.3)	9.2 (4.4-13.9)

Table 6B
Oral Health of Colorado's Third Grade Children Stratified by
Free and Reduced Price Meal Status of School (4 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch			
	< 25% (n=960)	25-49.9% (n=491)	50-74.9% (n=327)	> 75% (n=252)
Caries experience (%) (95% CI)	52.1 (46.0-58.1)	55.8 (45.1-66.4)	60.4 (49.8-71.1)	73.4 (66.8-80.0)
Untreated decay (%) (95% CI)	18.4 (14.7-22.2)	28.4 (22.5-34.4)	31.4 (21.1-41.7)	41.1 (31.4-50.9)
Quadrants with decay (mean) (95% CI)	0.305 (0.23-0.38)	0.534 (0.38-0.69)	0.593 (0.32-0.87)	0.803 (0.45-1.12)
Dental Sealants (%) (95% CI)	40.8 (34.0-47.7)	36.7 (25.7-47.8)	25.5 (18.0-33.1)	22.2 (11.5-32.8)
Treatment Urgency				
No obvious problem (%) (95% CI)	67.0 (58.7-75.4)	61.8 (51.3-72.3)	51.9 (31.8-72.0)	45.0 (29.6-60.3)
Early care (%) (95% CI)	29.9 (21.2-38.6)	31.9 (22.4-41.5)	40.9 (21.6-60.2)	43.6 (26.5-60.7)
Urgent care (%) (95% CI)	3.1 (1.7-4.5)	6.3 (3.2-9.3)	7.2 (0.0-14.7)	11.4 (7.0-15.9)

Table 7
Oral Health of Colorado's Kindergarten Children Stratified by Race/Ethnicity
Adjusted for Non-Response

Variable	Race/Ethnicity	
	White (1,203)	Hispanic (669)
Caries experience (%) (95% CI)	35.8 (31.1-40.5)	62.9 (57.0-68.7)
Untreated decay (%) (95% CI)	21.5 (17.2-25.9)	38.7 (33.7-43.6)
Quadrants with decay (mean) (95% CI)	0.402 (0.31-0.50)	0.790 (0.62-1.00)
Treatment Urgency		
No obvious problem (%) (95% CI)	76.0 (71.0-81.0)	56.7 (49.0-64.3)
Early care (%) (95% CI)	19.6 (16.2-23.0)	34.0 (26.9-41.1)
Urgent care (%) (95% CI)	4.4 (2.1-6.7)	9.3 (5.9-12.8)

Table 8
Oral Health of Colorado's Third Grade Children Stratified by Race/Ethnicity
Adjusted for Non-Response

Variable	Race/Ethnicity	
	White (n=1,167)	Hispanic (n=515)
Caries experience (%) (95% CI)	53.3 (48.3-58.3)	67.3 (61.9-72.6)
Untreated decay (%) (95% CI)	22.2 (18.5-25.9)	37.4 (31.2-43.6)
Quadrants with decay (mean) (95% CI)	0.384 (0.30-0.47)	0.740 (0.55-0.93)
Dental Sealants (%) (95% CI)	38.1 (32.7-43.6)	25.7 (19.2-32.1)
Treatment Urgency		
No obvious problem (%) (95% CI)	64.9 (58.5-71.2)	48.4 (40.0-56.9)
Early care (%) (95% CI)	31.0 (25.2-36.9)	41.9 (33.1-50.7)
Urgent care (%) (95% CI)	4.1 (2.1-6.1)	9.7 (6.5-13.0)

Table 9
Prevalence of Caries Experience and Untreated Decay in 6-8 Year Old and
Dental Sealants in 8-Year-Old Children
Compared to the Healthy People 2010 Objectives

Variable	Number of Children	Estimate	95% CI	HP 2010 Objective
Age				
6 years	1,018			
7 years	22			
8 years	833			
Caries experience	1,873	51.8	46.7-56.9	42
Untreated decay	1,873	27.9	23.4-32.5	21
Dental sealants	833	31.5	24.5-38.5	50

COLORADO ORAL HEALTH SURVEY 2003-2004 SCHOOL YEAR

**PRELIMINARY RESULTS
JULY 6, 2004**

Prepared by:
Kathy Phipps, DrPH
ASTDD Data Coordinator
PO Box 1006
Morro Bay, CA 93443
Tel: 805-771-9788
Fax: 805-771-9843
Email: krp123@charter.net

SUMMARY

During the 2003-2004 school year, the Colorado Department of Public Health and Environment conducted a statewide oral health survey of kindergarten and third grade children enrolled in Colorado's public elementary schools. Fifty public schools were included in the probability sample and 44 agreed to participate. Forty volunteer dental hygienists screened those children who returned a positive consent form. Within the 44 participating schools, the response rate was 74 percent for kindergarten and 68 percent for third grade children.

Key Findings

- ⇒ Dental decay is a significant public health problem for Colorado's children.
 - 46 percent of the kindergarten and 57 percent of the third grade children had cavities and/or fillings (decay experience)
 - 27 percent of the kindergarten and 26 percent of the third grade children had untreated dental decay (cavities)
- ⇒ While dental sealants are a proven method for preventing decay, most of Colorado's children do not have access to this preventive service.
 - Only 35 percent of the third grade children had dental sealants
- ⇒ Children from low-income schools have poorer oral health.
 - Compared to children from higher income schools (<25% eligible for free or reduced price meals), children in low-income schools ($\geq$ 75% eligible for free or reduced price meals) have a significantly higher prevalence of both decay experience and untreated decay; in addition to a higher mean number of quadrants in need of dental care. Children from low-income schools, however, have a significantly lower prevalence of dental sealants.
- ⇒ Hispanic children have poorer oral health.
 - Compared to white non-Hispanic children, a significantly higher proportion of Hispanic children had decay experience and untreated decay, while a lower proportion had dental sealants.
- ⇒ Considerable improvements in the oral health of Colorado's children must be made in order to meet the Healthy People 2010 objectives for caries experience, untreated decay and dental sealants.

Methods

Sampling: The 2002-2003 electronic list of all public elementary schools in Colorado with third grade children was obtained from the Department of Education (936 schools and 55,975 third grade students). All schools with at least 10 children in third grade were included in the sampling frame (884 schools and 55,724 students). Using probability proportional to size sampling along with implicit stratification by percent of children eligible for the free and/or reduced price meal program; 50 elementary schools were selected. If a school refused to participate, a replacement school within the same sampling strata was selected. If the sample school plus two replacement schools refused to participate, no data were collected in that sampling stratum. Of the 50 strata, data is available for 44.

Data Management and Analysis: Data entry and analysis was completed using Epi Info Version 3.2. Epi Info is a public access software program developed and supported by the Centers for Disease Control and Prevention. To account for differences in response rates between schools, the data were adjusted for non-response. The number of children enrolled in each school was divided by the number of children screened to obtain the non-response sampling weight for each school.

Screening Methods: All children in both kindergarten and third grade were screened; if they returned a positive consent form. Forty volunteer dental hygienists completed the screenings using gloves, flashlights, and disposable mouth mirrors supplied by the Department of Health. The diagnostic criteria outlined in **Basic Screening Surveys: An Approach to Monitoring Community Oral Health** were used. The volunteer hygienists attended a training session and watched the Basic Screening Survey training video.

Results

Of the 50 selected schools, 44 agreed to participate in the oral health survey. In terms of eligibility for the free and/or reduced price meal program, the participating schools did not differ substantially from either the 50 schools in the original sample or the 884 schools in the sampling frame.

Comparison of Participating Schools to All Colorado Schools			
	Participating Schools (n=44)	Schools in Sample (n=50)	All Schools with ≥ 10 3 rd Grade Students (n=884)
% Eligible for F/R Lunch	33.8	31.2	33.3

Kindergarten Children (Table 1): The 44 participating schools had a kindergarten enrollment of 2,962; of which 2,192 completed a dental screening (74% response rate). The children ranged in age from 4-7 years with a mean of 5.5 years. About half of the children were male (49%) and slightly more than half were white non-Hispanic (53%).

Forty-six percent of the children screened had decay experience (untreated decay or fillings) in their primary and/or permanent teeth while 27 percent had untreated decay at the time of the screening.³ Of the children with untreated decay (n=570), the mean number of quadrants with decay was 1.98. Almost 31 percent of the children needed dental treatment including six percent in need of urgent dental care because of pain or infection.

Third Grade Children (Table 3): The 44 participating schools had a third grade enrollment of 2,987; of which 2,031 completed a dental screening (68% response rate). The children ranged in age from 7-11 years with a mean of 8.6 years. About half of the children were male (52%) and slightly more than half were white non-Hispanic (56%).

Fifty-seven percent of the children screened had decay experience (untreated decay or fillings) in their primary and/or permanent teeth while 26 percent had untreated decay at the time of the screening. Of the children with untreated decay (n=516), the mean number of quadrants with decay was 1.82. Almost 40 percent of the children needed dental treatment including six percent in need of urgent dental care because of pain or infection.

Thirty-five percent of the children had a dental sealant on at least one permanent molar. Dental sealants provide an effective way to prevent decay on the chewing surfaces of molars (back teeth), which are most vulnerable to caries. A clear resin is used to cover the “pits and fissures” on the top of the teeth so that cavity-causing bacteria cannot reach areas that are difficult to clean and for fluoride to penetrate.

Impact of Socioeconomic Status (Tables 5B and 6B): Eligibility for the free and/or reduced price lunch (FRL) program is often used as an indicator of overall socioeconomic status. To be eligible for the FRL program during the 2003-2004 school year, annual family income for a family of four could not exceed \$34,040.⁴ While information on eligibility for the FRL program is not available at the student level it is available at the school level. The schools taking part in the oral health survey were categorized into four income levels based on the percentage of children eligible for the FRL program.

- High income: Less than 25% of students eligible.
- Moderate income: 25% - 49.9% of students eligible.
- Middle-low income: 50% - 74.9% of the students eligible.
- Low income: 75% or more of the students eligible.

For both kindergarten and third grade, children at low-income schools had a significantly higher prevalence of both caries experience and untreated decay compared to children at high-income school. In addition, children at low-income schools had a significantly

³ The percent of children with untreated decay is assumed to be an under estimation because radiographs (x-rays) were not taken.

⁴ U.S. Department of Agriculture, Child Nutrition Programs, School Lunch Program, Income Eligibility Guidelines SY 2003-2004, www.fns.usda.gov/cnd/governance/notices/iegs/IEGs03-04.pdf (06/16/04).

higher mean number of quadrants in need of dental care. For third grade children, the prevalence of dental sealants was significantly lower in low-income schools compared to higher-income schools.

Impact of Race and Ethnicity (Tables 7 and 8): Tables 7 and 8 compare the oral health of white non-Hispanic children with Hispanic children. For both kindergarten and third grade children, Hispanic children, compared to white children, have a significantly higher prevalence of caries experience and untreated decay. The prevalence of dental sealants is significantly lower in Hispanic third grade children compared to similar white non-Hispanic children. NOTE: The racial/ethnic disparities noted may be associated with differences in socioeconomic status.

Healthy People 2010 Objectives (Table 9): The National Oral Health Objectives for the Year 2010 (Healthy People 2010) outline several oral health status objectives for young children. For six- to eight-year-old children there are three primary oral health status objectives:

- To decrease the proportion of children who have experienced dental caries in permanent or primary teeth to 42 percent.
- To decrease the proportion of children with untreated dental caries in permanent or primary teeth to 21percent.
- To increase the proportion of eight-year-olds receiving protective sealing of the occlusal surfaces of permanent molar teeth to 50 percent.

While the Colorado Oral Health Survey was not designed to be representative of 6-8 year old children in Colorado, it does provide some information that can be compared to the Healthy People 2010 objectives. Of the kindergarten and third grade children screened, 1873 were between 6-8 years of age (with the majority of these being either age 6 or age 8). Based on information from these 1,873 children, the State of Colorado needs to make considerable progress if the Healthy People 2010 objectives are to be met. Almost 52 percent of the 6-8 year old children screened in Colorado had experienced dental caries – substantially higher than the HP2010 objective of 42 percent. Twenty-eight percent of the Colorado 6-8 year old children had untreated caries compared to the HP2010 objective of 21 percent. Thirty-two percent of eight-year-old children screened (n=833) had dental sealants compared to the HP2010 objective of 50 percent.

Comparison to Other States (Figures 1-3)

Figures 1-3 compare the oral health of Colorado's third grade children with the oral health of children from several other states. Each of the states represented in the figure gathered oral health status information using the same protocols as Colorado. Overall, third grade children in Colorado tend to be in the "middle" in terms of oral health status.

Table 1
Oral Health of Colorado's Kindergarten Children
Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,192		
Age			
Mean age (years)	2,129	5.5 (SE 0.03)	
Age range		4-7 years	
Gender			
% Male	2,192	49.4	46.2-52.7
% Female		50.6	47.3-53.8
Race/Ethnicity			
% White	2,192	52.7	43.7-61.7
% African-American		4.1	1.9-6.3
% Hispanic		32.5	23.3-41.6
% Asian		2.0	1.1-2.9
% Native American		0.3	0.0-0.6
% Pacific Islander		0.2	0.0-0.5
% Multi-racial		1.4	0.3-2.5
% Other		0.4	0.0-0.7
% Unknown		6.4	1.4-11.3
Caries Experience			
% with caries experience	2,192	45.7	40.0-51.5
% caries free		54.3	48.5-60.0
Untreated Decay			
% with untreated decay	2,192	26.9	22.2-31.7
Quadrants with Decay			
% with 0 quadrants	2,192	73.1	68.3-77.8
% with 1 quadrant		12.0	9.7-14.4
% with 2 quadrants		7.3	5.7-8.8
% with 3 quadrants		3.7	2.5-4.9
% with 4 quadrants		3.9	2.4-5.5
Quadrants with Decay			
All children (mean)	2,191	0.53	0.41-0.66
Children with decay (mean)	570	1.98	1.82-2.14
Treatment Urgency			
% with no obvious problem	2,191	69.5	63.9-75.1
% needing early care		24.2	20.2-28.3
% needing urgent care		6.3	3.8-8.7

Table 2
Oral Health of Colorado's Kindergarten Children
Not Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,192		
Age			
Mean age (years)	2,129	5.5 (SD 0.52)	
Age range		4-7 years	
Gender			
% Male	2,192	49.4	47.3-51.5
% Female		50.6	48.5-52.7
Race/Ethnicity			
% White	2,192	54.9	52.8-57.0
% African-American		3.7	3.0-4.6
% Hispanic		30.5	28.6-32.5
% Asian		2.1	1.6-2.8
% Native American		0.3	0.1-0.7
% Pacific Islander		0.3	0.1-0.6
% Multi-racial		1.2	0.8-1.8
% Other		0.4	0.2-0.8
% Unknown		6.5	5.5-7.7
Caries Experience			
% with caries experience	2,192	44.4	42.3-46.5
% caries free		55.6	53.5-57.7
Untreated Decay			
% with untreated decay	2,192	26.0	24.2-27.9
Quadrants with Decay			
% with 0 quadrants	2,192	74.0	72.1-75.8
% with 1 quadrant		11.5	10.2-12.9
% with 2 quadrants		7.4	6.3-8.6
% with 3 quadrants		3.6	2.8-4.4
% with 4 quadrants		3.6	2.8-4.4
Quadrants with Decay			
All children (mean)	2,191	0.51	0.40-0.62
Children with decay (mean)	570	1.97	1.84-2.10
Treatment Urgency			
% with no obvious problem	2,191	70.0	68.0-71.9
% needing early care		24.1	22.3-25.9
% needing urgent care		5.9	5.0-7.0

Table 3
Oral Health of Colorado's Third Grade Children
Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,031		
Age			
Mean age (years)	1,956	8.6 (SE 0.04)	
Age range		7-11 years	
Gender			
% Male	2,031	51.6	47.7-55.4
% Female		48.4	44.6-52.3
Race/Ethnicity			
% White	2,031	56.0	47.2-64.8
% African-American		3.3	1.6-5.1
% Hispanic		27.2	18.5-35.9
% Asian		2.5	1.1-4.0
% Native American		0.2	0.1-0.5
% Pacific Islander		0.3	0.0-0.1
% Multi-racial		1.1	0.3-1.8
% Other		0.5	0.1-0.9
% Unknown		9.0	1.8-16.2
Caries Experience			
% with caries experience	2,031	57.2	52.5-61.9
% caries free		42.8	38.1-47.5
Untreated Decay			
% with untreated decay	2,028	26.1	22.1-30.0
Quadrants with Decay			
% with 0 quadrants	2,028	73.9	70.0-77.9
% with 1 quadrant		13.7	11.4-16.0
% with 2 quadrants		6.7	5.0-8.4
% with 3 quadrants		2.2	1.4-3.1
% with 4 quadrants		3.4	1.9-5.0
Quadrants with Decay			
All children (mean)	2,028	0.48	0.37-0.58
Children with decay (mean)	516	1.82	1.65-2.00
Treatment Urgency			
% with no obvious problem	2,031	60.4	54.0-66.8
% needing early care		34.0	27.8-40.1
% needing urgent care		5.6	3.7-7.5
Dental Sealants			
% with dental sealants	1,958	35.2	30.1-40.2

Table 4
Oral Health of Colorado's Third Grade Children
Not Adjusted for Non-Response

Variable	Number with Data	Estimate	95% Confidence Interval
Number Screened	2,031		
Age			
Mean age (years)	1,956	8.6 (SD 0.56)	
Age range		7-11 years	
Gender			
% Male	2,031	50.5	48.3-52.7
% Female		49.5	47.3-51.7
Race/Ethnicity			
% White	2,031	57.5	55.3-59.6
% African-American		3.1	2.4-3.9
% Hispanic		25.4	23.5-27.3
% Asian		2.6	1.9-3.4
% Native American		0.2	0.1-0.6
% Pacific Islander		0.0	0.0-0.3
% Multi-racial		1.1	0.7-1.7
% Other		0.6	0.3-1.1
% Unknown		9.6	8.4-11.0
Caries Experience			
% with caries experience	2,031	57.1	54.9-59.2
% caries free		42.9	40.8-45.1
Untreated Decay			
% with untreated decay	2,028	25.4	23.6-27.4
Quadrants with Decay			
% with 0 quadrants	2,028	74.6	72.6-76.4
% with 1 quadrant		13.5	12.1-15.1
% with 2 quadrants		6.5	5.5-7.7
% with 3 quadrants		2.4	1.8-3.2
% with 4 quadrants		3.0	2.3-3.9
Quadrants with Decay			
All children (mean)	2,028	0.46	0.36-0.56
Children with decay (mean)	516	1.8	1.64-1.96
Treatment Urgency			
% with no obvious problem	2,031	60.3	58.1-62.4
% needing early care		34.8	32.7-36.9
% needing urgent care		5.0	4.1-6.0
Dental Sealants			
% with dental sealants	1,958	36.0	33.9-38.2

Table 5A
 Oral Health of Colorado's Kindergarten Children Stratified by
 Free and Reduced Price Meal Status of School (3 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch		
	< 25% (n=962)	25-49% (n=542)	≥ 50% (n=688)
Caries experience (%) (95% CI)	35.2 (29.8-40.6)	42.6 (34.0-51.2)	60.2 (50.5-70.0)
Untreated decay (%) (95% CI)	20.3 (15.1-25.4)	24.4 (17.9-30.9)	36.5 (27.5-45.5)
Quadrants with decay (mean) (95% CI)	0.395 (0.29-0.51)	0.466 (0.31-0.62)	0.744 (0.49-1.00)
Treatment Urgency			
No obvious problem (%) (95% CI)	78.2 (73.8-82.7)	71.2 (61.7-80.7)	58.0 (47.7-68.3)
Early care (%) (95% CI)	18.6 (14.5-22.7)	21.5 (17.1-25.8)	32.8 (24.8-40.8)
Urgent care (%) (95% CI)	3.1 (1.7-4.6)	7.3 (1.7-13.0)	9.2 (4.5-13.8)

Table 5B
 Oral Health of Colorado's Kindergarten Children Stratified by
 Free and Reduced Price Meal Status of School (4 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch			
	< 25% (n=962)	25-49.9% (n=542)	50-74.9% (n=435)	≥ 75% (n=253)
Caries experience (%) (95% CI)	35.2 (29.8-40.6)	42.6 (34.0-51.2)	50.5 (39.1-61.8)	72.7 (61.5-83.9)
Untreated decay (%) (95% CI)	20.3 (15.1-25.4)	24.4 (17.9-30.9)	27.8 (17.2-38.3)	47.6 (37.1-58.2)
Quadrants with decay (mean) (95% CI)	0.395 (0.29-0.51)	0.466 (0.31-0.62)	0.577 (0.31-0.85)	0.959 (0.56-1.36)
Treatment Urgency				
No obvious problem (%) (95% CI)	78.2 (73.8-82.7)	71.2 (61.7-80.7)	67.9 (57.7-78.1)	45.4 (31.0-59.7)
Early care (%) (95% CI)	18.6 (14.5-22.7)	21.5 (17.1-25.8)	24.1 (17.6-30.7)	43.9 (33.0-54.8)
Urgent care (%) (95% CI)	3.1 (1.7-4.6)	7.3 (1.7-13.0)	8.0 (2.2-13.7)	10.8 (3.2-18.3)

Table 6A
 Oral Health of Colorado's Third Grade Children Stratified by
 Free and Reduced Price Meal Status of School (3 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch		
	High SES < 25% F/R Lunch (n=960)	Middle SES 25-49% F/R Lunch (n=491)	Low SES ≥ 50% F/R Lunch (n=580)
Caries experience (%) (95% CI)	52.1 (46.0-58.1)	55.8 (45.1-66.4)	66.5 (58.9-74.2)
Untreated decay (%) (95% CI)	18.4 (14.7-22.2)	28.4 (22.5-34.4)	36.0 (27.9-44.0)
Quadrants with decay (mean) (95% CI)	0.305 (0.23-0.38)	0.534 (0.38-0.69)	0.691 (0.46-0.93)
Dental Sealants (%) (95% CI)	40.8 (34.0-47.7)	36.7 (25.7-47.8)	23.8 (17.1-30.5)
Treatment Urgency			
No obvious problem (%) (95% CI)	67.0 (58.7-75.4)	61.8 (51.3-72.3)	48.6 (35.7-61.6)
Early care (%) (95% CI)	29.9 (21.2-38.6)	31.9 (22.4-41.5)	42.2 (29.2-55.2)
Urgent care (%) (95% CI)	3.1 (1.7-4.5)	6.3 (3.2-9.3)	9.2 (4.4-13.9)

Table 6B
Oral Health of Colorado's Third Grade Children Stratified by
Free and Reduced Price Meal Status of School (4 Levels)
Adjusted for Non-Response

Variable	Percent of Children on F/R Lunch			
	< 25% (n=960)	25-49.9% (n=491)	50-74.9% (n=327)	> 75% (n=252)
Caries experience (%) (95% CI)	52.1 (46.0-58.1)	55.8 (45.1-66.4)	60.4 (49.8-71.1)	73.4 (66.8-80.0)
Untreated decay (%) (95% CI)	18.4 (14.7-22.2)	28.4 (22.5-34.4)	31.4 (21.1-41.7)	41.1 (31.4-50.9)
Quadrants with decay (mean) (95% CI)	0.305 (0.23-0.38)	0.534 (0.38-0.69)	0.593 (0.32-0.87)	0.803 (0.45-1.12)
Dental Sealants (%) (95% CI)	40.8 (34.0-47.7)	36.7 (25.7-47.8)	25.5 (18.0-33.1)	22.2 (11.5-32.8)
Treatment Urgency				
No obvious problem (%) (95% CI)	67.0 (58.7-75.4)	61.8 (51.3-72.3)	51.9 (31.8-72.0)	45.0 (29.6-60.3)
Early care (%) (95% CI)	29.9 (21.2-38.6)	31.9 (22.4-41.5)	40.9 (21.6-60.2)	43.6 (26.5-60.7)
Urgent care (%) (95% CI)	3.1 (1.7-4.5)	6.3 (3.2-9.3)	7.2 (0.0-14.7)	11.4 (7.0-15.9)

Table 7
Oral Health of Colorado's Kindergarten Children Stratified by Race/Ethnicity
Adjusted for Non-Response

Variable	Race/Ethnicity	
	White (1,203)	Hispanic (669)
Caries experience (%) (95% CI)	35.8 (31.1-40.5)	62.9 (57.0-68.7)
Untreated decay (%) (95% CI)	21.5 (17.2-25.9)	38.7 (33.7-43.6)
Quadrants with decay (mean) (95% CI)	0.402 (0.31-0.50)	0.790 (0.62-1.00)
Treatment Urgency		
No obvious problem (%) (95% CI)	76.0 (71.0-81.0)	56.7 (49.0-64.3)
Early care (%) (95% CI)	19.6 (16.2-23.0)	34.0 (26.9-41.1)
Urgent care (%) (95% CI)	4.4 (2.1-6.7)	9.3 (5.9-12.8)

Table 8
Oral Health of Colorado's Third Grade Children Stratified by Race/Ethnicity
Adjusted for Non-Response

Variable	Race/Ethnicity	
	White (n=1,167)	Hispanic (n=515)
Caries experience (%) (95% CI)	53.3 (48.3-58.3)	67.3 (61.9-72.6)
Untreated decay (%) (95% CI)	22.2 (18.5-25.9)	37.4 (31.2-43.6)
Quadrants with decay (mean) (95% CI)	0.384 (0.30-0.47)	0.740 (0.55-0.93)
Dental Sealants (%) (95% CI)	38.1 (32.7-43.6)	25.7 (19.2-32.1)
Treatment Urgency		
No obvious problem (%) (95% CI)	64.9 (58.5-71.2)	48.4 (40.0-56.9)
Early care (%) (95% CI)	31.0 (25.2-36.9)	41.9 (33.1-50.7)
Urgent care (%) (95% CI)	4.1 (2.1-6.1)	9.7 (6.5-13.0)

Table 9
Prevalence of Caries Experience and Untreated Decay in 6-8 Year Old and
Dental Sealants in 8-Year-Old Children
Compared to the Healthy People 2010 Objectives

Variable	Number of Children	Estimate	95% CI	HP 2010 Objective
Age				
6 years	1,018			
7 years	22			
8 years	833			
Caries experience	1,873	51.8	46.7-56.9	42
Untreated decay	1,873	27.9	23.4-32.5	21
Dental sealants	833	31.5	24.5-38.5	50