



# ORAL HEALTH IN WYOMING

**WYOMING DEPARTMENT OF HEALTH**

## FINAL REPORT





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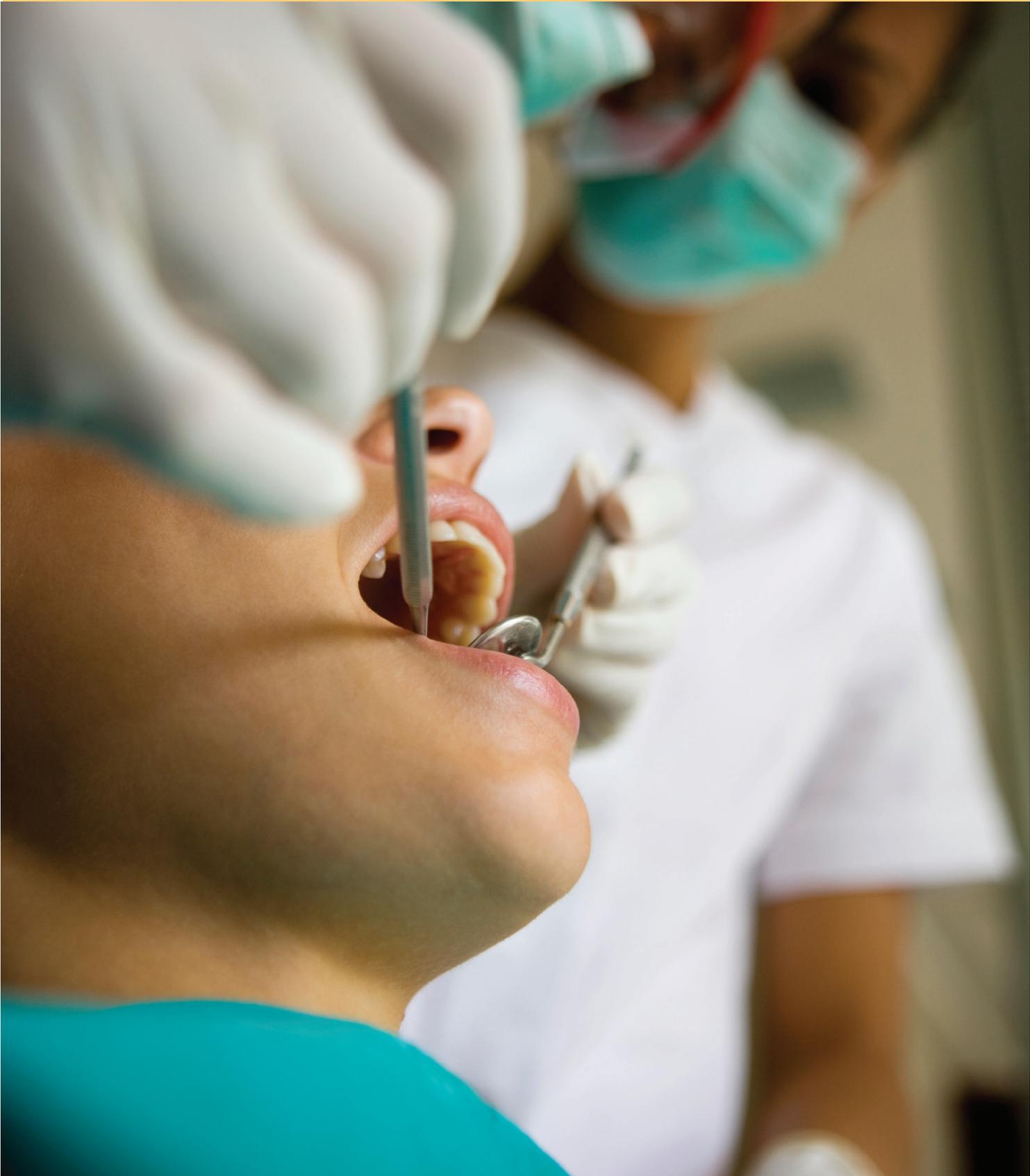
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# INTRODUCTION



In a 2000 report, Surgeon General David Satcher stated that “you cannot be healthy without oral health”.<sup>1</sup> Oral health is a pregnant mother without gingivitis, who has the best chance of delivering a healthy baby; it is a child, with or without special health care needs, who is free of dental pain and can eat and play; and it is an adult without periodontal disease who can enter the senior years with the confidence of keeping all of their teeth. Poor oral health can prevent these situations from happening. Poor oral health can manifest as tooth decay and periodontal disease or as pain or low self-esteem from an imperfect smile. This report addresses the importance of oral health for all Wyoming residents.

Pregnant women, children, including children with special health care needs, adults and seniors are addressed in this report. Background information is presented for each section, detailing the interplay between a healthy mouth and a person’s overall well-being at each stage of life. National trends, disparities and concerns are addressed and followed with current data from surveys conducted here in Wyoming. The information presented paints a picture of oral health in the state, and will help dentists and public health professionals better understand the oral health needs of the population. This information will be used to target prevention efforts.

## LEGISLATIVE MANDATE

In 2008, Wyoming public health policy professionals along with the Wyoming Dental Association (WyDA) shared their concerns that it had been two decades since the last comprehensive study on oral health – Wyoming’s own “State of the Mouth” analysis. Because oral health is integral to total body health, real and recent data on Wyoming oral health from children to seniors was seen as a public health priority. Support gathered in August 2008 for the concept of the Oral Health Initiative (OHI) and a subsequent bill was drafted in the following months with a variety of legislators across Wyoming sponsoring and co-sponsoring the legislation. The public private partnership included the Wyoming Department of Health (WDH), the WyDA, key statewide elected leaders and legislators.

The 2009 bill, Senate File 93, authorized and funded a targeted OHI through the Wyoming Department of Health for outreach and education to Wyoming residents, particularly vulnerable populations of children and seniors to improve oral healthcare. The initiative would also include an epidemiological study aimed at understanding the depth and severity of oral healthcare problems in Wyoming.

This bill appropriated \$50,000.00 from the tobacco settlement income account to WDH to conduct an epidemiologic study to determine the depth and severity of oral diseases and the oral health needs of Wyoming citizens. The Wyoming Dental Association pledged to supply volunteer dentists in order to conduct the oral health initiative.

By the end of the 2009 Budget Session, the Wyoming Legislature strongly approved and the Governor signed SF 93, authorizing an epidemiological study that will answer basic oral healthcare questions resulting in improved treatment and prevention. Additionally, recommendations from the study could result in cost savings to the state over the long term.

Our state was lacking certain information regarding how prevalent oral disease is, geographically as well as demographically, especially for at-risk populations, such as youth and seniors. WDH has conducted dental screenings and surveys of Wyoming children but has not published a formal report in over a generation. The unpublished data was used to establish programs for the WDH Oral Health Section (OHS). This study will begin to answer some basic oral healthcare questions that are critical for treatment and prevention among Wyoming residents.

## DEMOGRAPHICS OF WYOMING

The demographic characteristics of a state can affect the oral health of the residents and their ability to access dental care. Utilization of dental services in rural areas is significantly lower than in urban settings.<sup>2-5</sup> Reasons for this disparity include workforce shortages, insurance gaps, and terrain barriers. In addition, some medical professionals do not accept public insurance such as Medicaid and the State Children’s Health Insurance Program (SCHIP).<sup>3</sup> Rural residents may also have different attitudes toward dental care, preventing them from seeking it regularly.<sup>5</sup>

As a rural state, Wyoming faces many challenges. Geographically, Wyoming is the ninth largest state in the United States (U.S.) covering 97,670 square miles.<sup>6</sup> Wyoming’s 23 counties and the Wind River Indian Reservation cover terrain ranging from semi-arid plains and rolling grasslands to snow-covered peaks along the Continental Divide. Wyoming is the least populous state in the U.S. with an estimated population of 544,270 and a population density of 5.5 persons per square mile. Wyoming has two cities with a population greater than 50,000, Cheyenne (56,915) and Casper (54,047). The two counties where these cities are located are considered urban. Seventeen of Wyoming’s counties are frontier with fewer than six persons per square mile, and the remaining four counties are rural.

Wyoming’s population is predominantly White (93.9%). The American Indian (2.5%), Black (1.3%), Asian (0.7%), and Native Hawaiian and Pacific Islander (0.1%) populations make up less than 5% of the population combined.<sup>7</sup> An estimated 7.7% of Wyoming’s population is Hispanic.<sup>7</sup> In 2000, Healthy People 2010 (HP 2010) reported significant disparities in children’s oral health with respect to race and ethnicity. More recent literature shows the highest prevalence of unmet dental needs exist among Hispanic populations.<sup>8-10</sup>

Low income populations face many barriers to accessing dental care including financial, transportation, and insurance barriers as well as the availability of care.<sup>8</sup> Wyoming’s population fares slightly better than the U.S. In 2008, Wyoming’s median income for a household of four was \$53,207, which is slightly higher than the U.S. median house

# FLUORIDE

## INTRODUCTION

Community water fluoridation has been named one of the ten greatest public health achievements of the 20th century. Water fluoridation benefits all members of a community regardless of age or socioeconomic status. Fluoride prevents dental caries in a variety of ways. Fluoride inhibits demineralization of tooth enamel by acid from bacteria. Fluoride remineralizes teeth by absorbing into tooth enamel, attracting calcium ions, and facilitating the chemical reaction between calcium and phosphate to reform the crystal surface of teeth. Tooth hardness increases as a result of remineralization, which causes teeth to be less susceptible to future acid attack.<sup>16</sup> Fluoride also inhibits bacterial enzymes and reduces the amount of acid produced by bacteria.<sup>17</sup> Early studies resulted in the development of a recommended range of fluoride water concentrations (0.7-1.2 mg/L). Lower concentrations are recommended for warmer climates because water consumption is higher, and higher concentrations are recommended for cooler climates. The optimum level for Wyoming is 1.1 parts per million (ppm).<sup>18</sup>

Many studies have supported the effectiveness of water fluoridation. In 1945, cross-sectional surveys found a 50%-70% reduction in children's dental caries in fluoridated communities.<sup>19</sup> In a 1987 study, an 18% decrease in decay, missing teeth, or filled tooth surfaces (DMFS) scores was observed in children who had always had fluoridated water compared to those who had never had it.<sup>20</sup>

Community water fluoridation is the best and most cost effective way to provide optimal levels of fluoride to prevent tooth decay. According to Kip Duchon, National Fluoridation Engineer for the Centers for Disease Control and Prevention (CDC), the installation cost of fluoridation equipment is approximately \$15.00 per person, and the operating costs thereafter are \$2.00 per person.<sup>21</sup>

Fluoride supplements and topical fluoride applications are other approaches to prevent tooth decay. Fluoride supplements can be prescribed by the child's dentist or physician. The American Academy of Pediatric Dentistry recommends starting fluoride drops for infants at 6 months of age in areas where the fluoride level is less than 0.6 ppm.<sup>22</sup> A child's dentist may determine that a fluoride application is necessary during regular visits.

## 2010 Wyoming Department of Health (WDH) Fluoride Survey

### METHODS

In 2010, the Wyoming Department of Health's (WDH) Oral Health Section (OHS) conducted a water fluoride sample survey. In communities with several schools, samples were taken from two to three schools. Wyoming school principals were called by an OHS staff member and asked to participate. If they agreed, they were sent a water bottle and asked to return a sample of school drinking water taken directly from the school's drinking fountain. Samples were returned to the Wyoming Department of Agriculture laboratory, where they were analyzed for fluoride levels.

Schools were classified as being on a community water system or a well. Distance between the school and the water treatment plant was calculated for schools on a community water system. Additionally, schools were classified as fluoridated if fluoride was added to the community system or well.

### RESULTS

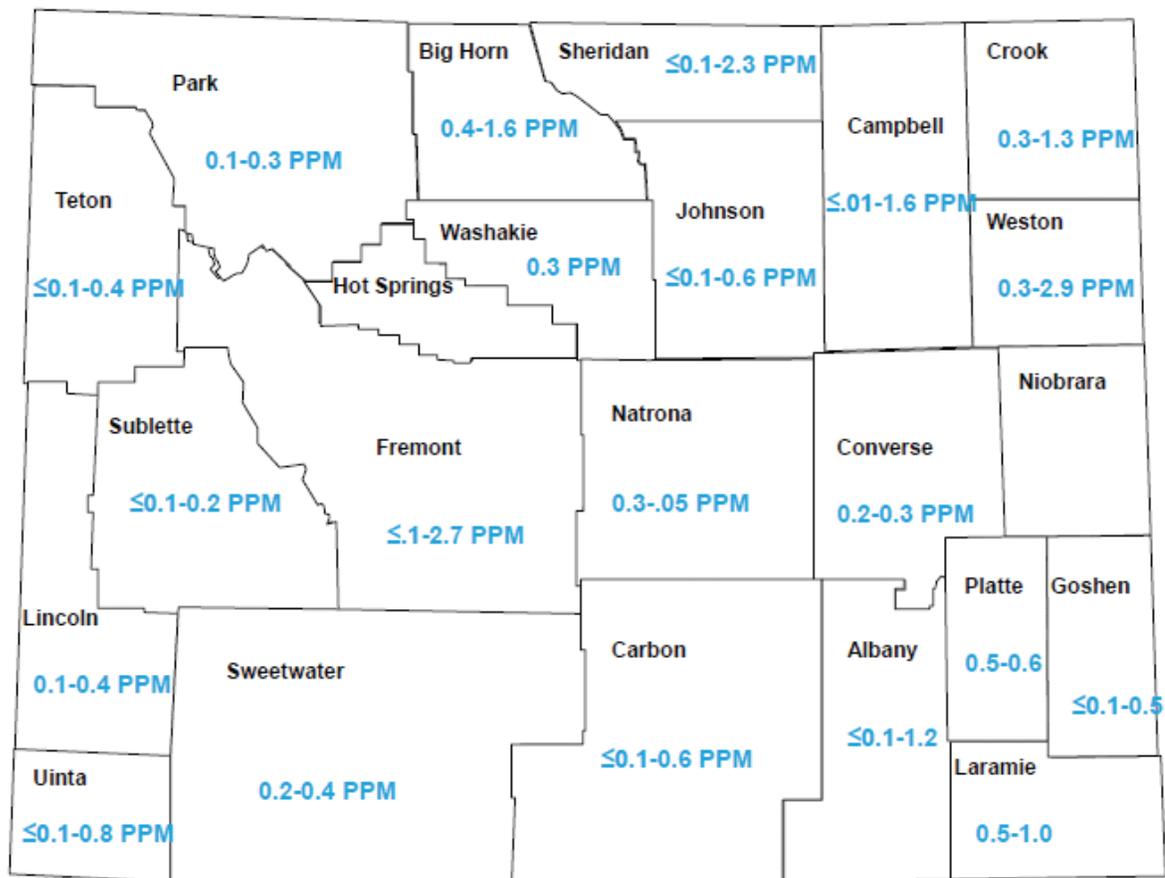
Overall, 104 water samples were collected from schools across the state. The recommended range for fluoride in drinking water is 0.7 mg/L - 1.1 mg/L, while the optimal level of fluoride is 1.1 mg/L. Fluoride levels among sampled schools ranged from below detection (0.10 mg/L) to 2.9 mg/L. Table 1 shows the percent of schools by optimal level of fluoride. The majority of Wyoming schools (75.96%) had fluoride levels below the recommended range.

**TABLE 1: FLUORIDE LEVELS AMONG ALL SAMPLED WYOMING PUBLIC SCHOOLS, 2010**

Fluoride Level	Percent of Schools (number)
Below Recommended Range (<0.7 mg/L)	75.96% (79)
Within Recommended Range (0.7 mg/L-1.1 mg/L)	16.35% (17)
Above Recommended Range (>1.1 mg/L)	7.69% (8)

The range of fluoride levels found in each county is shown on the map in Figure 1.

**FIGURE 1: MAP OF FLUORIDE RANGES BY COUNTY, WYOMING, 2010\***



\*Fluoride levels for Hot Springs and Niobrara counties are not shown as only one school participated in each of these counties.

## Fluoride Levels by Type of Water Supply (Community vs. Private Well)

Of the 104 schools sampled, 82 schools were on a community water system. The majority (73.17%) of schools on a community water supply had fluoride levels below the recommended range of 0.7 – 1.1 mg/L. Twenty-two schools had fluoride levels at or above the recommended range of 0.7 mg/L – 1.1 mg/L.

The remaining 22 sampled schools were on a private well. Three had fluoride levels at or above the recommended range of 0.7 mg/L – 1.1 mg/L. The majority (86.36%) of sampled schools on a private well had a fluoride level below the recommended range. The level of fluoride did not significantly differ by the type of water supply (p=0.20).

Table 2 shows fluoride levels by type of water supply.

**TABLE 2: FLUORIDE LEVELS AMONG SAMPLED WYOMING PUBLIC SCHOOLS BY TYPE OF WATER SUPPLY, 2010**

Fluoride Level	Percent of Schools on a Community Water Supply (number)	Percent of Schools on a Private Well (number)
Below Recommended Range (<0.7 mg/L)	73.17% (60)	86.36% (19)
At or Above Recommended Range (0.7 – 1.1 mg/L)	26.83% (22)	13.64% (3)

## Fluoride Levels by Type of Fluoridation Status

Ten of the schools sampled were on an actively fluoridated water system. Among these, the majority (70.0%) had a fluoride level at or above the recommended range. The fluoride levels among schools sampled on nonfluoridated water supplies were lower, with the majority (80.85%) of schools below the recommended fluoride range. Among the 94 schools sampled on a nonfluoridated water supply, 18 had fluoride levels at or above the recommended range of 0.7 mg/L – 1.1 mg/L. The proportion of water supplies with fluoride levels at or above the recommended range was significantly greater among actively fluoridated water supplies than nonfluoridated water supplies (p<0.001). Table 3 shows the percent of schools within fluoride levels by fluoridation status.

**TABLE 3: FLUORIDE LEVELS AMONG SAMPLED WYOMING PUBLI SCHOOLS BY FLUORIDATION STATUS, 2010**

Fluoride Level	Percent of Schools on an Actively Fluoridated Water Supply (number)	Percent of Schools on a Nonfluoridated Water Supply (number)
Below Recommended Range (<0.7 mg/L)	30.00% (3)	80.85% (76)
At or Above Recommended Range..(0.7 – 1.1 mg/L)	70.00% (7)	19.15% (18)

## Measured Fluoride Levels and Levels Reported by Treatment Plants

Fluoride levels reported by treatment plants with actively fluoridated water ranged from 0.17 to 1.05 mg/L, with a mean of 0.87 mg/L. Samples collected from the schools on fluoridated community water systems ranged from 0.1 to 1.2 mg/L, with a mean of 0.81 mg/L. The average fluoride levels reported by water treatment facilities and sampled schools are not statistically different from one another ( $p=0.33$ ).

## Discussion

A majority of the schools had drinking water with fluoride below the recommended range. Fluoride level did not significantly differ by the type of water supply (community vs. private well). The proportion of water supplies with fluoride level at or above the recommended range was significantly greater among actively fluoridated water supplies than nonfluoridated water supplies ( $p<0.001$ ). In addition, the average fluoride levels reported by water treatment facilities and sampled schools were not statistically different from one another.

This study has several limitations. Due to the limited time frame of the survey, samples were taken only one time from the school drinking fountain. Several samples taken over a few weeks at the same location would have given a more comprehensive look at the fluoride level. In addition, taking the water sample from the school drinking fountains may not provide an accurate assessment of exposure to fluoride among students. The use of drinking fountains among students or staff at the schools was not assessed. Students may also be exposed to different levels of fluoride at home. Some of the fluoride levels found in the survey were inconsistent with fluoride levels reported by the Environmental Protection Agency for the respective communities.

## WDH FLUORIDE PROGRAMS

OHS conducts fluoride mouth rinse programs in elementary schools within Wyoming communities where fluoride levels in the drinking water are below 0.7 ppm. In the 2009-2010 school year, programs were conducted in the classroom weekly in Goshen, Sheridan, Platte, and Washakie counties with a total of 2,560 students participating.

Fluoride varnish programs are conducted in Head Start programs and preschools for children who are at high risk for decay. Fluoride varnish is applied at three month intervals during the school year.

Wyoming EqualityCare (Medicaid) reimburses pediatricians and family practice physician for fluoride varnish applications for children six months through four years of age. In fiscal year (FY) 2010, 20 physician groups provided fluoride varnish applications for 1,242 children during office visits for EPSDT. Wyoming dentists are reimbursed for fluoride varnish applications. In FY2010, 65 dentists provided fluoride varnish applications for 2,253 children ages six months through four years.

# PREGNANT WOMEN

## BACKGROUND

Oral health is extremely important during pregnancy as a woman's oral health status has the potential to affect the health of her unborn child as well as the outcome of her pregnancy.<sup>23</sup> Additionally, the physiological changes she will undergo may adversely affect her oral health by increasing her risk of developing gingivitis, periodontal disease, and dental caries, which has been associated with an increased risk of pre-term labor, preeclampsia, gestational diabetes, and delivering a low birth weight infant.<sup>23-26</sup> A woman's oral health behaviors are also important for her young child.<sup>27</sup> "Dental caries is a transmissible, reversible, diet and time-dependent, multifactorial bacterial disease of the oral cavity that affects people of all ages."<sup>28</sup> It may be passed from a caregiver to a child, have a genetic component, and result from prolonged exposure to fermentable carbohydrates, which can be seen when a child is repeatedly allowed to sleep with a bottle of milk or juice.<sup>23-24, 27, 29</sup> Widespread dental caries, also called early childhood caries (ECC), has a multitude of potential health effects, such as malnutrition and systemic infection, as well as psychological effects, such as low self-esteem and impaired intellectual growth as a result of missed school.<sup>27, 30</sup>

Pregnancy has been associated with an increased risk for gingivitis, the inflammation of the gums which results from built-up plaque and tartar.<sup>31</sup> Bacteria associated with the plaque/tartar build up release enzymes that damage gums, causing them to become tender and bleed easily.<sup>31</sup> The New York State Department of Health reports that 30% of pregnant women experience pregnancy gingivitis.<sup>23</sup> Also, an estimated 2%-6% of pregnant women develop gestational diabetes mellitus which can lead to gingival infection and delayed healing.<sup>26</sup>

Periodontal disease is widely prevalent in women of childbearing age, especially those from low income and minority populations.<sup>24</sup> Boggess noted that "destructive periodontitis" is found in 15% of all women of childbearing age.<sup>24</sup> Periodontal disease has been associated with preterm labor, development of preeclampsia, and delivery of a low birth weight infant.<sup>24</sup> In 1996, Offenbacher first observed and reported that women with periodontal disease were much more likely to deliver a preterm infant, born before 37 weeks gestation, or have an infant born at low birth weight, weighing less than 2500 grams or 5 ½ pounds, than women without periodontal disease.<sup>32</sup> The data from this study suggests that about 18% of preterm and low birth weight infants born annually might be attributed to maternal periodontal disease.<sup>24</sup>

In addition to adverse pregnancy outcomes, maternal dental caries has been shown to affect the health of the infant. Dental caries, which can result in tooth decay, can be caused by over 500 types of microorganisms, one of which is *Streptococcus Mutans*.<sup>23, 33-34</sup> Caries is an infectious disease that is often passed directly from mother or principle caregiver to child via salivary transmission.<sup>23-24</sup> A direct relation has been reported between maternal factors, such as active caries and consumption of sugar, and the number of deciduous decayed, missed or filled teeth in their children.<sup>27</sup> Factors that influence the transmission of caries include the concentration of these bacteria in mater-

nal saliva, frequency and efficiency of transmission, and the child's receptivity to implantation, which is largely diet dependent.<sup>24</sup> Also, it has been found that the earlier the child is exposed to the cariogenic or decay-causing bacteria, the more likely the infant is to develop ECC.<sup>24, 27</sup>

In the United States, dental caries is the most common infectious disease among children, with its prevalence estimated to be five times higher than that of asthma and seven times higher than that of allergic rhinitis/hay fever.<sup>30, 35</sup> Some children will have caries that develops into uncontrolled generalized decay or ECC. The American Academy of Pediatrics' defines ECC as a transmissible infectious process affecting children under the age of five which rapidly spreads within the mouth and typically results in severe disease and tooth destruction.<sup>36</sup> It is estimated that ECC affects up to 12% of children ages six and younger and 24.7% of all children in the U.S.<sup>36-37</sup> Children from low income families are at a higher risk of developing ECC than children in the general population.<sup>33</sup>

Other behavioral factors may increase a child's risk of developing ECC. A child who is put to bed with a bottle filled with fruit juices or milk is exposed to a multitude of fermentable carbohydrates.<sup>27</sup> Salivary production and flow are important for clearing the mouth of food and drinks that might otherwise undergo fermentation. When a child is sleeping, the protective effects of saliva are diminished because of decreased salivary production.<sup>27</sup> Decreased salivary production leads to food stagnation and prolonged exposure to cariogenic food products, increasing the child's risk of developing ECC.<sup>30</sup>

ECC is a disease progression that can cause great hardship for a child, not only through damaged and painful teeth or tooth loss, but also through systemic, psychological and social means.<sup>27</sup> In rare situations, oral abscesses or infections may lead to systemic infection and even death.<sup>38</sup> ECC can also lead to malnutrition, asthma, recurrent infections, chronic diseases, decreased psychological well-being.<sup>30</sup> In addition, dental pain associated with tooth decay can impact a child's daily activities such as eating, sleeping, and playing. Ultimately, this can affect the child's performance in school and result in missed school days. Painful teeth may have to be removed, which further affects a child's development. The loss of deciduous (baby) teeth prematurely can lead to impairment in the development and growth of the maxillary arches and can lead to malocclusion, decreased chewing effectiveness and decreased speech function in the permanent teeth.<sup>27</sup>

# 2009-2010 OHI PREGNANT WOMAN SURVEY

## **METHODS**

### **SUBJECT RECRUITMENT**

The 2010 OHI Survey of Pregnant Women collected information from pregnant women served by county Women, Infants, and Children (WIC) program offices and private prenatal care providers. Staff from participating providers and WIC clinics distributed the surveys to pregnant women seen in their offices during January and February 2010.

### **SURVEY METHODS**

The survey consisted of 20 questions on routine dental care, urgent dental care, oral health needs during pregnancy, and general oral health knowledge. Once a pregnant client agreed to participate in the study, they were provided a paper survey and a prepaid return envelope. No identifying information was collected. Participants could separately return a detachable prepaid postcard to receive a small gift for participating in the survey. The gifts were sent to the participants within 10 days of receiving the cards. Each participant who returned a postcard received an infant gum brush, an adult toothbrush, a small child's book on brushing, and an immunization tracking card.

Informed consent for participation was gained passively through the completion and return of the survey. The study methodology was reviewed and approved by the WDH Institutional Review Board (IRB).

### **DATA**

All survey data were entered into a Microsoft Access database, and data verification was conducted on a random sample of 20% of the returned surveys. The overall error rate from the verification process was 0.15%. After the initial verification, data were analyzed for completeness and to identify unusual and out of range response values. All surveys found to contain missing data or out of range response, values were manually verified, and any errors identified were corrected by data entry staff members.

Some variables were created or recoded. Maternal age was categorized into three groups, 18-19, 20-34, and 35 years or older. A county of residence variable was created using the response to the maternal city of residence question. Finally, a variable was created for the presence/absence of a Community Oral Health Coordinator (COHC) within a county.

The frequency of responses to all twenty questions on the survey was conducted to determine the demographic distribution of respondents. Additionally, the associations between demographic characteristics of maternal race (White vs. non-White), maternal ethnicity, maternal age (categories), maternal parity, health insurance status, and dental insurance status and each of the survey questions were evaluated. Data were analyzed using SAS software version 9.2 (SAS Institute Inc, Cary, NC).

## **RESULTS**

### **DEMOGRAPHICS**

A total of 380 pregnant women from 18 Wyoming counties participated in the survey. Johnson, Niobrara, Platte, Teton, and Weston counties were not represented. Demographics for survey participants are presented in Table 4. Maternal age ranged from 18 to 44 years, with an average age of 26. Nearly 58% of respondents reported having a previous live birth, with the number of previous live births ranging from one to six and an average of 1.72.

**TABLE 4: RESPONDENT DEMOGRAPHICS, 2010 OHI SURVEY OF PREGNANT WOMEN**

<b>Maternal Race</b>	<b>Number of Respondents</b>	<b>Percent</b>
White	310	81.6%
American Indian	34	9.0%
Other	36	9.4%
<b>Maternal Ethnicity</b>		
Hispanic	43	11.3
Non Hispanic	337%	88.7
<b>Maternal Age (Years)</b>		
18-19	39	10.5%
20-34	304	81.7%
35+	29	7.8%
<b>Maternal Parity</b>		
Previous Live Birth	219	57.6%
No Previous Live Birth	160	42.1%
Blank	1	0.3%
<b>Health Insurance Coverage</b>		
Private/Other	167	44.0%
Medicaid	187	49.2%
Indian Health Service	4	1.1%
No Health Insurance	22	5.8
<b>Dental Insurance Covered</b>		
Covered	201	52.9%
Not Covered	140	36.8%
Blank	39	10.3

### **ORAL PAIN OR DENTAL PROBLEM**

Pregnant women were asked if they had experienced a toothache or other dental problem in the past six months. Overall, 35.8% of respondents reported having a toothache or other dental problem during the past six months, with the highest prevalence found in women 18 to 19 years of age (Table 5). Women ages 20 to 34 years had the lowest prevalence. A significantly greater proportion of respondents ages 18 to 19 years reported having a toothache or other dental problem during the past six months than respondents ages 20 to 34 years ( $p = 0.03$ ).

**TABLE 5: PERCENT OF PREGNANT WOMEN WHO REPORTED HAVING A TOOTHACHE OR OTHER DENTAL PROBLEM DURING THE PAST SIX MONTHS BY AGE, 2010 OHI SURVEY OF PREGNANT WOMEN**

<b>Age (years)</b>	<b>Percent</b>	<b>95% Confidence Interval (CI)</b>
18-19	53.9%	38.5-68.5
20-34	32.7%	27.5-38.0
35+	50.0%	32.5-67.5

A significantly greater proportion of respondents without dental insurance reported having a toothache or other dental problem during the past six months than respondents with dental insurance (p = 0.01). In addition, a significantly greater proportion of respondents who did not report on dental insurance coverage reported having a toothache or other dental problem during the past six months than respondents with dental insurance (p=0.01) (Table 6).

**TABLE 6: PERCENT OF PREGNANT WOMEN WHO REPORTED HAVING A TOOTHACHE OR OTHER DENTAL PROBLEM DURING THE PAST SIX MONTHS BY DENTAL INSURANCE COVERAGE, 2010 OHI SURVEY OF PREGNANT WOMEN**

Dental Insurance	Percent	95% Confidence Interval
Not serious enough		1.4-4.9/
Did not have insurance	26.3%	21.9-30.7
Trouble getting appointment	5.3%	3.0-7.5

### TIME SINCE LAST DENTAL VISIT

Pregnant women were asked how long it had been since their last dental visit. The majority of respondents (55.8%) reported having had a dental visit in the last year, 31.3% reported that it had been between one and three years, and 11.8% reported that it had been more than three years since their last visit. Additionally, 0.5% of respondents reported having never been to see a dentist, and 0.5% of respondents did not report the duration since their last dental visit.

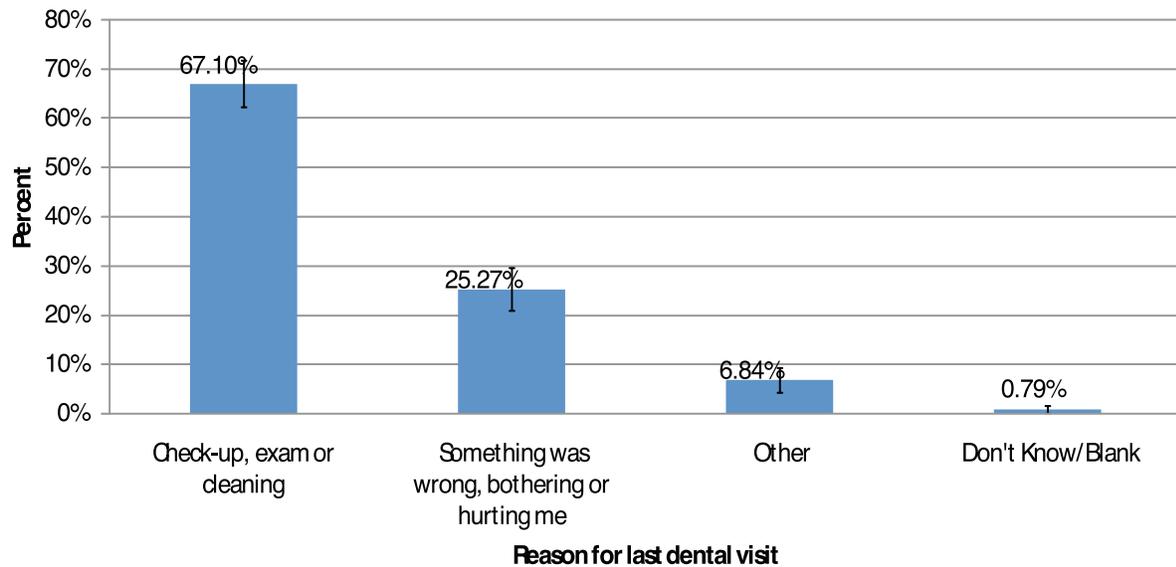
Several factors were associated with duration since last dental visit including health insurance coverage. A significantly greater proportion of respondents with private health insurance [70.5%, 95%CI (63.6-77.4)] reported a time since last dental visit of less than one year compared to respondents with Medicaid coverage [46.2%, 95%CI (39.1-53.4)] (p<0.001). In addition, a significantly greater proportion of respondents with private health insurance [70.5%, 95%CI (63.6-77.4)] reported a time since last dental visit of less than one year than respondents without health insurance coverage [27.3%, 95%CI (8.7-45.9)] (p<0.001).

Dental insurance coverage was associated with time since last dental visit. A significantly greater proportion of respondents with dental insurance [72.5%, 95%CI (66.3-78.7)] reported a time since last dental visit of less than one year than respondents without dental insurance [38.1%, 95%CI (30.1-46.2)] (p<0.001).

### REASON FOR LAST DENTAL VISIT

In addition to duration since last dental visit, pregnant women were asked the main reason/purpose for their visit. The most common reason for last dental visit among respondents was a check-up/exam or cleaning (Figure 2).

**FIGURE 2: REASONS FOR LAST DENTAL VISIT AMONG PREGNANT WOMEN, 2010 OHI SURVEY OF PREGNANT WOMEN**



Dental insurance coverage was associated with reason for last dental visit. A significantly greater proportion of respondents without dental insurance [38.4%, 95%CI (30.3-46.5)] reported the reason for their last dental visit something was wrong, bothering or hurting them than respondents with dental insurance [15.5%, 95%CI 10.5-20.5)] (p<0.01).

**UNMET DENTAL CARE NEEDS**

Pregnant women were asked if there was a time that they needed dental care but could not receive it in past 12 months. Twenty five percent (25.0%) of respondents reported that there was a time when they needed dental care, but reported that they could not get in to see a dentist during the past 12 months. A significantly greater proportion of pregnant women without dental insurance [45.3%, 95%CI (36.9-53.6)] reported having an unmet dental care need in the last twelve months than respondents with dental insurance [9.1%, 95%CI (5.1-13.0)] (p<0.001).

Participants who reported that they had an unmet need were asked to select reasons that they could not get care. These barriers are presented in Table 7. The most common barriers to receiving dental care were “I could not afford dental care” (66.3%) and “I did not have insurance” (26.3%), with the least reported barrier reported “Dentist hours inconvenient” (0.0%).

**TABLE 7: BARRIERS TO PREGNANT WOMEN RECEIVING DENTAL CARE IN THE PAST TWELVE MONTHS, 2010 OHI SURVEY OF PREGNANT WOMEN**

Barrier to Receiving Dental Care	Percent	95% CI
Could not afford care	66.3%	61.6-71.1
Not serious enough problem	3.2%	1.4-4.9
Did not have insurance	26.3%	21.9-30.7
Trouble getting appointment	5.3%	3.0-7.5
Dentist hours inconvenient	0.0%	0.0-0.0
Transportation barrier	5.3%	3.0-7.5
Dentist did not take Medicaid/insurance	4.2%	2.2-6.2
Do not like/trust/believe in the dentists	1.1%	0.0-2.1
No dentist available	1.1%	0.0-2.1
Did not know where to go	2.1%	0.7-3.6
Wait was too long in clinic/office	2.1%	0.7-3.6

## MATERNAL ORAL HEALTH KNOWLEDGE

Pregnant women were asked a series of yes or no questions about general oral health topics. Maternal oral health knowledge was generally high among survey respondents. A majority of respondents, however, did not know that dental caries is an infectious disease that is caused by bacteria and can be passed from mother or father to child or that if you have untreated cavities in your mouth your baby/child is more likely to have cavities in both their baby and permanent teeth. The maternal oral health knowledge results are presented in Table 8.

**TABLE 8: MATERNAL ORAL HEALTH KNOWLEDGE, 2010 OHI SURVEY OF PREGNANT WOMEN**

Survey Question	Correct Response	Percent giving the correct response	95% Confidence Interval
Sugary drinks and foods such as fruit juice, soda and/or candy will increase the risk of your baby/child having tooth decay.	Agree	83.4%	79.7-87.2
Cavities can cause serious health problems in your children	Agree	85.3%	81.7-88.8
Cavities in children are preventable.	Agree	92.6%	90.0-95.3
Cavities in baby teeth are not important because baby teeth will fall out.	Disagree	93.4%	90.9-95.9
Baby teeth are important because they help to hold space for the permanent.	Agree	96.6%	94.8-98.4
Healthy baby teeth allow your child to maintain a healthy body weight and normal growth throughout their life.	Agree	85.8%	82.3-89.3
Dental “cavities” is an infectious disease that is caused by bacteria and can be passed from mother or father to their child.dentists	Agree	26.1%	21.6-30.5
If you have untreated cavities in your mouth, your baby/child is more likely to have cavities in both their baby and permanent teeth.	Agree	30.3%	21.6-30.5
Putting your child to bed with a bottle of milk is bad for their teeth.	Agree	82.4%	78.5-86.2
Your oral health is an important part of your overall health and well-being.	Agree	99.0%	97.9-100.0

The number of children a woman had was associated with knowing that putting a baby to bed with a bottle of milk being bad for their teeth. A significantly greater proportion of respondents with a previous live birth [93.1%, 95%CI (89.7-96.5)] knew that putting a baby to bed with a bottle of milk was bad for their teeth compared to respondents without a previous live birth [70.7%, 95%CI (63.6-77.8)] ( $p < 0.001$ ). In addition, a significantly greater proportion of respondents with dental insurance [89.0%, 95%CI (84.7-93.3)] knew that putting a baby to bed with a bottle of milk was bad for their teeth than respondents without dental insurance [75.6%, 95%CI (68.3-82.8)] ( $p = 0.001$ ).

### **CHILD'S FIRST DENTAL CHECK-UP**

Pregnant women were asked when they planned to take their child for their first dental check-up. Approximately 47.7% of respondents reported that they planned to take their child for their first dental check-up by 12 months of age, 19.7% at 18 months of age, and 28.7% at 3 years of age. Additionally, 0.8% of respondents reported they planned to take their child for their first dental check-up when all of the child's baby teeth have been lost, and 0.5% reported they planned to take their child for their first dental check-up when the child complained about pain in their mouth.

A significantly greater proportion of respondents with a previous live birth [64.4%, 95%CI (59.6-69.2)] reported that they planned to take their child for their first dental check-up by 12 months of age, compared to respondents without a previous live birth [35.2%, 95%CI (30.4-40.0)] ( $p < 0.001$ ).

In addition, maternal age was associated with the planned time for a child's first dental check-up. A significantly greater proportion of respondents 18 to 19 years of age reported that they planned to take their child for their first dental check-up by 12 months of age than respondents 20 to 34 years of age [60.5% 95%CI (55.6-65.5) vs. 43.8% 95%CI (38.7-48.8)] ( $p = 0.03$ ). As well, a significantly greater proportion of respondents 35 years of age and older reported that they planned to take their child for their first dental check-up by 12 months of age than respondents 20 to 34 years of age [69.0% 95%CI (64.3-73.7) vs. 43.8% 95%CI (38.7-48.8)] ( $p = 0.01$ ).

### **ORAL HEALTH DISCUSSION DURING PRENATAL CARE**

Pregnant women were asked if a healthcare worker had talked with them about their oral health or their child's oral health during a prenatal visit. Approximately one quarter of pregnant women (26.6%) reported that a healthcare worker talked with them about their oral health during prenatal care, and 16.6% of respondents reported that a healthcare worker talked with them about their child's oral health.

### **ROUTINE DENTAL CARE DURING PREGNANCY**

Pregnant women were asked if they plan to go to a dentist for routine care during their pregnancy. Approximately 64% of respondents reported that they had seen or planned to see a dentist during their pregnancy. Dental insurance coverage was associated with respondent's intention to access dental care during pregnancy. A significantly greater proportion of respondents with dental insurance [74.9%, 95%CI (68.8-80.9)] reported having seen or planning to see a dentist during their pregnancy than respondents without dental insurance [53.3%, 95%CI (44.9-61.6)] ( $p < 0.001$ ).

Women were also asked if they had a problem with their teeth or gums during their pregnancy, and 29.0% of respondents reported having an issue with their teeth or gums during pregnancy. Among

these women, 34.6% reported visiting the dentist for treatment of the problem. A significantly greater proportion of respondents 18 to 19 years of age [51.3%, 95%CI (35.6-67.0)] reported having an issue with their teeth or gums during pregnancy than respondents 20 to 34 years of age [25.2%, 95%CI (20.3-30.1)] ( $p < 0.001$ ). In addition, a significantly greater proportion of respondents with dental insurance [48.9%, 95%CI (34.3-63.5)] reported receiving treatment for the issue with their teeth or gums during pregnancy than respondents without dental insurance [22.5%, 95%CI (10.8-34.1)] ( $p = 0.007$ ).

### **DENTAL CHECK-UP DURING PREGNANCY**

Pregnant women were asked when they thought the best time was to be seen by a dentist during pregnancy. Twenty-nine and a half percent (29.5%) of respondents reported the first trimester as the best time to be seen by a dentist during pregnancy, 21.1% reported the second trimester, and 4.2% reported the third trimester. Additionally, 36.0% of respondents reported that it does not matter what trimester of pregnancy a woman sees a dentist, 3.2% reported a woman should not go to the dentist during pregnancy, and 6.2% reported not knowing the best time to see a dentist.

### **DISCUSSION**

More than one third of all pregnant women reported having a toothache or other dental problem during the past six months. The percentage is higher among pregnant women without dental insurance and those 18 to 19 years of age. This is important because women who develop gingivitis, periodontal disease, and dental caries are at greater risk for pre-term labor, preeclampsia, gestational diabetes, and delivering a low birth weight infant.<sup>23-26</sup> In addition, women 18 to 19 years of age are already at higher risk for poor birth outcomes, so oral health problems could increase this risk.<sup>39</sup>

Many pregnant women are not seeking dental care. Nearly half (45%) of pregnant women had not visited a dentist in the past year. The American Dental Association recommends visiting the dentist regularly as one of the best strategies in preventing caries.<sup>40</sup> Dental insurance coverage is related to the time since last visit. Significantly more women with dental insurance visited the dentist in the past year than women who did not have dental insurance. More women without dental insurance also reported having unmet dental care needs. Overall, 25.0% of pregnant women reported needing dental care during the past year but said they could not get in to see a dentist. The most common barriers women reported were not being able to afford dental care and not having insurance.

Overall, pregnant women were knowledgeable about oral health. However, most did not know that dental caries is an infectious disease that can be passed from parent to child. Efforts should be made to educate pregnant women about the transmissible, infectious nature of the caries process.

A special effort should also be made to educate medical professionals who provide prenatal care to pregnant women. Very few women reported that someone discussed oral health during their prenatal care visits. More than one third of all pregnant women and nearly half of uninsured pregnant women reported that they were not planning to see a dentist during pregnancy. Pregnant women should understand the importance of dental care before, during, and after pregnancy in order to minimize the health risks to themselves and their infants. Physicians could help by encouraging women to seek dental care.

There were several limitations associated with this study. Only women who sought care during pregnancy, either at a WIC clinic or prenatal care provider, were included in this survey. This could bias the results if pregnant women not receiving care during pregnancy were different than women included in the survey. In addition, the survey was only

conducted for two months limiting pregnant women in the survey to those eligible for care during those months. Respondents were limited to those visiting participating providers. Participation in the survey was voluntary. Pregnant women who did not have good oral health or a good knowledge of oral health may not have chosen to participate causing the results to be different than if these mothers were included.

## Wyoming Pregnancy Risk Assessment Monitoring System (PRAMS) and Oral Health

The Pregnancy Risk Assessment Monitoring System (PRAMS) is an ongoing, population-based risk factor surveillance system developed by the CDC and conducted by the WDH, in collaboration with the Colorado Department of Public Health and Environment. PRAMS is designed to identify and monitor maternal experiences and behaviors that occur before, during, and after pregnancy, as well as the child’s early infancy experience. The PRAMS survey includes results that describe the oral healthcare of Wyoming women before, during, and after pregnancy.

PRAMS data for Wyoming women collected in 2007 and 2008 were combined for the analyses below:

- 28.4% (95% CI 25.9%-31.0%) of women reported needing to see a dentist for a problem during their most recent pregnancy. Among these women, 60.0% reported going to a dentist or dental clinic during their pregnancy.
- 41.9% (95% CI 39.2% - 44.7%) of women reported going to see a dentist or dental clinic during their most recent pregnancy.
- 37.6% (95%CI 34.9%-40.3%) of women reported that a dental or healthcare worker talked with them about how to care for their teeth and gums during their most recent pregnancy.

Maternal age was associated with needing to access dental services during pregnancy. The highest prevalence of women needing to see a dentist for a problem during their pregnancy was found in women 20 to 34 years of age (Table 9), while women ages 35 years or older had the lowest prevalence.

**TABLE 9: PERCENT OF PREGNANT WOMEN WHO REPORTED NEEDING TO SEE A DENTIST FOR A PROBLEM DURING PREGNANCY BY AGE, WYOMING PRAMS 2007-2008**

Age (years)	Percent	95% CI
18-19	28.9%	21.1-38.2
20-34	29.0%	26.2-31.9
35+	21.9	15.2-30.5

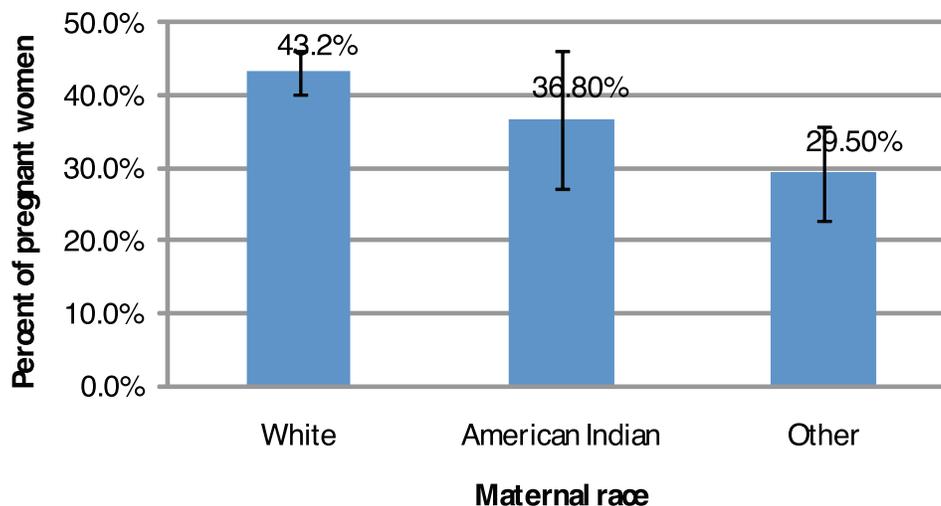
Women 35 years of age and older had the highest proportion reporting having gone to a dentist or dental clinic during their pregnancy (Table 10), while adults 18 to 19 years of age had the lowest prevalence.

**TABLE 10: PERCENT OF PREGNANT WOMEN WHO REPORTED VISITING A DENTIST OR DENTAL CLINIC DURING PREGNANCY BY AGE, WYOMING PRAMS 2007-2008**

Age (years)	Percent	95% CI
18-19	40.2%	31.1-49.7
20-34	41.6%	38.6-44.6
35+	47.4	38.5-56.5

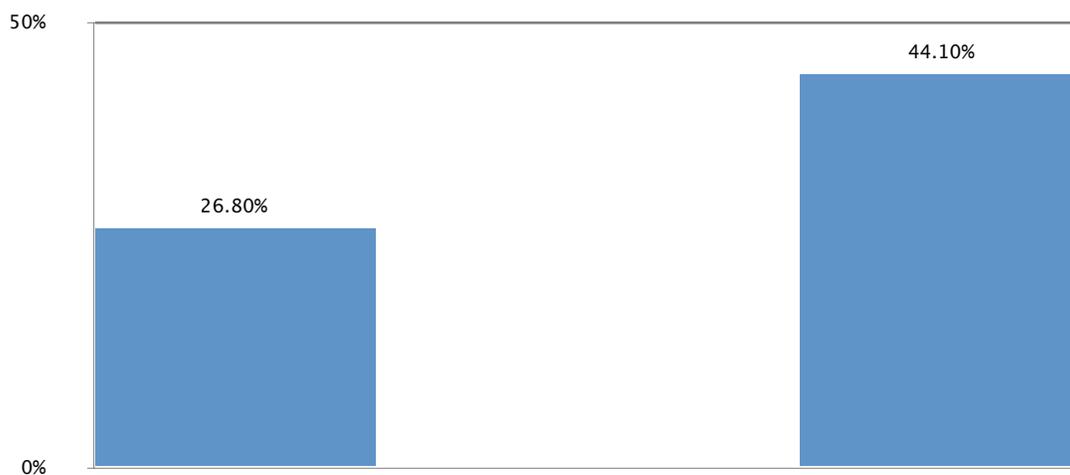
Using PRAMS data, disparities can be examined between racial and ethnic groups access to dental care and pre-pregnancy insurance status. White women were significantly more likely to report going to see a dentist or dental clinic during their pregnancy, than women of other races (Figure 3).

**FIGURE 3: PERCENT OF PREGNANT WOMEN WHO REPORTED VISITING A DENTIST OR DENTAL CLINIC DURING PREGNANCY BY MATERNAL RACE, WYOMING PRAMS 2007-2008**



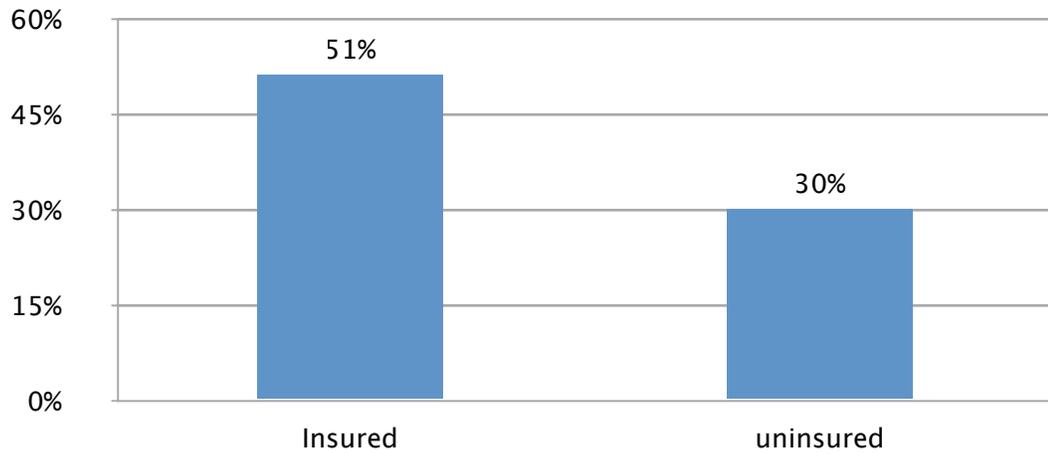
Non-Hispanic women were significantly more likely to have gone to see a dentist or dental clinic during their pregnancy than Hispanic women (Figure 4).

**FIGURE 4: PERCENT OF PREGNANT WOMEN WHO REPORTED VISITING A DENTIST OR DENTAL CLINIC DURING PREGNANCY BY MATERNAL ETHNICITY, WYOMING PRAMS 2007-2008**



Women who reported having health insurance coverage prior to pregnancy were significantly more likely to have visited a dentist or dental clinic during their pregnancy than women who were not covered by health insurance prior to pregnancy (Figure 5).

**FIGURE 5: PERCENT OF PREGNANT WOMEN WHO REPORTED VISITING A DENTIST OR DENTAL CLINIC DURING PREGNANCY BY PRE-PREGNANCY HEALTH INSURANCE STATUS, WYOMING PRAMS 2007-2008**



### **CONCLUSIONS FROM WYOMING PRAMS ORAL HEALTH DATA**

Fewer than half of Wyoming women who needed to see a dentist for a problem during their pregnancy reported actually going to see a dentist or dental clinic during their pregnancy, and less than half of all Wyoming PRAMS respondents reported going to see a dentist or dental clinic during pregnancy. The prevalence of needing to see a dentist for a problem during pregnancy was higher among PRAMS respondents 34 years of age and younger, while a greater proportion of respondents 35 years of age and older reported visiting a dentist or dental clinic during pregnancy. Health insurance coverage prior to pregnancy appears to be associated with accessing dental care during pregnancy.

### **WDH Prevention Activities among Pregnant Women**

OHS, through the work of COHCs, provides oral health education programs for pregnant women and mothers of young infants through prenatal classes, WIC clinics, and Head Start parent classes. Information is provided on tooth development, nutrition, cause and prevention of tooth decay, the importance of primary teeth, and the importance of taking a child to the dentist by one year of age. Each participant is given educational materials on oral hygiene, a toothbrush and a “Tender Touch” to clean the mouth of the infant.

# CHILDREN

## BACKGROUND

Dental caries is the most common chronic childhood disease; over 50 percent of children ages 5 to 9 years have had at least one cavity or filling.<sup>1, 41</sup> Dental pain can accompany decay and interfere with a child's well-being.<sup>42</sup> If left untreated, decay can progress to the softer structures of the tooth, which can lead to infections, abscess, or even death.<sup>43-44</sup> Dental caries is more prevalent in children who live below the FPL, have parents with lower educational attainment, are racial/ethnic minorities, are of immigrant, migrant or homeless status, and live in rural areas.<sup>1, 45</sup>

Dental pain is a significant concern accompanying dental disease. In a study of kindergarten and third-grade children in Maryland, 12% of all children reported at least one episode of dental pain, and one third of children with a history of dental caries reported associated pain.<sup>46</sup> A study of children presenting with oral/dental emergencies to pediatric dentistry training programs in the United States found that dental pain interfered with children's eating (86%), sleeping (50%), participation in school activities (32%), and play (19%). If dental pain is left untreated, nutritional deficiencies may result from the unwillingness to eat.<sup>42</sup> Non-trauma related pain can be indicative of caries or even abscess or infection.<sup>47</sup>

Untreated decay can progress through the tooth enamel and into the dentin and pulp.<sup>43-44</sup> If decay is severe, restorative treatments such as fillings and crowns may be unable to save the tooth, and root canal or tooth extraction may be necessary. In extreme and rare situations, oral abscesses or infections may lead to systemic infection, which can lead to death. Although caregivers of low income children have cited cost as a barrier to accessing care in a timely manner, a lack of preventive care leads to even more costly emergency room visits, which do not sufficiently treat the problem.<sup>43</sup>

Currently, the American Dental Association suggests brushing teeth twice a day, flossing between meals, eating a balanced diet, and visiting the dentist regularly as the best way to prevent caries.<sup>48</sup> Dental sealants are also especially effective in children. Dental sealants are plastics adhered to the chewing surfaces of a child's molars where they form an airtight, watertight bond with the enamel and prevent decay from affecting the tooth. They are a safe and effective method of preventing new decay and also limiting any existing decay.<sup>49</sup>

Racial and ethnic disparities in oral health have been noted for Hispanic and American Indian children, two of Wyoming's largest minority groups. A national survey of children's health found that once age, sex, education, and poverty level were controlled for, Hispanic children were more likely to self report fair or poor oral health than non-Hispanic White children [OR= 2.1 (1.9-2.4)].<sup>50</sup> Hispanic children ages 6 to 17 years were least likely to have seen a dentist ever or within the last 12 months.<sup>50</sup> A similar study by Flores et al. found that Hispanic children ages 0 to 17 years were more likely than non-Hispanic White children to have fair or poor oral health. In addition, 20.4% of Hispanic caregivers reported that they did not believe preventive care was necessary compared to 6.7% of non-Hispanic White caregivers.<sup>50</sup> Similarly, a national survey found that American Indian

children ages 0 to 17 years were less likely to have dental insurance [OR= 1.62 (1.28-2.05)] and more likely to have unmet dental needs [OR= 2.21 (1.09-4.45)] than Non-Hispanic White children of the same age.<sup>10</sup> In addition to typical access barriers cited by caregivers of all racial/ethnic groups such as transportation and the ability to schedule and attend appointments, American Indian caregivers reported the ongoing nature of treatment as a cause for unmet dental need.<sup>10</sup> Ongoing treatment refers to the lengthiness of treatment and need for follow up visits as a factor which may deter caregivers from seeking care.

Caregivers who understand the importance of children's dental hygiene are more likely to have children with better dental health.<sup>11</sup> This may be a result of seeking out preventive care and enforcing good oral behaviors in the home.<sup>8, 50-51</sup> In 2005, a study was published identifying barriers to seeking dental care for Medicaid-enrolled children with low income caregivers. Caregivers who utilized preventive dental care tended to emphasize its importance. They had a better understanding of the Medicaid system and the location of dental care providers.<sup>8</sup> Another study reported that children from mothers with lower educational attainment were more likely to have an increased occurrence of caries and were also more likely to be overweight.<sup>52</sup>

Obesity is a condition of significant concern to pediatricians and researchers. Currently, 18% of U.S. children are overweight with 15% at risk of becoming overweight. Childhood obesity has severe health and social implications in children.<sup>53</sup> Similar to dental caries, childhood obesity is approximately twice as likely to affect children of lower socioeconomic status, and overweight/obesity is more prevalent in rural populations.<sup>54-55</sup> Childhood obesity is a serious concern because children who are overweight are more likely to have high blood pressure, high cholesterol, and increased lipid and fasting insulin levels. They are more likely to be obese adults and more likely to develop heart disease, cancer and type II diabetes.<sup>56-62</sup> Decreased activity combined with increased caloric intake are the primary factors responsible for the increase in overweight and obesity.<sup>63</sup> Understanding the relationship between body weight and oral health has become a rapidly growing field of research in the United States and around the world. A German study found that 31% of overweight or obese children had healthy teeth compared to 40.7% of normal weight children and 44.7% of underweight children.<sup>64</sup> A diet high in refined sugar and carbohydrates is associated with both obesity and caries.<sup>64</sup> Children may have access to these low-nutrient, energy-dense foods at home or at school.<sup>65</sup>

Childhood oral health has been recognized by both the state and federal governments as an issue of paramount importance. The Maternal and Child Health Bureau (MCHB) of the U.S. Department of Health and Human Services (DHHS) sets standards (National Performance Measures) aimed at improving the health and well-being of children across the nation. One of the National Performance Measures is the percent of third grade children that have received protective sealants on at least one permanent molar tooth. Prior to 2008, the most recent data collected in Wyoming addressing this measure occurred in 1999-2000. Another measure of children's health and well-being

is body mass index (BMI). Data on childhood BMI has never been systematically collected in Wyoming. In 2007, OHS and the Wyoming Department of Health's Maternal and Family Health (MFH) sections teamed up to assess the oral health of third graders across the state. This survey was seen as an opportunity to also assess the BMI of third grade children in Wyoming.

## 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY

### METHODS SUBJECT RECRUITMENT

The 2008-2009 Oral Health and Body Mass Index Survey collected information from third graders in Wyoming elementary schools. The Wyoming Department of Education (WDE) provided a complete list of all public elementary schools, including third grade enrollment and the proportion of students eligible for the free and reduced lunch (FRL) program by district. Schools with fewer than ten enrolled students were removed from the list. The state was divided into three geographic regions with approximately equal third grade populations. For each region, schools were sorted in ascending order on the percentage of students eligible for the FRL program. A random sample of these schools was selected until the threshold of 400 third graders was reached for each region. OHS worked with the school's nurse to confirm school participation and schedule the screenings. COHCs conducted the oral health exams and the Community and Public Health Epidemiology Section staff conducted the BMI screenings. All screenings were completed between November 2008 and March 2009.

### SURVEY METHODS

Parents/ guardians of third graders in selected schools were asked to sign a consent form to allow their child to participate in the study. They were also asked to complete a student demographics form containing questions about the child's race/ethnicity, age, gender, FRL program eligibility, and dental insurance. The survey consisted of two parts. The first was an oral exam/screening conducted by a COHC. The coordinator utilized a disposable sterile explorer and mirror kit to examine the first permanent molars to determine the presence of untreated decay, fillings, sealants, and missing teeth. The second part of the survey was the measurement of each student's height and weight using a stadiometer and a portable digital scale. At screening completion, every third grader in the school, regardless of participation in the survey, received a cloth backpack containing an age appropriate toothbrush, oral health activity packet, bobble head pen, WDH immunization "Bee Wise Immunize" Magnet, information on teeth brushing, and other WDH educational materials. The study methodology was reviewed and approved by the WDH Institutional Review Board (IRB).

### DATA

Survey data were cleaned and verified. Select variables were created or recoded for analysis purposes. Participant race was divided into two categories: White and non-White. Four variables were created for the presence/absence of decay, fillings, sealants, or missing permanent first molars. Participant's BMI percentile was calculated based upon CDC guidelines for height and weight for age. A four level variable for BMI classification was created based on CDC criteria (Table 11). A variable for BMI status was created by collapsing BMI into two categories, underweight/healthy weight and overweight/obese.

**TABLE 11: CENTERS FOR DISEASE CONTROL AND PREVENTION (CDC) BODY MASS INDEX (BMI) CLASSIFICATION**

Classification	BMI Percentile
Underweight	<5lb percentile
Healthy Weight	5lb-84lb percentile
Overweight	85lb-94lb percentile
Obese	>95lb percentile

### ANALYSIS

The study data were analyzed using SAS version 9.2. Frequencies for each variable were calculated, and chi square tests were used to evaluate associations between oral health indicators, BMI and demographic factors.

### RESULTS PARTICIPATION RATES

Thirty eight public elementary schools from 14 Wyoming counties were selected to participate in the survey. The participation rate among selected Wyoming public schools was 73.7% (28/38) from 11 Wyoming counties. Among participating schools, 41.9% (489/1161) of enrolled third grade students participated in the screening.

## DEMOGRAPHICS

The demographic distribution of study subjects are presented in Table 12. Participants' ages ranged from 8 to 10 years, with a mean age of 8.7 years. The majority of participants were non-Hispanic and White, and a slightly higher percentage of girls participated. More than one fourth of participants (28.5%) were eligible for FRL, and the majority of students (72.1%) were covered by dental insurance.

**TABLE 12: DEMOGRAPHICS OF PARTICIPANTS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	<b>Number of Subjects</b>	<b>Percent</b>
<b>Race</b>		
White	382	78.4%
Non-White	33	6.8%
Blank	72	14.8%
<b>Ethnicity</b>		
Hispanic	71	14.6%
Non Hispanic	211	43.3%
Other	75	15.4%
Blank	130	26.7%
<b>Age (years)</b>		
8	163	33.5%
9	309	63.5%
10	15	3.0%
<b>Gender</b>		
Male	238	48.9%
Female	249	51.1%
<b>Free/Reduced Lunch</b>		
Yes	139	28.5%
No	268	55.0%
I don't know	31	6.4%
Blank	49	10.1%
<b>Dental Insurance Coverage</b>		
Covered	351	72.1%
Not Covered	79	16.2%
Blank	57	11.7%

## ORAL HEALTH

Results for the prevalence of decay, fillings, missing teeth and sealants in the first permanent molars of survey subjects are presented in Table 13. More than half of survey subjects (56.7%) had sealants on their first permanent molar, and 8.4% of children had untreated decay. Fewer than 1% of children were missing a first permanent molar, and 12.7% had a filling in their first molar.

**TABLE 13: PERCENT OF THIRD GRADERS WITH DECAY, FILLED, MISSING OR SEALED FIRST PERMANENT MOLARS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	<b>Percent</b>	<b>95% CI</b>
Decay	8.4%	6.0-10.9
Filled	12.7%	9.8-15.7
Missing	0.6	0.0-1.32
Sealants	56.7%	52.3-61.07

## UNTREATED DECAY

Among third graders, 8.4% [95% CI (6.0-10.9)] had untreated decay on at least one first permanent molar. The presence of untreated decay did not differ significantly by age (p=0.6), race (p=0.4), or FRL eligibility (p=0.2). A significantly greater proportion of Hispanic children had decay present than non-Hispanic children (p=0.03). Additionally, a greater proportion of males had decay present than female subjects (p=0.05). As well, a significantly greater proportion of children not covered by dental insurance had decay present than children covered by dental insurance (p=0.05). These results are presented in Table 14.

**TABLE 14: PERCENT OF SURVEY PARTICIPANTS WITH DECAY OF THE FIRST PERMANENT MOLAR BY SELECT DEMOGRAPHIC CHARACTERISTICS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	Percent	95% CI
<b>Race</b>		
White	6.8%	5.7-10.6
Non-White	9.4%	9.2-15.0
<b>Ethnicity</b>		
Hispanic	14.1%	11-17.2
Non Hispanic	5.7%	3.6-7.8
Other	13.3%	10.3-16.4
<b>Age (years)</b>		
8	6.75%	4.5-9.0
9	9.39%	6.8-12.0
10	6.67%	4.5-8.9
<b>Gender</b>		
Male	10.9%	8.2-13.69
Female	6.0%	3.9-8.1
<b>Free/Reduced Lunch</b>		
Yes	12.2%	9.2-15.3.
No	7.1%	4.7-9.5
I don't know	6.5%	4.2-8.8
<b>Dental Insurance Coverage</b>		
Covered	7.4%	5.0-9.9
Not Covered	13.9%	10.7-17.2
I did not know	12.5%	9.4-15.6

## FILLINGS

Among third graders, 12.7% [95% CI (9.8-15.7)] had a filling on at least one of the first permanent molars. The presence of fillings did not differ significantly by gender (p=0.3), FRL eligibility (p=0.5), or dental insurance (p=0.8). A significantly greater proportion of white subjects had fillings than non-white subjects (p=0.03). As well, a significantly greater proportion of ten year old subjects had fillings present than eight or nine year old subjects (p =0.03). Additionally, a significantly greater proportion of non-Hispanic subjects had fillings present than Hispanic subjects (p=0.01). These results are presented in Table 15.

**TABLE 15: PERCENT OF SURVEY PARTICIPANTS WITH FILLINGS IN ANY FIRST PERMANENT MOLAR BY SELECT DEMOGRAPHIC CHARACTERISTICS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	<b>Percent</b>	<b>95% CI</b>
<b>Race</b>		
White	13.2%	10.2-16.2
Non-White	6.1%	3.9-8.18
<b>Ethnicity</b>		
Hispanic	2.8%	1.4-4.3
Non Hispanic	13.7%	10.7-16.8
Other	18.67%	15.2-22.1
<b>Age (years)</b>		
8	11.6%	8.8-14.4
9	12.6%	8.7-16.5
10	26.7%	16.7-36.7
<b>Gender</b>		
Male	14.3%	11.2-17.4
Female	11.2%	8.4-14.1
<b>Free/Reduced Lunch</b>		
Yes	11.5%	8.5-14.5
No	13.1%	9.9-15.2
I don't know	19.4%	15.7-23.1
<b>Dental Insurance Coverage</b>		
Covered	12.5%	9.4-15.6
Not Covered	15.2%	11.8-18.6
I did not know	12.5%	9.4-15.6

## MISSING FIRST PERMANENT MOLAR

Among third graders, 0.6% [95% CI (0.0-1.3)] were missing at least one of their first permanent molars. The prevalence of missing any first permanent molars did not differ significantly by age (p=0.95), race (p=0.64), ethnicity (p=0.23), gender (p=0.08), FRL eligibility (p=0.42), or dental insurance (p=0.69). The prevalence of missing at least one first permanent molar was not associated with any of the key demographic characteristics collected in this survey. These results are presented in Table 16.

**TABLE 16: PERCENT OF SURVEY PARTICIPANTS MISSING ANY FIRST PERMANENT MOLAR BY SELECT DEMOGRAPHIC CHARACTERISTICS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	Percent	95% CI
<b>Race</b>		
White	0.7%	0.0-1.4
Non-White	0.0%	0.0-0.0
<b>Ethnicity</b>		
Hispanic	1.4%	0.4-2.5
Non Hispanic	0.0%	0.0-0.0
Other	1.3%	0.3-2.4
<b>Age (years)</b>		
8	0.6%	0.0-1.3
9	0.7%	0.0-1.4
10	0.0%	0.0-0.0
<b>Gender</b>		
Male	1.3%	0.3-2.2
Female	0.0%	0.0-0.0
<b>Free/Reduced Lunch</b>		
Yes	1.4%	0.3-2.6.
No	0.4%	0.0-0.9
I don't know	0.0%	0.0-0.0
<b>Dental Insurance Coverage</b>		
Covered	0.9%	0.0-1.7
Not Covered	0.0%	0.0-0.0
Ido not know	0.0%	0.0-0.0

## SEALANTS

Among third graders, 56.7% [95% CI (52.3-61.1)] had sealants on their first permanent molars. The presence of sealants did not differ significantly by ethnicity (p=0.34), or FRL eligibility (p=0.81). A significantly greater proportion of females had sealants present than males (p<0.001). As well, a significantly greater proportion of white subjects had sealants present than non-white subjects (p=0.04). As well, a significantly greater proportion of eight year old subjects had sealants present than ten year old subjects age (p=0.03). Additionally, a significantly greater proportion of children with dental insurance had sealants present than subjects without dental insurance (p=0.02). These results are presented in Table 17.

**TABLE 17: PERCENT OF SURVEY PARTICIPANTS WITH SEALANTS ON ANY FIRST PERMANENT MOLAR BY SELECT DEMOGRAPHIC CHARACTERISTICS, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	<b>Percent</b>	<b>95% CI</b>
<b>Race</b>		
White	57.7%	53.3-62.1
Non-White	42.4%	38.0-46.8
<b>Ethnicity</b>		
Hispanic	50.7%	46.1-55.3
Non Hispanic	59.7%	55.2-64.2
Other	53.3%	48.8-57.9
<b>Age (years)</b>		
8	61.4%	57.0-65.7
9	55.0%	50.6-59.4
10	46.7%	41.2-52.1
<b>Gender</b>		
Male	48.7%	44.3-53.2
Female	64.3%	60.0-68.5
<b>Free/Reduced Lunch</b>		
Yes	57.6%	52.9-62.2.
No	54.5%	49.8-59.1
I don't know	58.1%	53.4-62.7
<b>Dental Insurance Coverage</b>		
Covered	59.0%	54.4-63.6
Not Covered	41.8%	37.2-46.4
I do not know	50.0%	45.3-54.7

## BODY MASS INDEX

The distribution of weight classification based on BMI percentile among third graders is presented in Table 18. The majority of children (68.0%) were at a healthy weight (BMI 5th percentile - 84th percentile), while 29.1% of subjects were classified as overweight or obese (BMI > 85th percentile) and 2.9% were classified as underweight (BMI < 5th percentile). The BMI percentiles ranged from 1.6 to 99.7 with a mean BMI percentile of 59.9.

**TABLE 18: PERCENT OF SURVEY SUBJECTS BY BODY MASS INDEX CATEGORY, 2008-2009 ORAL HEALTH AND BODY MASS INDEX SURVEY**

	Percent	95% CI
Underweight (BMI less than the 5th percentile)	2.9%	1.4-4.4
Healthy weight (BMI 5th percentile up to the 85th percentile)	68.0%	63.9-72.1
Over weight (BMI 85th to less than the 95th percentile)	14.1%	11.0-17.2
Obese (BMI greater than or equal to the 95th percentile)	15.0%	11.8-18.2

## DISCUSSION

The 2008-2009 survey of third graders was the first to collect both oral health and BMI data from Wyoming public school students. In the last two decades, there has been a concerted effort across the nation to find associations between oral health problems and select social characteristics including socioeconomic status, race, ethnicity, and BMI to enhance targeted prevention efforts. This study has provided valuable information and insight into the oral health and BMI of school age children in Wyoming.

Results from this study both confirmed and conflicted with results from other publications. Dietrich et al. reported that Hispanic children were more likely to self-report fair or poor oral health than non-Hispanic White children.<sup>50</sup> Wyoming data confirm Hispanic third graders more than twice as likely to have untreated decay and four times less likely to have treated decay (fillings) when compared to non-Hispanic White children.

Some studies have also reported that dental caries is more prevalent in children who live below the FPL.<sup>1, 45</sup> The prevalence of untreated decay was higher among children whose parents reported that they were eligible for FRL; however, untreated decay did not differ significantly by FRL eligibility. This study may have lacked sufficient power to assess this relationship.

Dental sealants can prevent decay.<sup>49</sup> The observed prevalence of dental sealants on one or more surfaces of the permanent teeth among Wyoming third graders (6 to 11 years of age) is more than twice that of children nationally in 2007-2008 [Wyoming: 56.7% (95%CI 52.3-61.1); US: 25.0% (95% CI: 19.2-31.8)].<sup>66</sup> The high prevalence of dental sealants in Wyoming subjects demonstrates the success of Wyoming dentists and the WDH Sealant Program.

Another factor considered in this study was BMI. Understanding the relationship between body weight and oral health has become a rapidly growing field of research in the United States. The prevalence of overweight/obesity among third graders enrolled in the study conforms to overall BMI trends among school-age children in the United States.<sup>53</sup> Obesity research has found evidence that overweight/obesity is more prevalent in rural than urban populations.<sup>54-55</sup> The rurality of Wyoming may impose environmental and social barriers to physical activity, increasing the potential for a more sedentary life style.<sup>63</sup>

This study was unable to establish a relationship between BMI and

oral health. A possible reason for this is the prevalence of untreated decay/filled teeth and overweight/obese was relatively small; the study may have lacked statistical power to adequately assess the relationship. Additionally, two cross-sectional studies based on data from the National Health and Nutrition Examination Surveys (NHANES II and III) did not find evidence that overweight children were at an increased risk for dental caries after adjusting for confounding factors.<sup>67-68</sup>

There are several limitations to this study. Participation in the study was voluntary. This may have resulted in individuals of either excellent or poor oral health opting not to participate, which could bias the results. Additionally, the survey had a low number of participants from racial and ethnic minorities, which hinders the ability to evaluate disparities in oral health and BMI among children of racial/ethnic minority groups. School participation was not optimal; there was a 73% participation rate among the schools initially selected and a 41% participation rate among students at these schools. The relatively low participation rates among children could affect generalizability of the results to all Wyoming third graders. Additionally, the results may be biased if participation rates differed according to minority population or socioeconomic status.

In spite of these limitations, this study was an important public health effort. Prior to the time of this study, there was no ongoing surveillance of oral health or obesity in Wyoming children. These results provide valuable baseline information on the oral health of school age children in Wyoming.

# 2009-2010 ORAL HEALTH SURVEY

As part of the OHI, the WyDA and the WDH collaborated to conduct an oral health screening of all Wyoming third graders. The WyDA asked its members to volunteer to perform the oral health screenings in their respective communities. OHS worked with the volunteer dentist, COHC, and school nurse at each school to schedule screenings. The WDH Community and Public Health Epidemiology Section were responsible for data analysis.

## **METHODS** **SUBJECT RECRUITMENT**

The WDE sent a letter of support for the study to all superintendents, principals, and school nurses in the state. Schools had the option to decline participation by not scheduling a screening. Once a school agreed to participate, a passive consent form was sent home with children for their parents to review. The child was asked to participate unless their parents signed the form refusing to allow their child to participate. This opt out form was adapted using suggested forms from the Association of State and Territorial Dental Directors (ASTDD) Basic Screening Survey: An Approach to Monitoring Community Oral Health.

In participating schools, third graders whose parents had not chosen to opt out were asked to join the study. Children or their parents could terminate participation at any time before, during or after the screening occurred by telling one of the volunteers or school staff, by completing and returning the opt-out form, or by calling the primary investigator, whose contact information was listed on the consent form.

## **ORAL HEALTH SCREENING METHODS**

Children who chose to participate were taken from the classroom individually or in small groups in an effort to minimize classroom disruptions. Non-participants stayed in the classroom and performed their normal daily school work. The entire screening process took approximately three minutes per child. In each school, screenings were performed in an area designated by school administration.

A new disposable explorer and mirror kit was used for each child's exam and then discarded. The dental screeners determined the presence of untreated decay, treated decay, sealants on permanent molars, and treatment urgency for untreated decay. These indicators along with age and gender were recorded on a study form labeled with an identification number for each child. No names were recorded on the study data collection form. A referral card indicating the need and urgency of treatment was completed by the school nurse and sent home with the child. All screening data were collected on paper and entered into a database.

Volunteer dentists or COHCs conducted the screenings according to the guidelines set forth by the ASTDD's Oral Health Basic Screening Survey Tool. If the oral screener was unsure of an indicator, they would assume that it was not present. Therefore, results err on the side of underreporting indicators.<sup>69</sup>

## **ORAL HEALTH INDICATOR DEFINITIONS**

The first indicator was untreated decay; teeth were only considered decayed when enough enamel has been lost from the surface to create a hole or a definitive break in the enamel. Broken or chipped teeth were not recorded as decayed unless a cavity was found. Retained roots of teeth were considered untreated decay. Untreated decay was recorded as yes or no; children with untreated decay could have had one or multiple cavities.<sup>69</sup>

The next indicator was treated decay. Any type of filling or crown was considered treated decay. Missing teeth due to extraction because of tooth decay were also considered treated decay. Teeth that were broken, missing or had crowns on them because of an injury rather than decay were not considered treated decay. Teeth extracted for orthodontic treatment were not considered treated decay. The indicator was measured as yes or no; children recorded as having treated decay could have had one or more areas of treated decay.<sup>69</sup>

The third indicator was sealants. Children were categorized as having sealants if they had at least one on a permanent molar. This included sealants that did not cover all the pits and fissure of the tooth or sealants where some of the material has been lost. Presence of sealants was also recorded as yes or no; children with one sealant were categorized the same as those with many.<sup>69</sup>

The final indicator was treatment urgency. This indicator was divided into three categories. The first category was "no obvious problem" meaning the child had no untreated decay or other dental problem; this included children with untreated decay on a primary tooth that was about to fall out. The next category was "early dental care," meaning the child had untreated decay but was not experiencing pain or infection. These children were referred to see a dentist within the next few weeks. The last category was "urgent need for dental care," meaning the child had untreated decay accompanied by pain, infection or swelling and needed treatment within 24 to 48 hours.<sup>69</sup>

## **BODY MASS INDEX SCREENINGS**

In a subset of schools, height and weight measurements were taken to calculate BMI. Schools were selected to represent Wyoming geographically and across proportions of students eligible for FRL. All third graders were selected for the BMI study when the school they attended was selected for participation. For selected schools, screenings for height and weight were conducted by trained WDH staff at the same time as the dental screenings. Heights were measured using a stadiometer, and weights were measured using a digital scale. Results were recorded on the same form used for the dental screening for each participating child. Heights, weights, age and gender were used to calculate BMI.

## **ADDITIONAL INFORMATION COLLECTED**

The WDE provided school level data on the following factors for each participating school: total enrollment, the number of children eligible for FRL, and enrollment by race/ethnicity. The association between the prevalence of eligibility for FRL and oral health indicators was examined. The association between the schools' racial/ethnic minority enrollment and school oral health was also evaluated.

Using Healthcare Provider Shortage Area (HPSA) designations from the U.S. Department of Health and Human Services, schools located in a county with a low income HPSA designation were classified as being in a low income HPSA. The association between the schools' oral health indicators and HPSA status was examined.

Among schools participating in the 2010 Oral Health Fluoride Survey, schools were classified by ranges of fluoride in the drinking water.

Using data from the 2010 OHS Provider Survey, schools were classified as being in a high provider to children county or a low provider to children county. Schools were also classified as being in a high Medicaid provider to Medicaid enrolled county or a low Medicaid provider to Medicaid enrolled county. The association of the ratio of providers to children and oral health indicators was evaluated.

## **VENDING MACHINE SURVEY**

A survey on school policies concerning vending machines, recess and snack times were given to the school nurse or other representative from each school. The association between the presence of vending machines in the schools and decay was evaluated.

## **DATA ANALYSIS**

All surveys were entered into a Microsoft Access database. Data verification was conducted on about 10% of the returned surveys. The overall error rate for verification was 0.33%. After verification, the data set was checked for duplicate entries. A permanent data set was created, and data were analyzed using SAS 9.2. A variable for a child with caries experience was created by combining children who had treated decay with children who had untreated decay.

## **RESULTS**

### **PARTICIPATION RATES**

At least one school in each Wyoming County participated in the oral health screenings. The participation rate among Wyoming public schools was 90.1% (173/192). Among participating schools, 78.9% (5300/6715) of enrolled third grade students participated in the screening.

### **DEMOGRAPHICS OF PARTICIPANTS**

Among participating students, 50.9% were male and 49.1% were female. The mean age of participating students was 8.26 years and ages ranged from 7 to 10 years.

### **UNTREATED DECAY**

Statewide, 27.24% of Wyoming public third grade students screened had untreated decay. This is not significantly different than the national prevalence of treated decay of 25.8% (95% CI: 18.3-35.1).<sup>66</sup> Among students with untreated decay, 24.85% needed urgent treatment. Data were aggregated by county. Data are not shown for counties where only one school participated (Niobrara and Hot Springs). County prevalence of untreated decay (Table 19) ranged from 18.63% (Natrona County) to 41.54% (Johnson County). Compared to the statewide prevalence, four counties had higher a significantly higher prevalence of untreated decay, and three counties had a significantly lower prevalence of untreated decay. A map of these prevalence values for each county is shown in Figure 6.

**TABLE 19: PREVALENCE OF UNTREATED DECAY BY WYOMING COUNTY\***

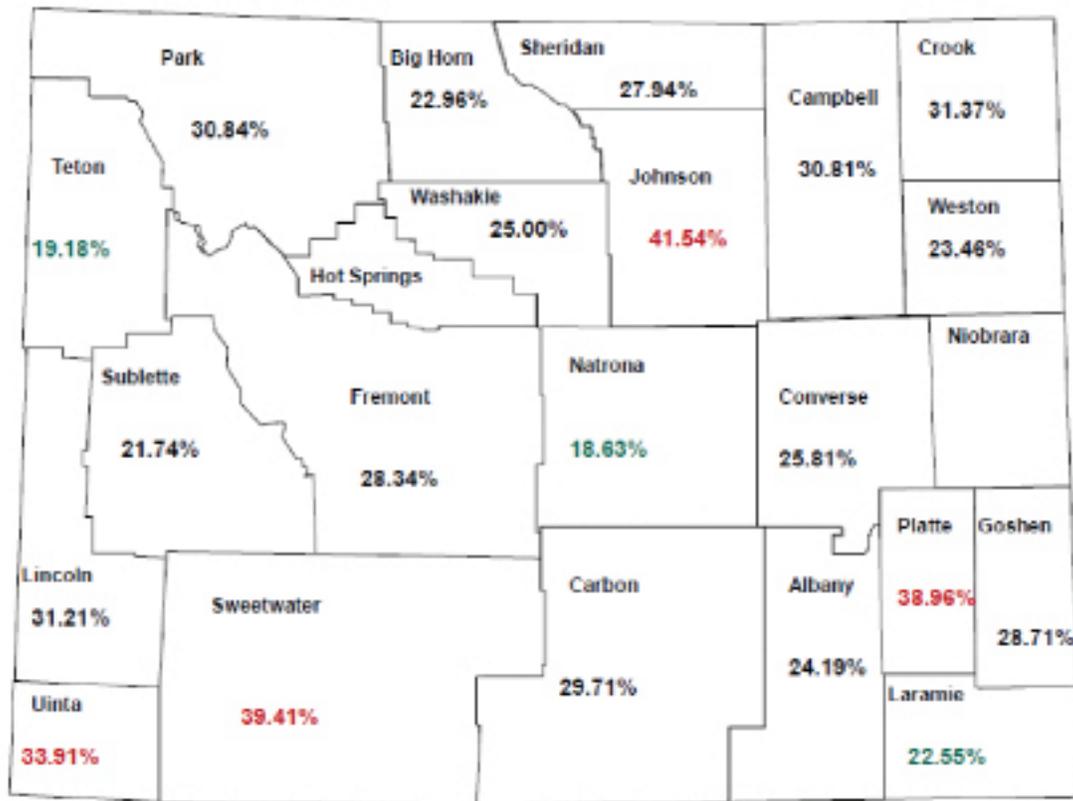
	<b>Prevalence of Untreated Decay</b>	<b>95% Confidence Interval</b>	<b>Comparison to Statewide Prevalence</b>
Wyoming	27.24%		
Albany	24.19%	18.42 - 29.96	Not different
Big Horn	22.96%	15.78 - 30.15	Not different
Campbell	30.81%	15.78 - 30.15	Not different
Carbon	29.71%	22.88 - 36.55	Not different
Converse	25.81%	18.84 - 32.77	Not different
Crook	31.37%	18.19 - 44.55	Not different
Fremont	28.34%	22.93 - 31.62	Not different
Goshen	28.71%	19.74 - 37.69	Not different
Hot Springs	-----		N/A
Johnson	41.54%	29.23 - 53.84	Higher than State
Laramie	22.55%	19.62 - 25.48	Lower than State
Lincoln	31.21%	24.23 - 38.19	Not different
Natrona	18.63%	15.75 - 21.52	Lower than State
Niobrara	-----		N/A
Park	30.84%	24.60 - 37.08	Not different
Platte	38.96%	27.82 - 50.10	Higher than State
Sheridan	27.94%	22.57 - 33.31	Not different
Sublette	21.74%	13.15 - 30.33	Not different
Sweetwater	39.41%	35.13 - 43.68	Higher than State
Teton	19.18%	12.72 - 25.64	Lower than State
Uinta	33.91%	27.78 - 40.03	Higher than State
Washakie	25.00%	16.18 - 33.82	Not different
Weston	23.46%	14.03 - 32.88	Not different

\*Green percentages are significantly lower than the state prevalence while percentages in red are significantly higher than the state.

FIGURE 6: PREVALENCE OF UNTREATED DECAY BY COUNTY

Higher than State rate  
 Lower than State rate  
 Not different

### Untreated Decay by County State Prevalence 27.24%



## TREATED DECAY

The statewide prevalence of treated decay was 57.3%. This is not significantly different than the national prevalence of treated decay of 50.1% (95% CI: 40.8-60.9).<sup>66</sup> The county prevalence of treated decay (Table 20) ranged from 44.16% (Platte County) to 76.04% (Washakie County). Compared to the statewide prevalence of treated decay, five counties had a significantly higher prevalence of treated decay, and four states had a significantly lower prevalence of treated decay.

**TABLE 20: PREVALENCE OF TREATED DECAY BY WYOMING COUNTY\***

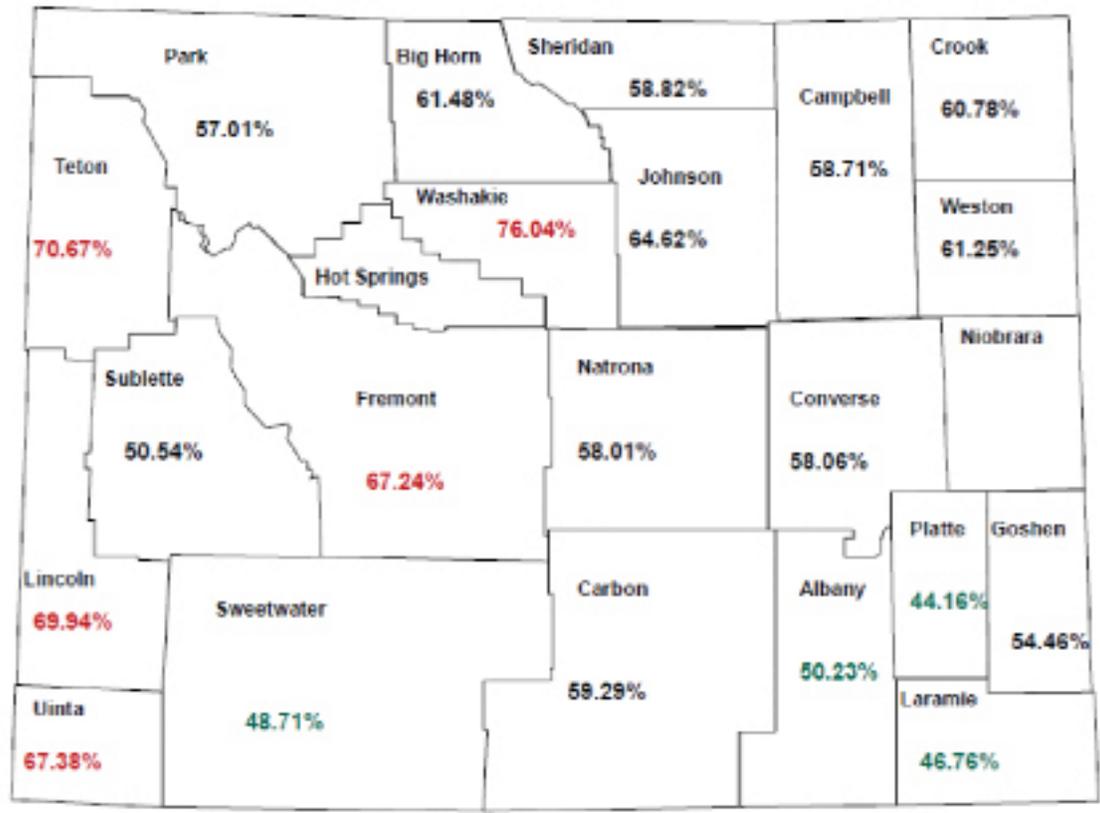
	<b>Prevalence of Un-treated Decay</b>	<b>95% Confidence Interval</b>	<b>Comparison to Statewide Prevalence</b>
Wyoming	57.30%		
Albany	50.23%	43.50 - 56.97	Lower than State
Big Horn	61.48%	53.17 - 69.80	Not different
Campbell	58.71%	54.50 - 62.93	Not different
Carbon	59.29%	50.91 - 65.66	Not different
Converse	58.06%	50.21 - 65.92	Not different
Crook	60.78%	46.92 - 74.65	Not different
Fremont	67.24%	62.66 - 71.83	Higher than State
Goshen	54.46%	44.58 - 64.34	Not different
Hot Springs	-----		N/A
Johnson	64.62%	52.67 - 76.56	Not Different
Laramie	46.76%	43.27 - 50.25	Lower than State
Lincoln	69.94%	63.04 - 76.84	Higher than State
Natrona	58.01%	54.36 - 61.67	Not Different
Niobrara	-----		
Park	57.01%	50.32 - 63.70	Not different
Platte	44.16%	32.81 - 55.50	Lower than State
Sheridan	58.82%	52.94 - 64.71	Not different
Sublette	50.54%	40.19 - 60.89	Not different
Sweetwater	48.71%	44.34 - 53.09	Lower than State
Teton	70.67%	63.30 - 78.04	Higher than State
Uinta	67.38%	61.32 - 73.45	Higher than State
Washakie	76.04%	67.35 - 84.74	Higher than State
Weston	61.25%	50.34 - 72.16	Not different

\*Green percentages are significantly lower than the state prevalence while percentages in red are significantly higher than the state.

FIGURE 7: PREVALENCE OF TREATED DECAY BY COUNTY

Higher than State rate  
 Lower than State rate  
 Not different

### Treated Decay by County State Prevalence 57.30%



## CARIES EXPERIENCE

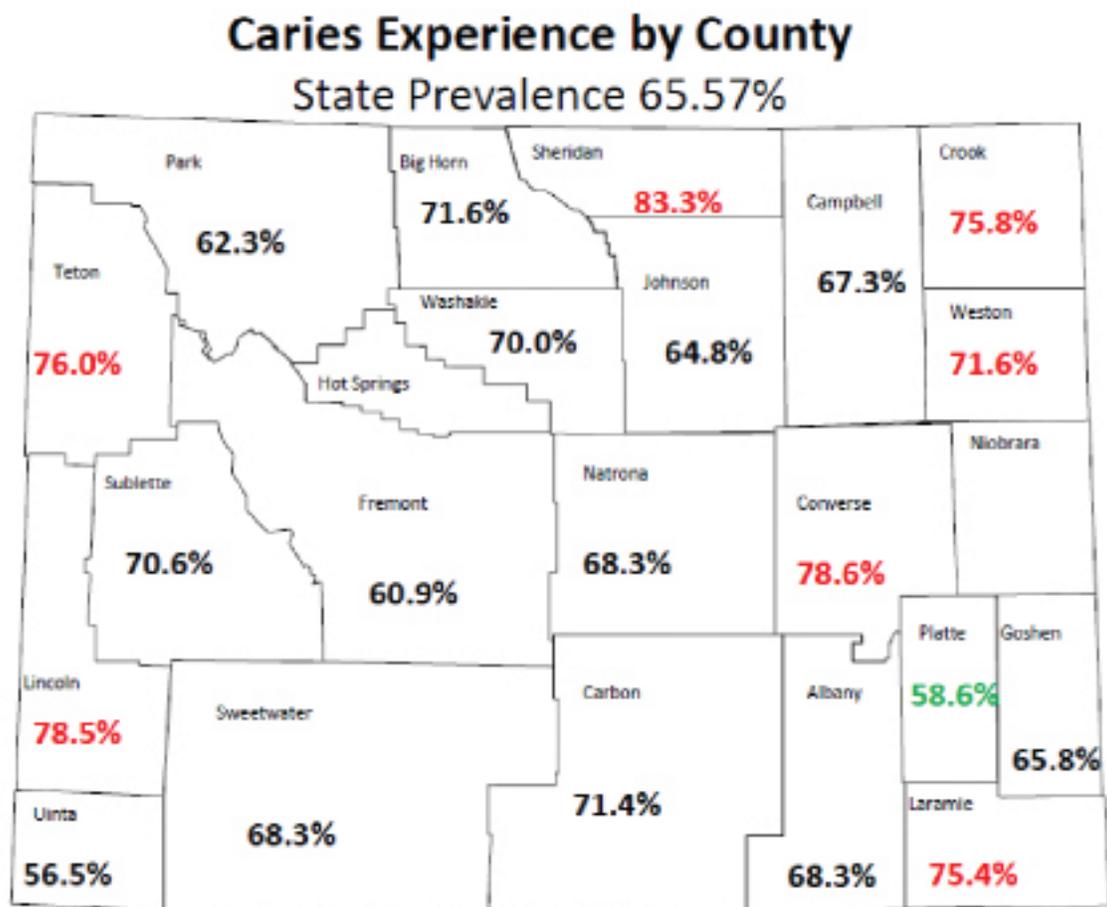
The statewide prevalence of caries experience, which included treated decay, untreated decay or both, was 65.6%. The prevalence of caries experience (Table 21) ranged from 56.52% (Uinta County) to 83.33% (Sheridan County). Compared to the statewide prevalence of decay, seven counties had a significantly higher prevalence of caries experience, and one county had a significantly lower prevalence of caries experience.

**TABLE 21: PREVALENCE OF CARIES EXPERIENCE BY WYOMING COUNTY\***

	<b>Prevalence of Caries Experience</b>	<b>95% Confidence Interval</b>	<b>Comparison to Statewide Prevalence</b>
Wyoming	65.57%		
Albany	68.32%	59.09 - 77.55	Not different
Big Horn	71.59%	64.86 - 78.32	Not different
Campbell	67.29%	60.95 - 73.63	Not different
Carbon	71.43%	64.67 - 78.19	Not different
Converse	78.61%	72.44 - 84.78	Higher than State
Crook	75.84%	68.89 - 82.79	Higher than State
Fremont	60.87%	50.71 - 71.03	Not different
Goshen	65.81%	60.14 - 71.48	Not different
Hot Springs	-----		N/A
Johnson	64.82%	61.29 - 68.36	Not Different
Laramie	75.37%	71.16 - 79.57	Higher than State
Lincoln	78.46%	68.20 - 88.73	Higher than State
Natrona	68.25%	64.18 - 72.33	Not Different
Niobrara	-----		N/A
Park	62.34%	51.27 - 73.41	Not different
Platte	58.60%	51.97 - 65.24	Lower than State
Sheridan	83.33%	75.74 - 90.92	Higher than State
Sublette	70.59%	57.65 - 83.53	Not different
Sweetwater	68.32%	64.25 - 72.39	Not different
Teton	75.97%	70.44 - 81.49	Higher than State
Uinta	56.52%	53.04 - 60.00	Not different
Washakie	70.00%	59.74 - 80.26	Not different
Weston	71.59%	67.73 - 75.45	Higher than State

**\*GREEN PERCENTAGES ARE SIGNIFICANTLY LOWER THAN THE STATE PREVALENCE WHILE PERCENTAGES IN RED ARE SIGNIFICANTLY HIGHER THAN THE STATE.**

FIGURE 8: PREVALENCE OF CARIES EXPERIENCE BY COUNTY



## SEALANTS

The statewide prevalence of sealants was 49.2%. This is higher than the national prevalence of sealants of 25.0% (95% CI: 19.2-31.8). The prevalence of sealants (Table 22) ranged from 23.38% (Platte County) to 68.75% (Washakie County). Compared to the statewide prevalence, six counties had a significantly lower prevalence of sealants and five counties had a significantly higher prevalence of sealants.

**TABLE 22: PREVALENCE OF SEALANTS BY WYOMING COUNTY\***

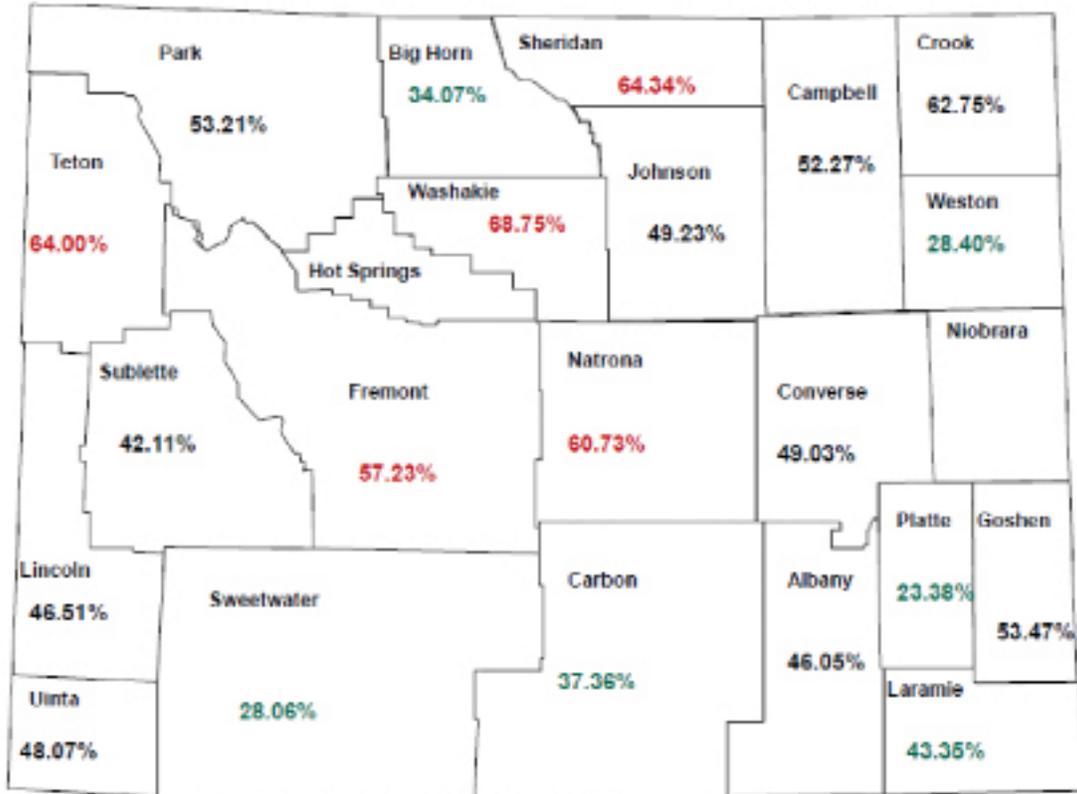
	<b>Prevalence of Sealants</b>	<b>95% Confidence Interval</b>	<b>Comparison to Statewide Prevalence</b>
Wyoming	49.20%		
Albany	46.05%	39.33 - 52.76	Not different
Big Horn	34.07%	25.98 - 42.17	Lower than the State
Campbell	52.27%	48.00 - 56.55	Not different
Carbon	37.36%	30.10 - 44.62	Lower than the State
Converse	49.03%	41.07 - 56.99	Not different
Crook	62.75%	49.01 - 76.48	Not different
Fremont	57.23%	53.42 - 63.04	Higher than the State
Goshen	53.47%	43.57 - 63.36	Not different
Hot Springs	-----		N/A
Johnson	49.23%	36.75 - 61.72	Not Different
Laramie	43.35%	39.87 - 46.83	Lower than the State
Lincoln	46.51%	38.98 - 54.04	Not different
Natrona	60.73%	57.13 - 64.34	Higher than the State
Niobrara	-----		N/A
Park	53.21%	47.48 - 60.93	Not different
Platte	23.38%	13.71 - 33.05	Lower than the State
Sheridan	64.34%	58.61 - 70.07	Higher than the State
Sublette	42.11%	31.99 - 52.22	Not different
Sweetwater	28.06%	24.14 - 31.99	Lower than the State
Teton	64.00%	56.23 - 71.77	Higher than State
Uinta	48.07%	41.61 - 54.53	Not different
Washakie	68.75%	59.31 - 78.19	Higher than the state
Weston	28.40%	18.36 - 38.43	Lower than the state

**\*GREEN PERCENTAGES ARE SIGNIFICANTLY LOWER THAN THE STATE PREVALENCE WHILE PERCENTAGES IN RED ARE SIGNIFICANTLY HIGHER THAN THE STATE.**

FIGURE 9: PREVALENCE OF SEALANTS BY COUNTY

Higher than State rate  
Lower than State rate  
Not different

### Sealants by County State Prevalence 49.20%



## GENDER AND ORAL HEALTH

The association between oral health indicator variables and gender was evaluated. The prevalence of treated decay was significantly greater among boys than girls (Boys: 58.52% Girls: 55.6%,  $p=0.03$ ). No other oral health indicator differed significantly among genders.

## ASSOCIATIONS BETWEEN ORAL HEALTH INDICATORS AND SCHOOL LEVEL FACTORS

In order to evaluate the association between oral health indicators (treated decay, untreated decay, caries experience, presence of sealants, and urgent care needed among children with untreated decay) and school level factors (fluoride, FRL eligibility, minority enrollment, urban/rural status, and presence of vending machines) schools were classified as having a high level of the factor or a low level based on a median split of the prevalence. The cut points used are given in Table 23.

**TABLE 23: MEDIAN VALUES FOR ORAL HEALTH INDICATORS**

Variable	Median (cut point)
Untreated Decay	24.14%
Treated Decay	56.25%
Caries Experience	66.67%
Sealants	49.15%
Urgent Care needed among children with untreated decay	16.67%

## FLUORIDE LEVELS

One hundred and four of the schools participating in the oral health screenings were sampled for fluoride levels. See the WDH Fluoride Survey section of this report for study methods and in-depth results. Among the schools sampled, 11 schools had fluoride levels at or above the recommended level of 1.1 mg/L. Eight schools were just below the recommended level at 1.0 mg/L. Schools were classified as being within or above the optimal range if the level was above 0.7 mg/L as the benefit of 0.7 mg/L fluoride concentration is close to the benefit of 1.1 mg/L.

There is no significant relationship between school fluoride level and decay; however, statistical power was limited in these analyses. The correlation between fluoride levels and prevalence of caries experience was also evaluated. There was not a statistically significant correlation ( $r=0.06$ ,  $p=0.56$ ). The lack of correlation between fluoride levels and decay among public schools may be due to confounding of other variables such as race and or socioeconomic status.

Urgency of treatment among children with untreated decay was associated with school fluoride level ( $p = 0.01$ , Table 24). Children with untreated decay in schools below the fluoride level of 0.7 mg/L were almost four times as likely to need urgent care than children with untreated decay in schools above the fluoride level of 0.7 mg/L (OR= 3.825, 95% CI: 1.27-11.52).

**TABLE 24: ASSOCIATION OF FLUORIDE LEVELS WITH URGENCY OF TREATMENT AMONG CHILDREN WITH UNTREATED DECAY IN WYOMING, 2010**

Fluoride Category	Percent of Schools with Low Percent Urgent Care Needed (number of schools)	Percent of Schools with High Percent Urgent Care Needed (number of schools)
Below Recommended Range ( 0.7 mg/L)	48.48% (32)	51.52% (34)
At or Above Recommended Range (0.7mg/L - 1.1 mg/L)	78.26% (18)	21.74% (5)

## FREE AND REDUCED LUNCH ELIGIBILITY

Schools were divided into two categories: schools with a high percentage of students eligible for FRL and schools with a low percentage of students eligible for FRL based on tertiles. The cut point of 30.95% eligible for FRL represent the lowest tertile of the FRL categories. The association between oral health indicators and eligibility for FRL was evaluated.

The relationship between caries experience and FRL eligibility was significant ( $p < 0.0001$ ; Table 25). Schools with larger populations of students eligible for FRL were approximately four and a half times more likely to have a high prevalence of caries experience (OR= 4.563, 95% CI: 2.276, 9.147).

**TABLE 25: PREVALENCE OF CARIES EXPERIENCE BY FREE AND REDUCED LUNCH ELIGIBILITY**

	<b>Percent of Schools with Low Percent of Decay Experienced (number of schools)</b>	<b>Percent of Schools with High Percent of Decay Experienced (number of schools)</b>
Low Percent Eligible Free and Reduced Lunches	75.48% (44)	25.42% (15)
High Percent Eligible Free and Reduced Lunches	39.13% (45)	40.23% (70)

The relationship between treated decay and FRL eligibility was also statistically significant ( $p = 0.0008$ ; Table 26). Schools with larger populations of students eligible for FRL were approximately three times more likely to have a high prevalence of treated decay (OR= 3.068, 95% CI: 1.576-5.972).

**TABLE 26: PREVALENCE OF TREATED DECAY BY FREE AND REDUCED LUNCH ELIGIBILITY**

	<b>Percent of Schools with Low Percent of Treated Decay (number of schools)</b>	<b>Percent of Schools with High Percent of Treated Decay (number of schools)</b>
Low Percent Eligible Free and Reduced Lunches	69.49% (41)	30.51% (18)
High Percent Eligible Free and Reduced Lunches	42.61% (49)	57.39% (66)

The relationship between untreated decay and FRL eligibility was also statistically significant (p=0.009; Table 27). Schools with larger populations of students eligible for FRL are approximately two and a half times more likely to have a high prevalence of untreated decay (OR= 2.352, 95% CI: 1.230-4.497).

**TABLE 27: PREVALENCE OF UNTREATED DECAY BY FREE AND REDUCED LUNCH ELIGIBILITY**

	<b>Percent of Schools with Low Percent of Untreated Decay (number of schools)</b>	<b>Percent of Schools with High Percent of Untreated Decay (number of schools)</b>
Low Percent Eligible Free and Reduced Lunches	64.41% (38)	35.59% (21)
High Percent Eligible Free and Reduced Lunches	43.48% (50)	56.52% (65)

The prevalence of sealants did not differ by eligibility for FRL and the prevalence of sealants was not correlated with the percent of children eligible for FRL (p=0.21).

**URBAN/RURAL DIFFERENCES**

Using the school zip codes, schools were categorized using Rural Urban Commuting Area (RUCA) codes as urban, large rural, small rural or isolated rural. The association between these categories and oral health indicators was examined. Table 28 shows the classification of the participating schools.

**TABLE 28: URBAN/RURAL CLASSIFICATION OF SCHOOLS**

<b>Urban/Rural Status</b>	<b>Percent of Schools</b>
Urban	28.74%
Large Rural	33.33%
Small Rural	16.67%
Isolated Rural	21.26%

**TABLE 29 ILLUSTRATES THE PREVALENCE OF UNTREATED DECAY BY URBAN/RURAL STATUS. THE PREVALENCE OF DECAY VARIED SIGNIFICANTLY (P=0.03).**

<b>Urban/Rural Status</b>	<b>Percent of Schools with Low Percent of Untreated Decay= (number of schools)</b>	<b>Percent of Schools with High Percent of Untreated Decay= (number of schools)</b>
Urban	68.0% (34)	32.0% (16)
Large Rural	39.66% (23)	60.34% (35)
Small Rural	48.28% (14)	51.72% (15)
Isolated Rural	45.95% (17)	54.05% (20)

In general, rural schools are approximately three times more likely to have a high percent of untreated decay than urban schools (OR=2.75, 95% CI: 1.38-5.50).

### **LOW INCOME HPSA**

Sixty five of the participating schools were located in counties designated as low income health professional shortage areas (LIHPSA). The relationship between LIHPSA and treated decay was statistically significant (p=0.007; Table 30). Schools in LIHPSAs are approximately two and a half times more likely to have a high prevalence of treated decay than schools not in LIHPSAs (OR= 2.35, 95% CI: 1.26-4.39). There were no other significant associations between oral health indicators and LIHPSA.

**TABLE 30: PREVALENCE OF TREATED DECAY BY LOW INCOME HEALTH PROFESSIONAL SHORTAGE AREA**

	<b>Percent of Schools with a Low Percent of Treated Decay (number of schools)</b>	<b>Percent of Schools with a High Percent of Treated Decay (number of schools)</b>
Not considered Low Income HPSA	59.81% (64)	40.19% (43)
Low Income HPSA	38.81% (26)	61.19% (41)

## MINORITY ENROLLMENT

Schools were classified as having a high minority enrollment if it was higher than the median (14%). The relationship between untreated decay and the percent of minority students was close to statistically significant ( $p=0.07$ ; Table 31), although the difference was not statistically significant at the 0.05 level. Schools with a high minority population are 74% more likely to have a high prevalence of untreated decay, however this odds ratio is not significant (OR= 1.74 95% CI: 0.955-3.173). Minority enrollment was not significantly associated with any other indicators.

**TABLE 31: PREVALENCE OF UNTREATED DECAY BY MINORITY ENROLLMENT**

	<b>Percent of Schools with a Low Percent of Untreated Decay (number of schools)</b>	<b>Percent of Schools with a High Percent of Untreated Decay (number of schools)</b>
Low Percent Minority Enrollment	57.30% (51)	42.70% (38)
High Percent Minority Enrollment	43.53% (37)	56.47% (48)

## DENTAL PROVIDERS

The ratios of children ages 0 to 18 years per dental care provider and children ages 0 to 18 years enrolled in Medicaid per dental care provider that reported accepting Medicaid were calculated for each county. A lower ratio is desirable because it means there are fewer children for an individual dentist to treat. Schools in counties with more children per provider than the Wyoming average were classified as being in a high child to provider county, and schools in counties with fewer children per provider than the Wyoming average were classified as being in a low child to provider county. Schools in counties with more Medicaid enrolled children per Medicaid accepting provider than the Wyoming average were also classified as being in a high Medicaid enrolled to Medicaid provider county; schools in counties with fewer Medicaid enrolled children per Medicaid accepting provider than the Wyoming average were classified as being in a low Medicaid enrolled to Medicaid provider county.

The relationship between treated decay and the ratio of children to dental providers in the county was statistically significant ( $p=0.02$ , Table 32). Schools in counties with fewer children per provider were approximately two times more likely to have a high prevalence of treated decay (OR= 2.11, 95% CI: 1.14-3.92).

**TABLE 32: PREVALENCE OF TREATED DECAY BY CHILDREN TO PROVIDER RATIO**

	<b>Percent of Schools with a Low Percent of Treated Decay (number of schools)</b>	<b>Percent of Schools with a High Percent of Treated Decay (number of schools)</b>
Low child to provider ratio	40.58% (28)	69.42% (41)
High child to provider ratio	59.05% (62)	40.95% (43)

The relationship between untreated decay and the ratio of dental providers to children in the county was statistically significant (p=0.005, Table 33). Schools in counties with more children per provider were approximately two and a half times more likely to have a high prevalence of untreated decay (OR= 2.44, 95% CI: 1.31-4.56).

**TABLE 33: PREVALENCE OF UNTREATED DECAY BY CHILDREN TO PROVIDER RATIO**

	<b>Percent of Schools with a Low Percent of Untreated Decay (number of schools)</b>	<b>Percent of Schools with a High Percent of Untreated Decay (number of schools)</b>
Low child to provider ratio	63.77% (44)	36.23% (25)
High child to provider ratio	41.90% (44)	58.10% (61)

The relationship between sealants and the ratio of dental providers to children in the county was statistically significant (p<0.0001, Table 34). Schools in counties with fewer children per provider are approximately four times more likely to have a high prevalence of sealants (OR= 3.62, 95% CI: 1.90-6.87).

**TABLE 34: PREVALENCE OF SEALANTS BY CHILDREN TO PROVIDER RATIO**

	<b>Percent of Schools with a Low Percent of Sealants (number of schools)</b>	<b>Percent of Schools with a High Percent of Sealants (number of schools)</b>
Low child to provider ratio	31.88% (22)	68.12% (47)
High child to provider ratio	62.86% (66)	37.14% (39)

The ratio of dentists was not significantly associated with any other indicators. The ratio of Medicaid children to Medicaid dentists was not significantly associated with any indicators.

## VENDING MACHINES

Information on the presence of vending machines by school was obtained using a survey completed by the school nurses. Only 16.67% (29/174) of schools with survey information reported having vending machines in the schools. The relationship between having a vending machine at the school and the prevalence of decay was not significant ( $p=0.25$ , Table 35).

**TABLE 35: PREVALENCE OF EXPERIENCED DECAY BY PRESENCE OF VENDING MACHINES**

	<b>Percent of Schools with a Low Percent of Decay Ever Experienced</b>	<b>Percent of Schools with a High Percent of Decay Ever Experienced</b>
No Vending Machines In School	53.10% (77)	46.90% (68)
Vending Machines In School	41.38% (12)	58.62% (17)

## BODY MASS INDEX

A sub-set of schools was selected for participation in screenings to assess the prevalence of obesity among Wyoming third grade students. Using measured heights and weights, the students' BMI gender/age specific percentiles were calculated, and students were classified as underweight, healthy weight, overweight, or obese. Most students (66.31%) were classified as being at a healthy weight; 2.36% were underweight; 15.8% were overweight; and 15.54% were obese (Table 36).

**TABLE 36: WEIGHT STATUS BASED ON BMI PERCENTILE**

<b>Weight Status</b>	<b>Percent of Students</b>
Underweight	2.36%
Healthy Weight	66.31%
Overweight	15.80%
Obese	15.54%

BMI category was not associated with any oral health indicators.

## **DISCUSSION**

Overall, the percentages of Wyoming children with untreated decay and treated decay were not different from that of U.S. children or children from surrounding states. However, more Wyoming children had sealants than U.S. children.

Fluoride levels affected the urgency of the need for treatment. Children with untreated decay attending schools with fluoride levels below the recommended range were more likely to need urgent dental care. Many of these children may live in homes with drinking water from the same water system, meaning they have low fluoride exposure at home and at school. Because fluoride slows decay by remineralizing teeth and by reducing the amount of acid produced by bacteria, the effects of untreated decay in children living in areas with low fluoride levels could be lessened if these children were exposed to higher levels of fluoride.<sup>17</sup> Fluoride treatments are important for children living in these areas. Fluoride levels were not associated with other oral health indicators, but further research is needed to discover any relationships and to look for any confounding factors.

Another important predictor of oral health problems is poverty. The results of this study indicate that the percentage of children in a school eligible for FRL is major predictor of oral health. Schools with a higher percentage of children eligible for FRL were more likely to have a higher prevalence of treated decay, untreated decay, and caries experience. These results are consistent with those found in other studies that indicate dental caries is more prevalent in children who live below the FPL.<sup>1, 45</sup> Children eligible for FRL may not have dental insurance and their families may not be able to afford dental care.

Several community level factors were also associated with oral health indicators in this study. As seen in previous studies, rural schools were more likely to have a higher prevalence of untreated decay. Rural areas may have fewer providers limiting the ability to access to dental care.

Access to dental care was an issue associated to several other factors. Some schools are located in counties designated as low income health professional shortage areas (LIHPSA) meaning there is a shortage of providers available to see low income people. These schools were more likely to have a higher prevalence of treated decay. Because there is no individual level data on students, it is unknown whether the students with treated decay lived in families with a low income. It is also unknown if these counties had a sufficient number of providers for higher income families. The results of the study also show that schools in counties with a lower ratio of children to providers had a higher prevalence of treated decay and a higher prevalence of sealants. With fewer children for a provider to see, appointments may be more readily available, allowing children to get dental care. Conversely, schools in counties with a high ratio of children to providers have a higher prevalence of untreated decay. Providers in these counties may have higher patient loads making it more difficult for children to get appointments.

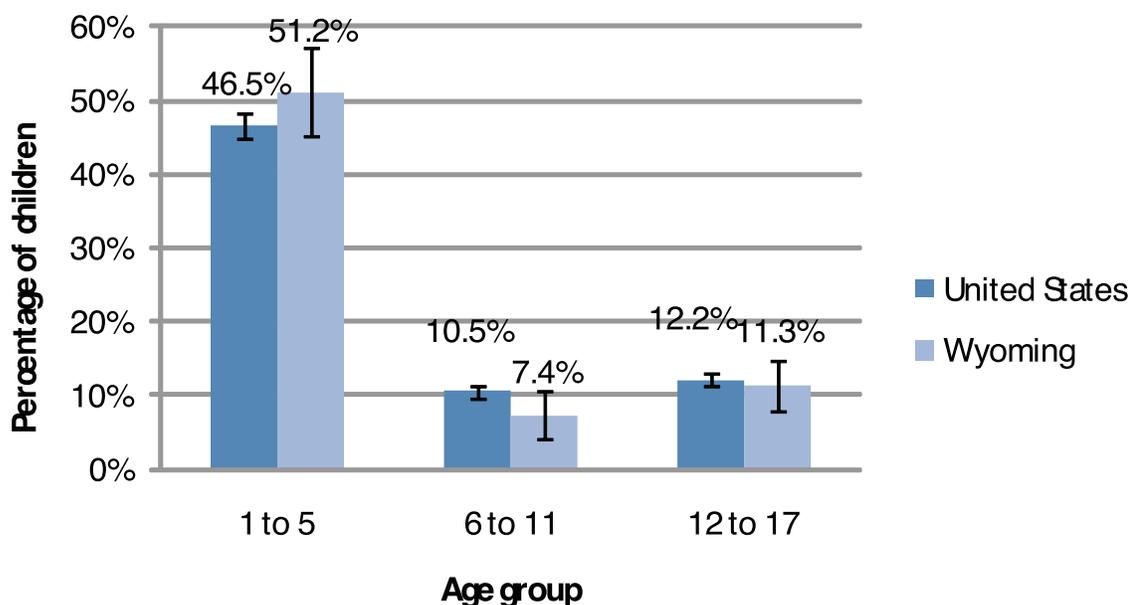
# WYOMING DATA FROM THE NATIONAL SURVEY OF CHILDREN'S HEALTH

The National Survey of Children's Health (NSCH) is a random digit dial telephone survey conducted in all U.S. states that provides state-specific information about the health and well-being of children less than 18 years of age. MCHB sponsors the survey.<sup>70</sup> The NSCH includes a broad range of health topics such as physical, emotional, behavioral, and oral health.<sup>71</sup> Only oral health related issues are addressed in this summary of NSCH survey data from 2007.

## PREVENTIVE DENTAL CARE

Parents were asked how many times their child received preventive dental care such as check-ups and dental cleanings in the 12 months before the survey. In 2007, 78.0% of Wyoming children were reported to have had at least one preventive dental care visit. This is similar to the proportion of U.S. children (78.4%) who received at least one dental care visit. Significantly more Wyoming children 1 to 5 years of age did not receive preventive dental care than children 6 to 11 and 12 to 17 years of age. This difference was similar among U.S. children (Figure 10).

**FIGURE 10: PERCENT OF WYOMING AND U.S. CHILDREN AGES 1 TO 17 YEARS WHO DID NOT RECEIVE PREVENTIVE DENTAL CARE VISITS IN THE 12 MONTHS PRIOR TO THE 2007 NSCH SURVEY BY AGE GROUP**



## Oral Health Problems

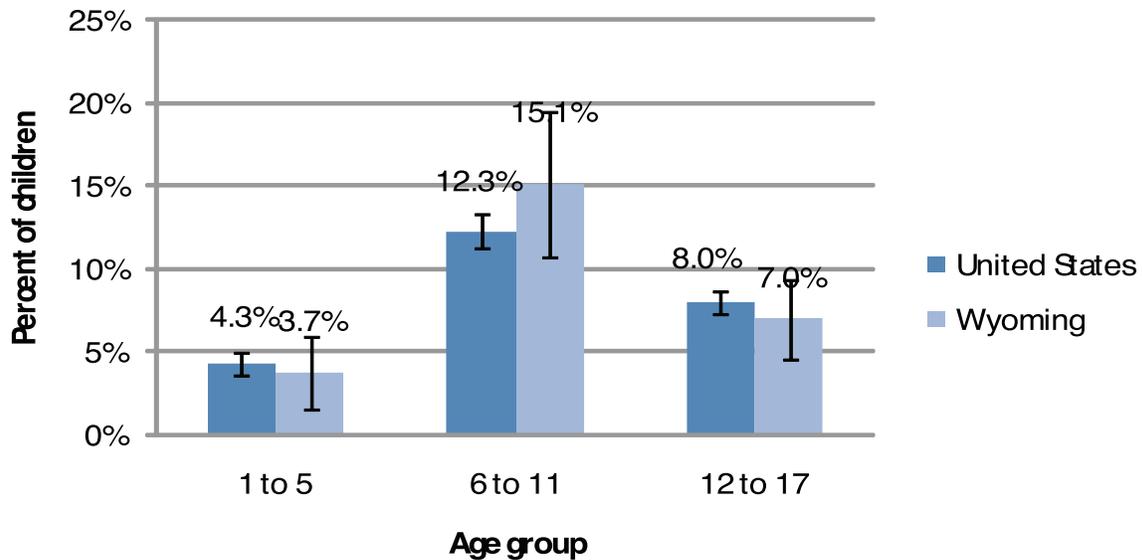
Parents were asked if their child had any one of four specific oral health problems (toothache, decayed teeth/cavities, broken teeth, or bleeding gums) in the six months before the survey. Of Wyoming children ages 1 to 17 years, 18.3% reported having one problem and 8.8% reported two or more problems. This was similar among U.S. children with 18.7% having one problem and 8.4% with two or more problems. The prevalence for each type of problem is summarized in Table 37.

**TABLE 37: PREVALENCE OF ORAL HEALTH PROBLEMS AMONG WYOMING AND U.S. CHILDREN AGES 1 TO 17 YEARS, NSCH 2007**

SPECIFIC PROBLEM	Wyoming		United States	
	PREVALENCE	95% CONFIDENCE INTERVAL	PREVALENCE	95% CONFIDENCE INTERVAL
Bleeding Gums	3.0%	1.9-4.1	3.3%	3.0-3.6
Broken Teeth	3.7%	2.4-5.0	4.1%	3.7-4.5
Decay/Cavities	19.3%	16.8-21.7	19.4%	18.7-20.1
Toothache	12.8%	10.5-15.1	10.7%	10.2-11.3

Wyoming children 6 to 11 years of age were significantly more likely to report having two or more oral health problems than Wyoming children 1 to 5 and 12 to 17 years of age. U.S. children followed a similar pattern (Figure 11).

**FIGURE 11: PERCENT OF WYOMING AND U.S. CHILDREN AGES 1 TO 17 YEARS WHO REPORTED TWO OR MORE ORAL HEALTH PROBLEMS BY AGE GROUP, NSCH 2007**



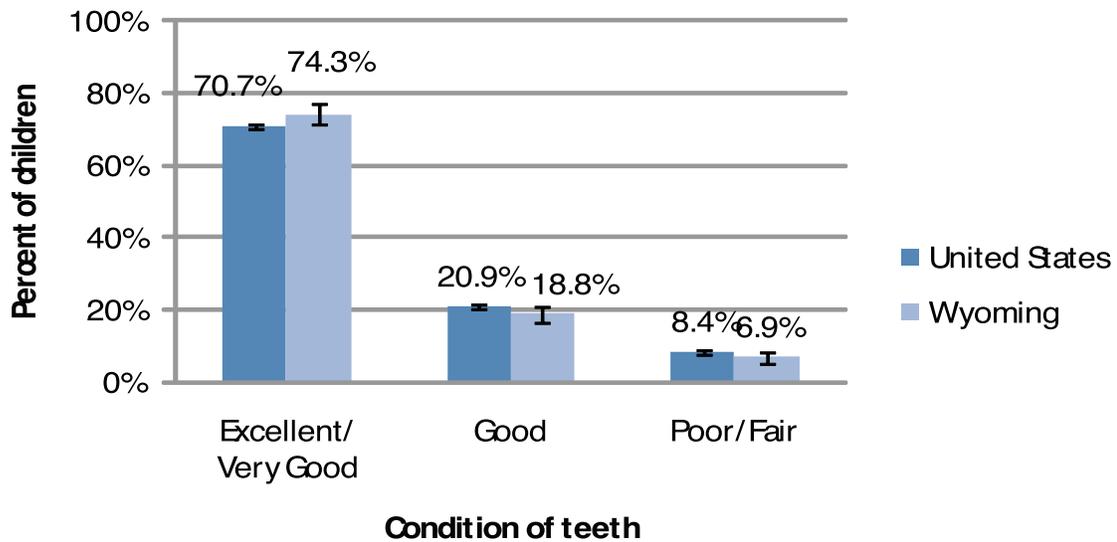
## Unmet Dental Care Needs

Parents were asked if there was any delayed or unmet dental care need for their child in the 12 months before the survey. The percentage of Wyoming children ages 1 to 17 years that reported delayed or unmet dental care was 2.9%. This was not significantly different from the 2.8% reported nationally.

## Overall Condition of Teeth

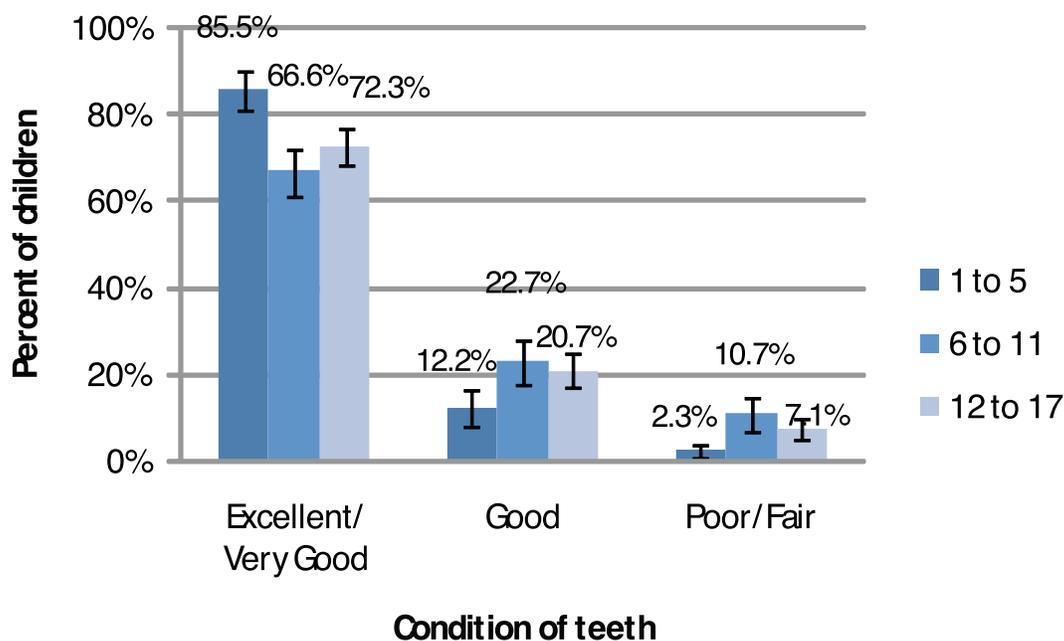
Parents were asked to report on the overall condition of their child's teeth. The percentage of Wyoming children ages 1 to 17 years who reported that their teeth were in Excellent/Very Good condition was not significantly different than the percentage of children nationally (Figure 12).

**FIGURE 12: CONDITION OF TEETH AMONG WYOMING AND U.S. CHILDREN AGES 1 TO 17 YEARS, NSCH 2007**



A significantly higher percentage of Wyoming children ages 1 to 5 years were reported to have teeth in Excellent/Very Good condition compared to U.S. children of the same age [85.5% (CI: 81.2%-89.9%) vs. 77.9% (CI: 76.3%-79.5%) respectively]. The percentage of Wyoming children 6 to 11 and 12 to 17 years of age who reported having teeth in Excellent/Very Good condition did not differ significantly from U.S. children in the same age groups. Among Wyoming children, the percent that reported Excellent/Very Good condition of teeth was significantly higher in children ages 1 to 5 years than in the 6 to 11 years and 12 to 17 years age groups (Figure 13).

**FIGURE 13: CONDITION OF TEETH AMONG WYOMING CHILDREN BY AGE GROUP, NSCH 2007**



## PREVENTION SERVICES AMONG CHILDREN

### Sealants

MFH provides funding to OHS to pay for dental sealants to be placed on permanent teeth for children up to 19 years of age. In FY2009, the program provided sealants for 3,215 children. In FY2009, Wyoming EqualityCare funded the application of dental sealants on permanent teeth for 4,060 children

### Community Oral Health Coordinator (COHC) Program

Wyoming received a State Oral Health Collaborative Systems grant from Health Resources and Services Administration (HRSA) in 2004 to start a pilot project for a COHC in Sheridan County. This grant also provided funding for the Wyoming Oral Health Coalition (WOHC). The WOHC was instrumental in initiating legislation to start the present COHC program

In 2007, the Wyoming Legislature funded the COHC Program. The legislation authorized OHS to contract dental hygienists to conduct public health programs at the community level. Currently there are seven COHCs working in thirteen counties in Wyoming. The COHC works under the direct, indirect and general supervision and license of the Wyoming State Dentist.

Counties were chosen as locations for COHCs by researching the number of EqualityCare eligible recipients in the county, the number of students on FRL, access to care, and results of previous years' dental screenings. The COHCs conduct dental screenings in Head Start programs, Child Development Centers, private preschools, and elementary schools. Children with visible dental problems are referred to dentists for examination and treatment. Working with local dentists, the COHC assists families in finding a dentist if they do not have a dental home. Follow up letters and phone calls are made to families to verify treatment. The COHCs facilitate collaborations between community level health professionals and partners to stabilize and strengthen strategies to increase access to oral health services for low income and other underserved children.

The COHCs perform outreach, education and publicity regarding oral disease prevention for parents, pregnant women, local governments, school officials, and community organizations. Oral health education programs, fluoride mouth rinse programs and fluoride varnish applications are also made available to students. The COHCs collect evaluation data on the progress of the program. OHS provides an annual Interim Report to the Wyoming Legislature on the status of this program.

In FY2009, a total of 6,842 children received a dental screening. Referrals for dental treatment were made on 2,311 of the children screened. Individual follow-up was given to families who requested assistance in finding funding or a dentist to provide treatment. A total of 7,837 individuals attended an education program or had contact with the COHC program. A total of 2,682 students participated in a prevention program such as fluoride varnish or school fluoride mouth rinse.

# CHILDREN WITH SPECIAL HEALTH CARE NEEDS

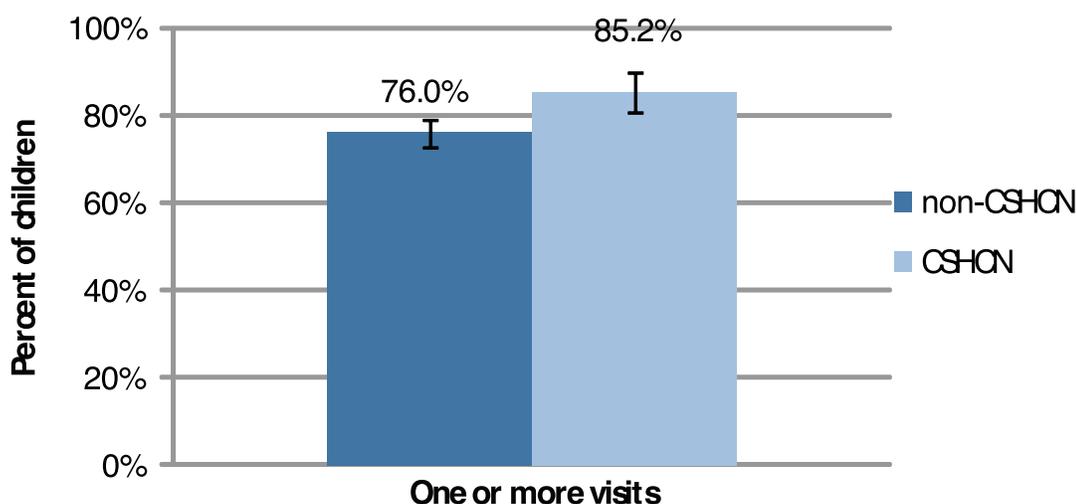
## WYOMING DATA FROM THE NATIONAL SURVEY OF CHILDREN WITH SPECIAL HEALTH CARE NEEDS

The National Survey of Children with Special Health Care Needs (NS-CSHCN) is a random digit dial telephone survey conducted in all U.S. states that provides state-specific information about children with special health care needs (CSHCN) who are less than 18 years of age. MCHB sponsors the survey.<sup>70</sup> Children that fit the definition of having special health care needs are “those who have or are at increased risk for a chronic physical, developmental, behavioral, or emotional condition and who also require health and related services of a type or amount beyond that required by children generally.”<sup>72</sup> The NS-CSHCN provides an estimate of the number of CSHCN and includes a broad range of topics including oral health, functional status, health insurance, and care coordination.<sup>71</sup> NS-CSHCN also compares CSHCN with data from children without special health care needs using data from the 2007 National Survey of Children’s Health. Only oral health related issues from the 2005/2006 NS-CSHCN survey are addressed in this summary.

### Preventive Dental Care

In 2005/2006, parents of CSHCN were asked if their child needed preventive dental care any time in the 12 months before taking the survey. Among Wyoming CSHCN 0 to 17 years of age, 83.1% reported needing preventive dental care. This is similar in the U.S. with 81.1% of CSHCN of the same age needing preventive dental care. Among Wyoming CSHCN that needed care, approximately 9% had unmet preventive dental care needs compared to 8% of U.S. CSHCN. Parents were asked how many times their child visited the dentist for preventive care in the 12 months before the survey. A significantly higher percentage of Wyoming CSHCN reported one or more visits for preventive dental care and cleanings than Wyoming children without special health care needs (Figure 14).

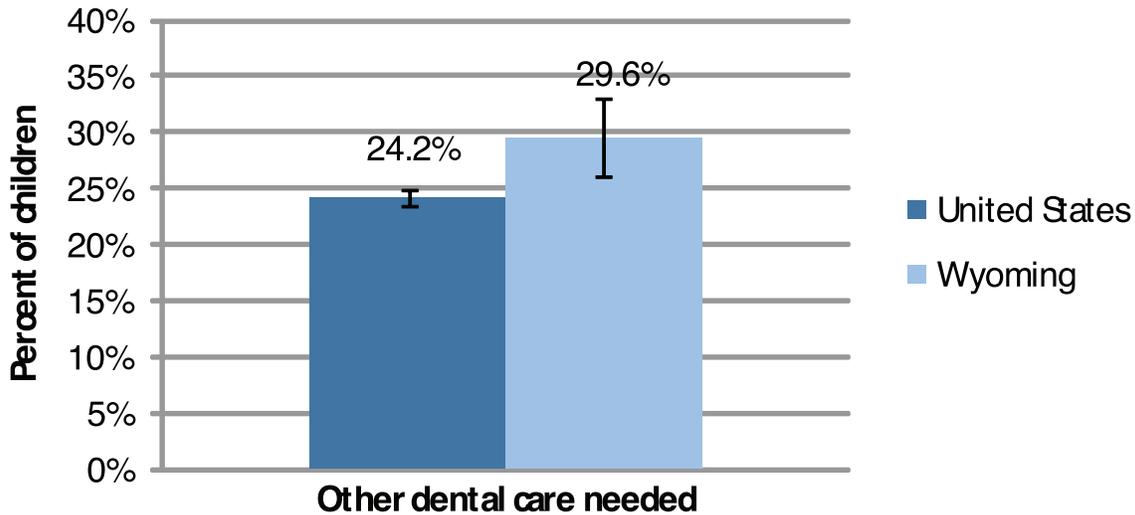
**FIGURE 14: WYOMING CSHCN AND NON-CSHCN WHO RECEIVED ONE OR MORE VISITS FOR PREVENTIVE DENTAL CARE, 2005/2006**



## Other Dental Care

Parents of children 0 to 17 years of age were asked if their child needed dental care other than preventive care during the 12 months before the 2005/2006 survey. A significantly higher percentage of Wyoming CSHCN (29.6%) needed dental care than U.S. CSHCN (24.2%) (Figure 15). Among Wyoming CSHCN who needed other dental care, an estimated 10% reported having an unmet need, which was similar to the estimated 10.2% of U.S. CSHCN reporting an unmet need.

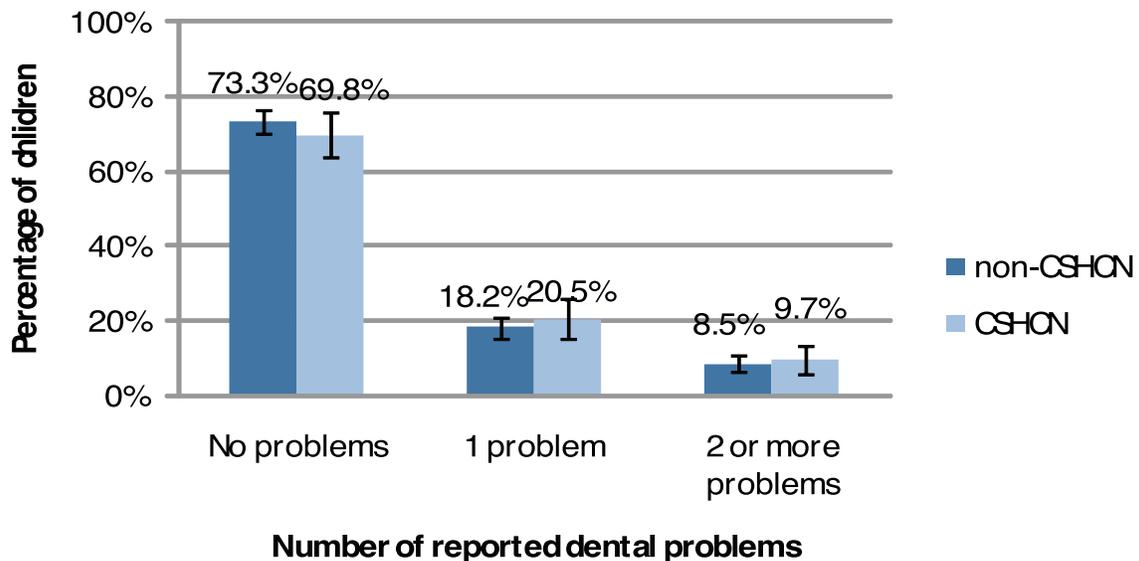
**FIGURE 15: THE PERCENT OF WYOMING AND U.S. CSHCN WHO NEEDED DENTAL CARE OTHER THAN PREVENTIVE IN THE 12 MONTHS BEFORE THE NS-CSHCN, 2005/2006**



## Dental Problems

Parents were asked to report the number of dental problems their child had six months prior to taking the survey. The percentage of Wyoming CSHCN who reported one or more dental problems in the six months prior the survey was not statistically different than the percentage of Wyoming non-CSHCN (Figure 16).

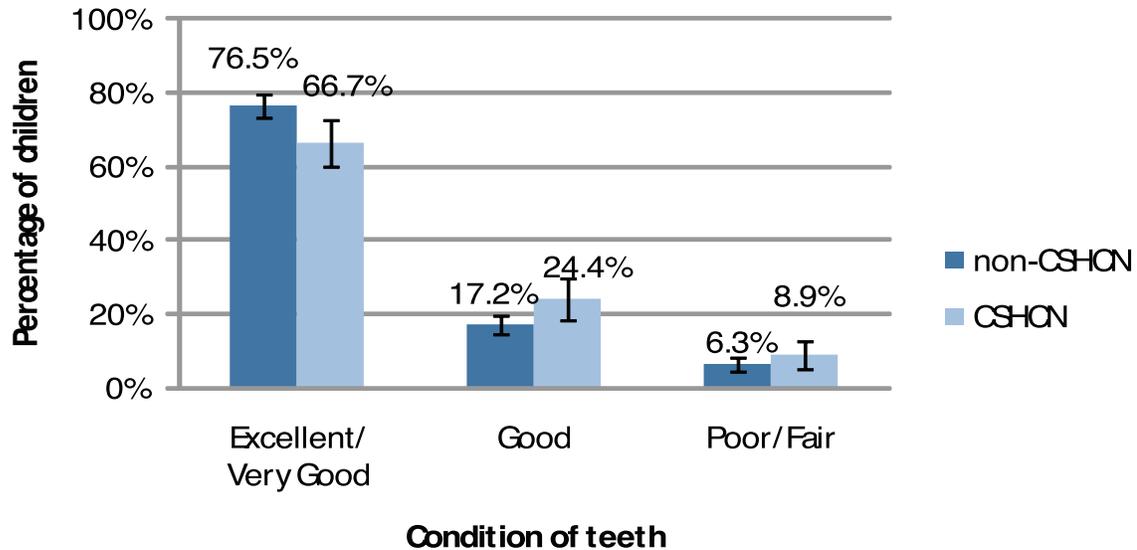
**FIGURE 16: PERCENT OF WYOMING CSHCN AND NON-CSHCN AGES 0 TO 17 YEARS WHO REPORTED DENTAL PROBLEMS SIX MONTHS PRIOR TO NS-CSHCN, 2005/2006**



## Overall Condition of Teeth

Parents were asked to report on the overall condition of their child's teeth. A significantly lower percentage of Wyoming CSHCN (66.7%) reported their teeth to be in Excellent/Very Good Condition than Wyoming non-CSHCN children (76.5%) (Figure 17).

**FIGURE 17: REPORTED CONDITION OF TEETH AMONG WYOMING CSHCN AND NON-CSHCN AGES 0 TO 17 YEARS, 2005/2006**



## Prevention

Often, CSHCN are limited in their ability to participate in a fluoride mouth rinse program when it is provided in a school setting. The COHCs who conduct the mouth rinse programs provide fluoride varnish applications for CSHCN every three months during the school year.

## Cleft Palate Services

The Wyoming Cleft Palate Evaluation Team was established in 1967. Clinics are conducted biannually and are funded by the WDH, Community and Public Health Division, OHS. These spring and fall clinics are scheduled on a Thursday and Friday of a given month. Casper was chosen as the clinic site because of its central location for both the patients and team members. The clinic services are available without charge to Wyoming residents with cleft lip and/or palate and other facial anomalies.

Services provided at the Cleft Palate Clinics are for diagnostic purposes and treatment recommendations. No treatment is provided at clinic. The multidisciplinary team consists of private Wyoming healthcare providers who specialize in the care of children with clefts of the lip or palate. Team members include experts in plastic and reconstructive surgery; ear, nose, and throat surgery; speech-language therapy; audiology; dentistry; orthodontics; and prosthodontics. A comprehensive treatment plan is developed by the team to meet patient and family needs. This plan is then shared with the client and parent/guardian, as well as with other healthcare providers involved in the client's care. WDH staff is available to help coordinate services with the Children's Special Health program (CSH), Genetic Counseling, OHS, and Public Health Nursing Services.

State personnel from OHS and CSH, Wyoming's program for CSHCN, assist families in coordinating their child's care. Families are connected with public health services in their community, screened for eligibility for OHS and MFH programs, and assisted in locating other financial resources as needed. Clients enrolled in CSH receive specialty care benefits and gap-filling services such as reimbursement for travel and coverage of oral maxillary surgery.

# ADULTS

## Background

Oral health is a lifelong concern, affecting not only children and pregnant women, but also adults and seniors. Years of exposure to bacteria and decay can mean that dental problems are cumulative.<sup>73</sup> Consequences of poor oral health include pain, tooth loss, social stigma, self-consciousness, malnutrition, and an overall decreased quality of life.<sup>73-74</sup> Oral health problems such as caries and periodontal disease affect a majority of the adult population and progressively worsen with age.<sup>73, 75-76</sup>

Decay results from the breakdown of enamel by fermented acids, a process that can be treated, but never reversed. Treating caries requires removal of decayed sections of the tooth. Over time, there may be little left of the original dentition. Similarly, years of plaque and tartar buildup around the base of the teeth can irritate the gums and underlying bone, affecting the quality of tooth attachment, a condition known as periodontal disease.<sup>74-75</sup> Caries and periodontal disease can be painful and lead to extensive damage including tooth loss or need for extraction.<sup>73, 75, 77</sup>

Oral diseases can affect a person's daily life in a number of ways. Dental pain interferes with normal functions such as eating, swallowing and talking, and can disrupt daily activities at home and work.<sup>74, 78</sup> Dental pain can also lead to social withdrawal and depression.<sup>74</sup> Severe oral disease resulting in tooth loss can have psychological and social consequences such as low self-esteem.<sup>73</sup> There is also financial burden attached with oral disease.<sup>75</sup> Each year, employed American adults lose over 164 million hours of work because of oral health problems and dental visits.<sup>79</sup>

Oral health may also play an important role in overall health. Higher levels of unmet dental needs have been reported among adults with rheumatoid arthritis, diabetes, or liver conditions.<sup>80</sup> Periodontal disease has been associated with dementia, rheumatoid arthritis, and diabetes.<sup>81-83</sup> Taylor and Borgnakke's review of the associations between diabetes mellitus and periodontal disease concluded that "diabetes is associated with increased occurrence and progression of periodontitis and periodontal infection is associated with poorer glycemic control in people with diabetes."<sup>82</sup> Dietrich et al. reported that chronic periodontitis increased the risk of developing coronary heart disease among younger men (less than 60 years of age).<sup>84</sup> Tooth loss (edentulism) has also been associated with adverse health effects among adults, including coronary heart disease (in men over 60 years of age), chronic kidney disease, death (all causes), and death from cerebrovascular disease.<sup>84-86</sup>

An estimated 92% of adults ages 20 to 64 years have experienced dental caries in their permanent teeth, and 23% of adults have untreated decay.<sup>76</sup> Groups with a higher instance of untreated decay include adults who are Black, Hispanic, younger in age, and those at lower income levels or low educational attainment.<sup>76</sup> Dental caries is more prevalent in adults living in rural areas than among adults living in ur-

ban areas.<sup>87</sup> Other dental problems are also common among adults. It is estimated that among adults ages 35 to 44 years, 48% have gingivitis and 22% have destructive gum disease.<sup>78</sup>

Tooth loss is another measure of oral health. Edentulism—complete loss of natural teeth—is more prevalent in older adults and poor adults living in rural areas. Among adults 35 to 44 years of age, 69% have lost at least one tooth.<sup>78</sup> Meanwhile, 10% of adults 45 to 64 years of age and 24.5% of poor adults living in rural areas of the same age are edentulous.<sup>87</sup>

As people reach 65 years of age and older, they face increased challenges for maintaining good oral health. Nearly one third of adults over 65 years of age have untreated caries.<sup>73</sup> The caries may be attributed to increased use of over-the-counter and prescribed medications, decreased ability to care for oral health, greater health concerns, and need for complex or specialized care.<sup>73</sup> Poor oral health is more frequently seen in older adults who are low income, part of a racial or ethnic minority, of low educational attainment, or living in rural areas.

Chronic disease also increases with age and can affect oral health in a variety of ways. Many commonly prescribed and over-the-counter medications identify dry mouth as a side effect.<sup>73, 88</sup> Saliva plays an important role in the oral health of all populations by circulating fluoride, clearing the mouth of food particles, and, in older edentulous adults, decreasing denture discomfort.<sup>30, 89-90</sup> Dry mouth interferes with a person's ability to talk, chew, and swallow and increases their risk of developing caries.<sup>73, 89</sup>

Disparities in oral health exist among adults 65 years of age and older with regard to educational attainment, race and ethnicity, and rural or urban residence. Those with more than 12 years of education were almost twice as likely to have reported a dental visit in the past year than persons with less than 12 years of education (76% vs. 39%).<sup>73</sup> Non-Hispanic White adults were more likely to have reported a dental visit than Hispanic adults (57% vs. 45%), and rural residents were less likely than urban residents to have reported a dental visit (46.9% versus 58.4%).<sup>73, 91</sup> Rural residents were also more likely to be uninsured than urban residents (72.1% vs. 66.1%).

# Wyoming Behavioral Risk Factor Surveillance System

## OVERVIEW

Some data concerning oral health among adults in Wyoming comes from the Wyoming Behavioral Risk Factor Surveillance System (BRFSS). The BRFSS is a random digit dial telephone survey of adults age 18 and older which is conducted annually by the CDC. BRFSS is conducted in all 50 states, Washington D.C. and in some territories. The results of the survey provide public health decision makers with state-specific information concerning individual behaviors as well as information about access to healthcare. Every year adults are asked a series of core questions regarding their behaviors and attitudes towards several health related conditions. The following data are from Wyoming residents.

## DENTAL VISITS

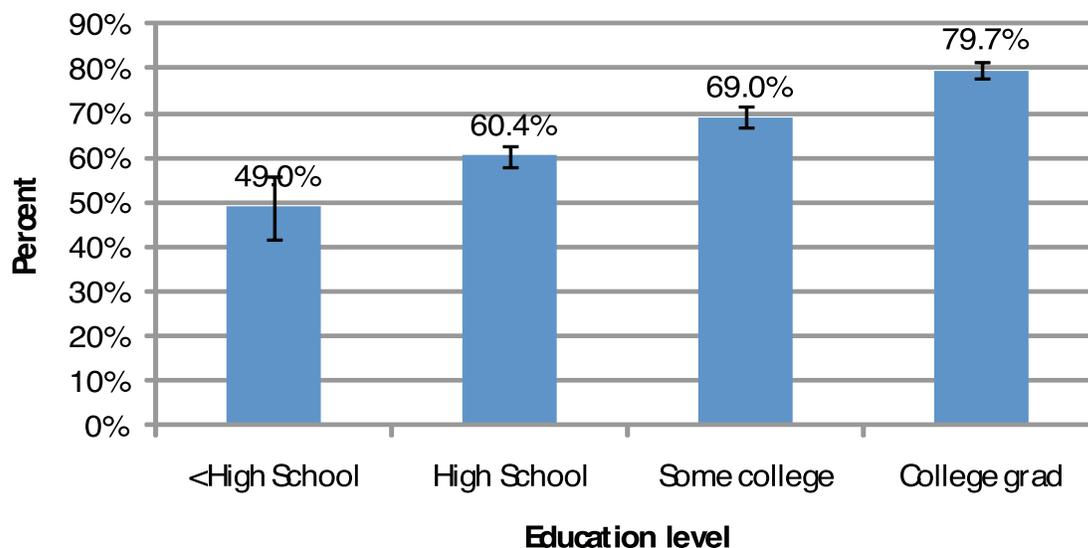
According to data from Wyoming's 2008 BRFSS, 68% of Wyoming adults reported having visited a dentist, dental hygienist, or dental clinic in the last year; which is lower than the U.S. median of 71.3%. Values in other states ranged from 57.9% in Oklahoma to 80.3% in Connecticut. Several factors influenced dental visits among Wyoming adults. Females were significantly more likely to report visiting a dentist, dental hygienist, or dental clinic in the last year than males (females 71.2% vs. males 64.8%;  $p < 0.001$ ). Having a dental visit in the last year also varied by age. Wyoming adults who were 55 to 64 years of age had the highest prevalence of a dental visit in the last year (Table 38), while adults 25 to 34 years of age had the lowest

**TABLE 38: PERCENT OF WYOMING ADULTS WHO REPORTED A DENTAL VISIT IN THE PAST YEAR BY AGE GROUP, 2008 WY BRFSS**

Age (years)	Percent	95% CI
18-24	65.9%	59.4-71.9
25-34	62.5%	58.7-66.1
35-44	69.4%	66.3-72.4
45-54	70.0%	68.6-73.3
55-64	72.4%	70.1-74.6
65+	65.9%	63.7-68.0

The prevalence of having a dental visit in the past year increased with increasing education level. Yearly visits were most commonly reported among Wyoming adults who were college graduates and least common among adults with less than a high school education (Figure 18). A similar trend was seen in income level; the prevalence of a dental visit in the past year increased as yearly income increased (data not shown).

**FIGURE 18: WYOMING ADULTS REPORTING A DENTAL VISIT IN THE PAST YEAR BY EDUCATION LEVEL, 2008**



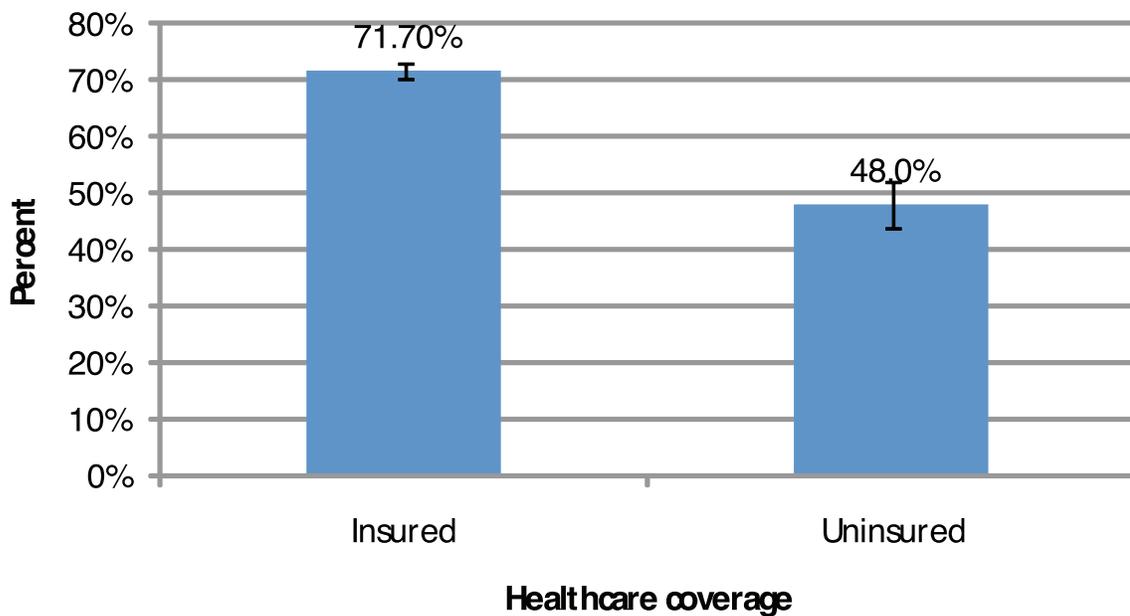
The prevalence of dental visits among Wyoming adults varied by county population. The U.S. Census classifies counties based on population density. Metropolitan counties have more than 50,000 residents; micropolitan counties have 10,000-49,999 residents; and rural counties have fewer than 10,000 residents. Wyoming adults living in rural counties were significantly less likely to report having a dental visit in the past year compared to adults living in larger counties (Table 39). The number of visits was not statistically different between micropolitan and metropolitan areas.

**TABLE 39: PERCENT OF WYOMING ADULTS WHO REPORTED A DENTAL VISIT IN THE PAST YEAR BY COUNTY POPULATION DENSITY, 2008 WY BRFS**

Population	Percent	95% CI
Counties >50,000 people	70.4%	67.8-72.8
Counties 10,000-50,000	69.9%	67.7-71.9
Counties <10,000	64.6%	62.1-67.0

Adults reporting having any healthcare coverage (not specific to dental insurance) were significantly more likely to report having a dental visit in the past year ( $p < 0.0001$ ) (Figure 19). The BRFSS does not include questions about dental insurance coverage.

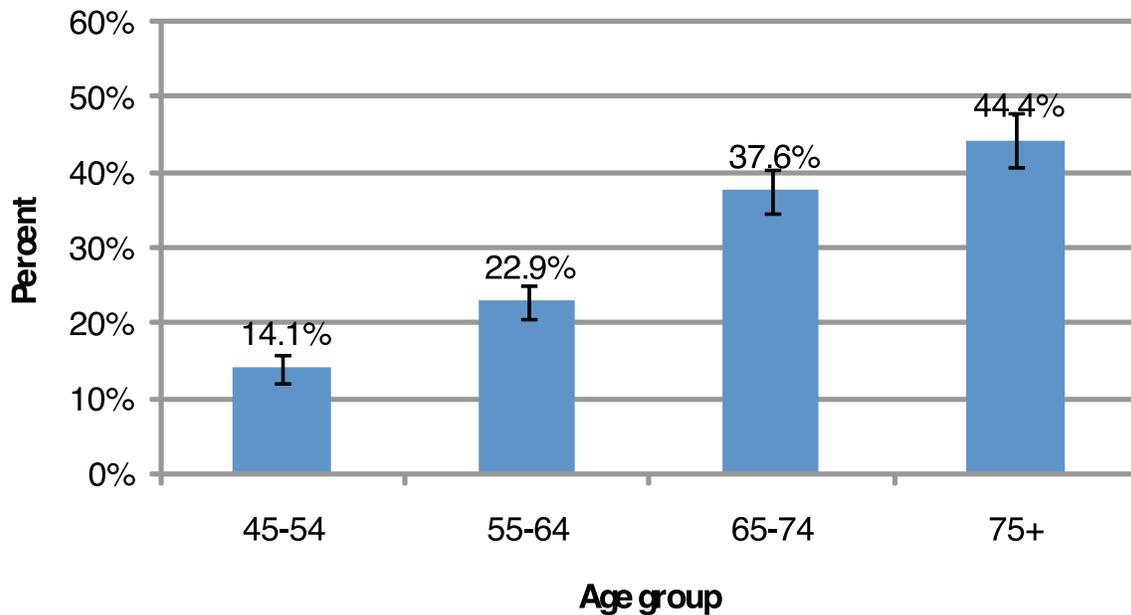
**FIGURE 19: PERCENT OF WYOMING ADULTS REPORTING A DENTAL VISIT IN THE PAST YEAR BY HEALTHCARE COVERAGE, 2008**



## Tooth Loss

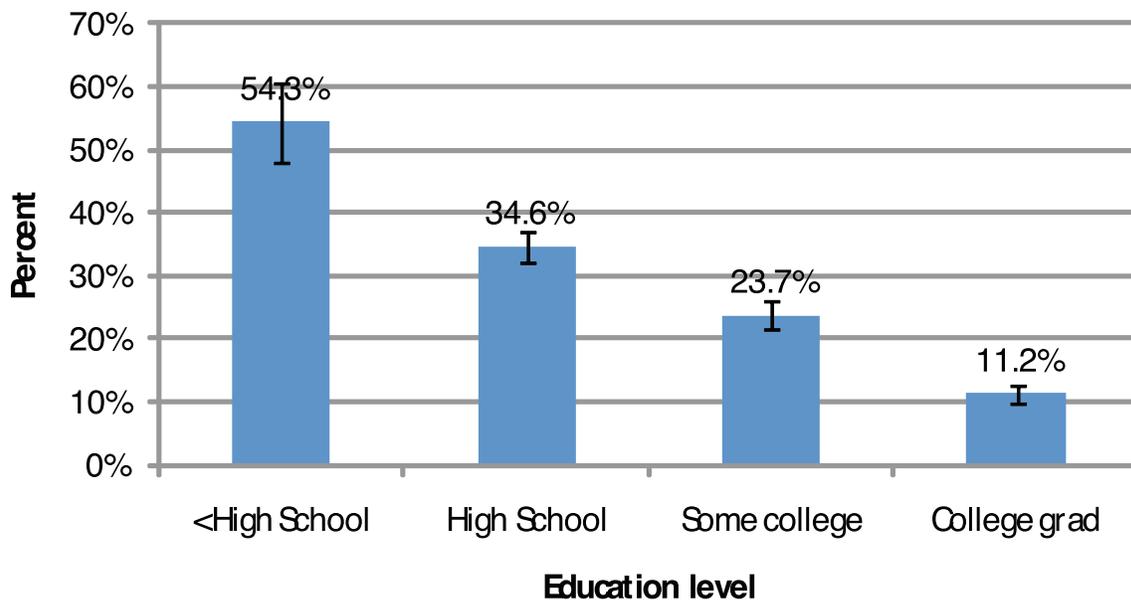
The BRFSS also asked adults to report the number of teeth removed due to tooth decay or gum disease. One quarter of Wyoming adults (25%) 45 years of age or older reported that they have lost six or more teeth due to tooth decay or gum disease, which is similar to the U.S. median of 25.5%. Tooth loss varied by demographic factors among Wyoming adults. Significantly more females (26.4%) than males (23.6%) reported having lost six or more teeth due to decay or gum disease ( $p=0.03$ ). Tooth loss was more common among older adults. The prevalence increased as age increased (Figure 20).

**FIGURE 20: WYOMING ADULTS 45 YEARS OF AGE AND OLDER REPORTING SIX OR MORE TEETH REMOVED DUE TO TOOTH DECAY OR GUM DISEASE BY AGE, 2008**



Tooth loss was inversely associated with education level; prevalence was highest among the lowest education levels and lowest among higher education level (Figure 21)

**FIGURE 21: WYOMING ADULTS 45 YEARS OF AGE AND OLDER REPORTING SIX OR MORE TEETH REMOVED DUE TO TOOTH DECAY OR GUM DISEASE BY EDUCATION LEVEL, 2008**



Tooth loss did not significantly vary based on county population; prevalence was similar among adults 45 years of age and older living in rural, micropolitan and metropolitan counties in Wyoming (data not shown).

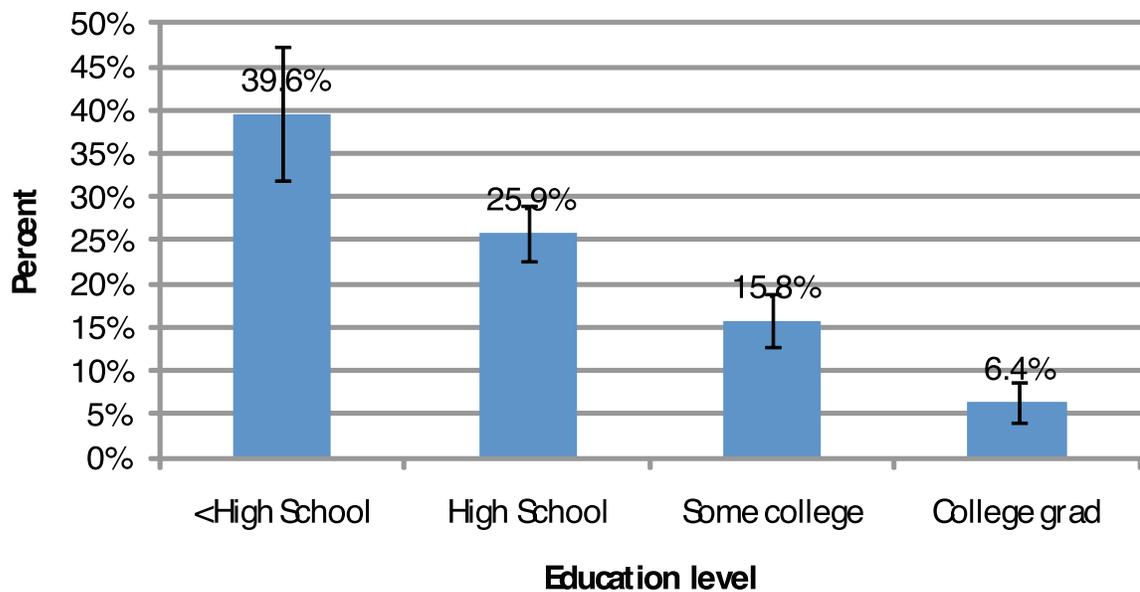
Insurance coverage was associated with tooth loss. Wyoming adults who reported being uninsured were significantly more likely to report having lost six or more teeth removed due to tooth decay or gum disease than adults with insurance (24.3% insured vs. 31.7% uninsured,  $p=0.001$ ).

Just over 19% of Wyoming adults 65 years of age or older reported that they had all of their teeth removed, which is similar to the U.S. median of 18.5%. The HP 2010 objective is for fewer than 20% of adults 65 years of age or older to report that they have had all of their teeth removed; Wyoming has met this objective.

There were not statistical differences in all teeth lost among Wyoming adults 65 years of age and older by gender, age, or county population density.

The prevalence of all teeth missing was statistically different by education level (Figure 22). Prevalence was inversely related to education level. Having had all teeth removed was most common among the lowest levels of education and the prevalence decreased as education level increased.

**FIGURE 22: WYOMING ADULTS 65 YEARS OF AGE AND OLDER REPORTING ALL OF THEIR TEETH REMOVED DUE TO TOOTH DECAY OR GUM DISEASE BY EDUCATION LEVEL, 2008**



## Adults with Increased Risk of Oral Disease

Several factors can increase an adult's risk for oral health problems. Highlighted below are data from the 2008 Wyoming BRFSS on the association between diabetes, tobacco use, and oral health.

### DIABETES

People with diabetes are at an increased risk of oral disease. Poor control of blood glucose levels increases the risk of serious gum disease and subsequent tooth loss. Additionally, serious gum disease may affect blood glucose control, which can contribute to the progression of diabetes.<sup>92</sup>

Wyoming adults with diabetes were significantly less likely to report having had a dental visit in the past year compared to adults without diabetes. Among adults with diabetes, 57% reported visiting the dentist in the past year while 65.9% of adults without diabetes reported having had a dental visit in the past year ( $p=0.003$ ).

Wyoming adults 45 years of age and older with diabetes were significantly more likely to report having had six or more teeth removed due to tooth decay or gum disease compared to adults 45 years of age and older without diabetes (diabetes 41.5% vs. 22.9% without diabetes;  $p<0.0001$ ).

A higher percentage of people with diabetes 65 years of age and older reported having lost all of their teeth compared to adults 65 years of age and older without diabetes; however, the difference did not reach statistical significance (21.9% among people with diabetes vs. 18.6% among people without diabetes;  $p=0.18$ ).

In spite of being at increased risk of oral disease, Wyoming adults with diabetes were less likely to report having had a dental visit in the past year compared to adults without diabetes. Additionally, Wyoming adults with diabetes have a higher prevalence of missing six or more teeth due to decay or gum disease.

### TOBACCO USE SMOKING

In addition to being associated with increased risk for oral cancers, smoking has been identified as a risk factor for periodontitis, a chronic destructive disease of the connective tissues which anchor teeth to the jaw bone.<sup>93</sup> If left untreated, periodontitis can lead to tooth loss.

Wyoming adults who reported being a current smoker were significantly less likely to report having a dental visit in the past year when compared to non-smoking adults (current smoker: 47.1% vs. non-smoker: 69.5%,  $p<0.001$ ).

Wyoming adults 45 years of age and older who reported being a current smoker were significantly more likely to report having had six or more teeth removed due to decay or gum disease compared to non-smoking adults (current smoker: 48.2% vs. non-smoker: 20%,  $p<0.001$ ).

Wyoming adults 65 years of age and older who reported being a current smoker were also significantly more likely to report having had all of their teeth removed due to decay or gum disease compared to non-smoking adults (current smoker: 34.7% vs. non-smoker: 17.7%,  $p<0.001$ ).

Based on BRFSS data, Wyoming adults who smoke are less likely to have had a dental visit in the past year and are more likely to have missing teeth when compared to non-smokers. Neither the relation-

ship between former smokers and oral health nor the relationship between amount of smoking and oral was assessed.

### SMOKELESS TOBACCO

Smokeless tobacco has also been associated with an increased risk of oral cancer.<sup>94</sup> Some studies have suggested an association between the use of smokeless tobacco and periodontal disease, tooth loss, and dental caries.<sup>95</sup>

Wyoming adults who reported using smokeless tobacco were significantly less likely to report having a dental visit in the past year when compared to adults who do not use smokeless tobacco (current User: 49.6% vs. non-user: 66.7%,  $p<0.001$ ).

There was not a significant difference in the prevalence of having had six or more teeth removed due to decay or gum disease among adults 45 years of age and older who reported using smokeless tobacco and adults who did not use (current user: 20.5% vs. non-user: 25.2%,  $p=0.11$ ).

A higher percentage of current smokeless tobacco users reported having had all of their teeth removed due to decay or gum disease compared to non-users; however, the difference did not reach statistical significance (current user: 26.4% vs. non-user: 18.8%,  $p=0.25$ ).

# THE OHI SURVEY OF SENIOR CITIZENS

## **METHODS**

### **SUBJECT RECRUITMENT**

The 2010 OHI Survey of Senior Citizens collected information from seniors served by county senior citizens centers, home health visitation and select community Meals on Wheels programs. For the purposes of this survey, seniors are defined as those 55 years of age and older. Staff from participating study locations distributed surveys to clients/participants from January through March 2010.

### **SURVEY METHODS**

The survey consisted of fourteen questions on routine dental care, urgent dental care, and denture oral health needs of senior citizens. Once a senior citizen agreed to participate in the study, they were provided a paper survey and a prepaid return envelope. No identifying information was collected. Participants could separately return a detachable prepaid postcard card to receive a small gift for participating in the survey. The gifts were sent to the participants within 10 days of receiving the cards. Each participant who returned a postcard received a denture brush, an adult toothbrush, immunization photo magnet, or a tote bag.

The study methodology was reviewed and approved by the WDH IRB.

### **DATA**

All survey data were entered into a Microsoft Access database, and data verification was conducted on a random sample of 20% of the returned surveys. The overall error rate from the verification process was 0.27%. After the initial verification, data were analyzed for completeness and to identify unusual and out of range response values. All surveys found to contain missing data or out of range response, values were manually verified, and any errors identified were corrected by data entry staff members.

Once data verification was completed, select variables were created or recoded. Respondent age and duration of denture use were categorized into groups. Data were analyzed using SAS software version 9.2. Associations between demographic characteristics of respondent age categories, health insurance status, and dental insurance status and each of the survey questions were evaluated.

## **RESULTS**

### **DEMOGRAPHICS**

A total of 1,989 senior citizens from 22 Wyoming counties participated in the survey. Niobrara County was not represented. Respondent demographics are presented in Table 40. Respondent age ranged from 55 to 99 years, with a mean age of 71.5 years.

**TABLE 40: 2010 OHI SURVEY OF SENIOR CITIZENS RESPONDENT DEMOGRAPHICS**

Age (years)	Number of Respondents	Percent
55-60	89	4.5%
60-69	462	23.2%
70-79	664	33.4%
80-89	579	29.1%
90+	96	4.8%
Blank	99	4.9%
Health Insurance		
Yes	1377	69.2%
No	513	25.8%
Blank	99	5.0%
Dental Insurance		
Yes	474	23.8%
No	1402	70.5%
Blank	113	5.7%

### ORAL PAIN OR PROBLEM

Respondents were asked if they had experienced a toothache or other dental problem in the past six months. Overall, 29.8% of respondents reported having a toothache or other dental problem during the past six months, with the highest prevalence found in respondents 55 to 59 years of age (Table 41). Respondents over 90 years of age had the lowest prevalence.

**TABLE 41: PERCENT OF SENIOR CITIZENS WHO REPORTED HAVING A TOOTHACHE OR OTHER DENTAL PROBLEM DURING THE PAST SIX MONTHS BY AGE, 2010 OHI SURVEY OF SENIOR CITIZENS**

Age (years)	Percent with Dental Problem	95% CI
55-59	47.2%	36.8-57.6
60-69	34.4%	30.09-38.8
70-79	30.3%	26.1-34.4
80-89	23.7%	19.7-27.6
90+	22.92%	14.5-31.3

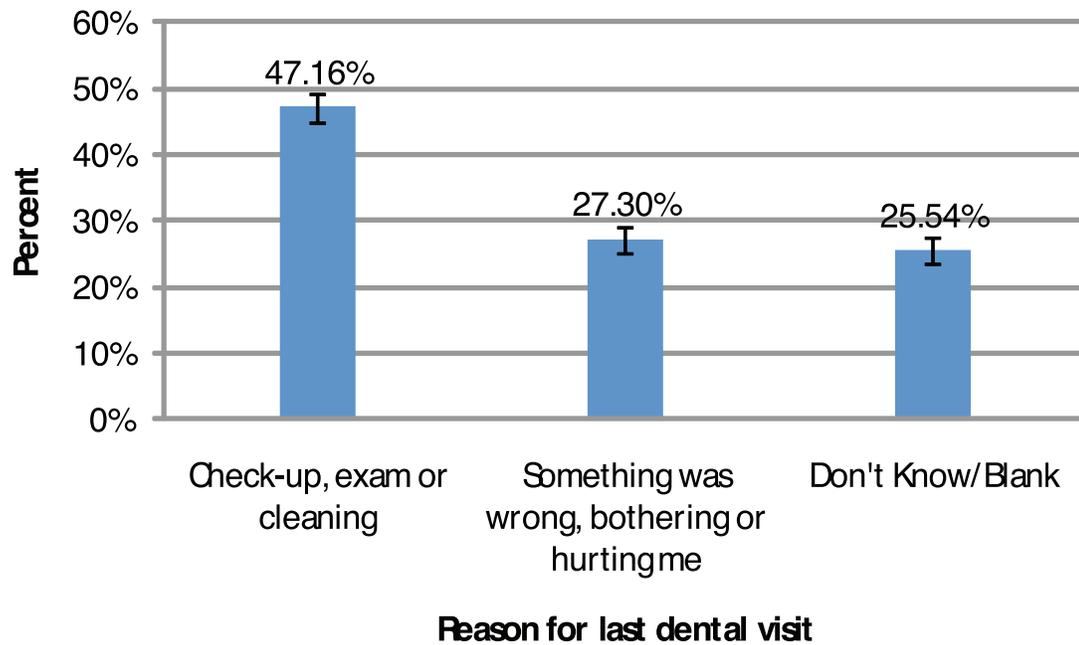
### TIME SINCE LAST DENTAL VISIT

Respondents were asked how long it had been since their last dental visit. The majority of respondents (45.2%) reported having had a dental visit in the last six months, 32.0% reported that it had been between six months and five years, and 20.0% reported that it had been more than five years since their last visit. Additionally, 0.6% of respondents reported having never been to see a dentist, and 2.2% of respondents did not report the duration since their last dental visit. Dental insurance coverage was associated with time since last dental visit. A significantly greater proportion of respondents with dental insurance reported a time since last dental visit of less than six months than respondents without dental insurance [57.6%, 95%CI (53.1-62.0) vs. 42.1%, 95%CI (39.5-44.7) respectively; (p<0.001)].

## REASON FOR LAST DENTAL VISIT

In addition to duration since last dental visit, respondents were asked the main reason/purpose for their visit. The most common reason for last dental visit among respondents was a check-up/exam or cleaning (Figure 23). None of the respondent's demographic characteristics were associated with reason for last dental visit.

**FIGURE 23: REASONS FOR LAST DENTAL VISIT AMONG SENIOR CITIZENS, 2010 OHI SURVEY OF SENIOR CITIZENS**



## UNMET DENTAL CARE NEED

Respondents were asked if there was a time that they needed dental care but could not receive care at any time in the past 12 months. The majority of respondents (79.4%) reported not having unmet dental needs in the past 12 months, 16.0% reported an unmet needed dental care, and 4.5% of respondents did not respond.

Participants who reported that they had an unmet need were asked to select reasons that they were unable to receive care. These barriers are presented in Table 42. The most common barriers to receiving dental care reported were "I could not afford dental care," (74.6%) and "I did not have insurance," (39.8%), while the least reported barrier reported was "Do not like/trust/believe in the dentist," (2.5%).

**TABLE 42: BARRIERS TO RECEIVING DENTAL CARE IN THE PAST TWELVE MONTHS**

Barrier to Receiving Dental Care	Percent	95% CI
Could not afford care	66.3%	61.6-71.1
Not serious enough	3.2%	1.4-4.9
Did not have insurance	26.3%	21.9-30.7
Trouble getting appointment	5.3%	3.0-7.5
Transportation barrier	0.0%	0.0-0.0
Dentist did not take Medicaid/insurance	5.3%	3.0-7.5
Do not like/trust/believe in the dentists	4.2%	2.2-6.2
No dentist available	1.1%	0.0-2.1
Did not know where to go	1.1%	0.0-2.1
Wait was too long in clinic/office	2.1%	0.7-3.6

## DENTURES

Respondents were asked if they had full or partial dentures. Just over half of respondents (50.6%) reported not having dentures, 45.1% reported having dentures, and 4.3% of respondents did not respond. None of the respondent's demographic characteristics were associated with denture status. The duration of having dentures ranged from 0 to 70 years with a mean of 10.4 years among participants that reported having dentures.

Respondents who reported having full or partial dentures were asked if they ever had their dentures replaced or relined. More than half of respondents with dentures (53.2%) reported having their dentures replaced or relined, 39.3% reported never having their dentures replaced or relined, and 7.5% did not respond. None of the respondent's demographic characteristics were associated with denture replacement or relining status.

Respondents who reported having their dentures replaced or relined were asked the duration since replacement or relining. The most common duration (48.6%) was less than five years ago, 45.7% reported duration of greater than five years, and 5.7% did not respond. None of the respondent's demographic characteristics were associated with duration since last denture replaced or relined.

## ORAL HEALTH DIAGNOSIS AND TREATMENT PREFERENCE

Respondents were asked if they had an infection, growth, or sore in their mouth, from whom would they seek diagnosis and treatment. More than half of respondents (53.3%) reported they would seek diagnosis and treatment from a dentist, 35.3% reported a physician, 1.0% reported a pharmacist, and 10.4% of respondents did not report a preference.

Dental insurance coverage was associated with respondents' preference of provider for an oral health malady. A significantly greater proportion of respondents with dental insurance reported they would seek diagnosis and treatment from a dentist than respondents without dental insurance [60.6%, 95%CI (56.2-65) vs. 53.4%, 95%CI (50.7-56.0); (p<0.01)].

## DISCUSSION

The 2009-2010 survey of senior citizens was the first to publish oral health data from Wyoming senior citizens. A concerted effort has been put forth to understand associations between oral health problems and select social characteristics including socioeconomic status, race, and ethnicity, and to enhance targeted prevention efforts. This study has provided valuable information and insight into the oral health of Wyoming senior citizens.

Results from this study both confirm and conflict with results from other publications. Vargas et al. reported that nearly one third of adults over 65 years of age have untreated caries and unmet dental needs that progressively worsen with age.<sup>73</sup> Wyoming data confirms that 29.8% of respondents reported having a toothache or other dental problem during the past six months. However, the highest prevalence (47.2%) of reported toothache or other dental problem was found among the youngest age group (55 to 59 years of age) of respondents. In addition, 79.4% of senior citizens did not report having unmet dental needs in the past twelve months. These results are unexpected considering the rural nature and geographic barriers of Wyoming. The primary reasons cited for unmet dental care needs were cost of dental care and insurance coverage. The low proportion

of Wyoming senior citizens reporting unmet dental needs demonstrates the success of Wyoming dentists and the WDH oral health prevention program.

There are several limitations to this study. Participation in the study was voluntary, which may have resulted in individuals of either excellent or poor oral health opting not to participate. If oral health affected participation in the study, the results may be biased. Senior citizen center participation was not optimal; there was a 58.3% participation rate among the senior citizen centers. The relatively low participation rate among senior citizens could affect the generalizability of the results to all Wyoming senior citizens. Additionally, the results may be biased if participation rates differed according to minority populations or socioeconomic status. Finally, nursing home populations were not included in this survey. This may have biased the results if nursing home residents had more oral problems than the current survey respondents.

In spite of these limitations, prior to this study there was no ongoing surveillance of oral health in Wyoming senior citizens. These results provide valuable baseline information on the oral health of senior citizens in Wyoming.

## Prevention Activities among Adults

OHS provides presentations on oral hygiene and care of dentures to staff in Wyoming nursing homes. OHS also provides materials for presentations made by the nursing home's staff dentist.

## ORAL CANCER

Oral cancer includes cancers of the lip, tongue, pharynx and mouth.<sup>96</sup> Tobacco use is a major risk factor for oral cancers. According to the American Cancer Society, 8 out of 10 people with oral cancer use tobacco products. Results of a meta-analysis indicate that the risk of developing oral cancer is increased 3 fold among current smokers versus non-smokers. Additionally, the risk of developing pharyngeal cancer was increased almost 7 fold among current smokers.<sup>97</sup> Individuals who use smokeless tobacco products are also more likely to develop cancers of the cheeks, gums and inner surfaces of the lips.<sup>98</sup> Alcohol has also been identified as a risk factor for oral cancers, and the risk is amplified among people who are heavy drinkers and smokers. Men are twice as likely to be diagnosed with oral cancer as women, which is likely a reflection of the increased use of tobacco and alcohol among men.<sup>98</sup> Outdoor workers are at an increased risk of developing cancer of the lips due to their increased exposure to the sun's ultraviolet radiation. Poor nutrition, exposure to the human papillomavirus (HPV), and immune system suppression have also been identified as risk factors for oral cancer.<sup>98</sup>

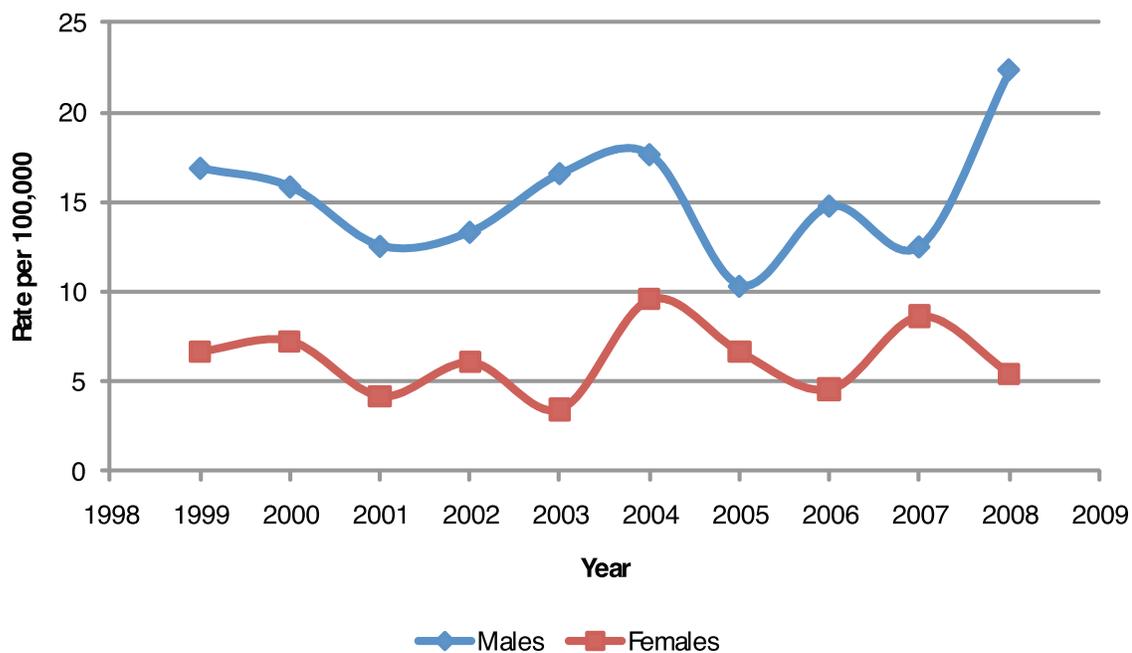
Each year in the United States, around 30,000 cases of oral cancer are diagnosed, with over 8,000 deaths attributable to oral cancer.<sup>99</sup> From 2002-2006, the U.S. incidence rate for oral and pharyngeal cancer was 10.4 per 100,000 people.<sup>100</sup>

According to the National Cancer Institute, based on data from 1996-2003, the five year relative survival rate for all stages of oral cancer combined was 60%.<sup>101</sup> Overall survival rates for oral cancers are low as these cancers are typically discovered late in their development. Over half of oral cancers are not diagnosed until the cancer has spread to the surrounding tissues.<sup>102</sup> As with all cancers, diagnosing at an early stage improves survival rates. The five year relative survival rate for localized cancers is 83%.<sup>101</sup>

## Incidence in Wyoming

From 1999-2008, there were 551 cases of oral cavity and pharynx cancer in Wyoming, which translates to a rate of oral/pharyngeal cancer of 10.41 per 100,000 people. The rate was much higher among Wyoming males (15.31/100,000) than among Wyoming females (6.2/100,000). Wyoming oral/pharyngeal cancer rates over time by sex are illustrated in Figure 24. The overall incidence of oral/pharyngeal cancers did not decrease in the 10 year period from 1999-2008.

**FIGURE 24: AGE-ADJUSTED INCIDENCE RATE (PER 100,000) OF ORAL/PHARYNGEAL CANCER BY SEX, WYOMING 1999-2008\***

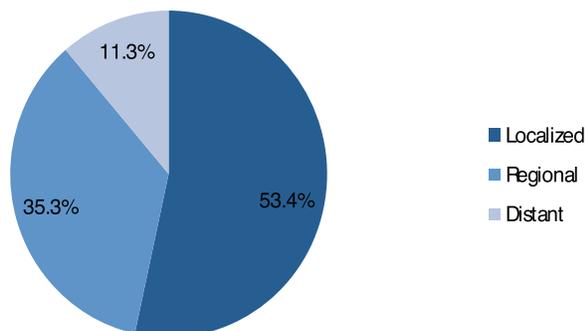


\*Rates are per 100,000 and age-adjusted to the 2000 US Standard Million (18 age groups) standard

## ORAL AND PHARYNGEAL CANCER BY STAGE

Cancer stages are classified as local, regional, or distant. Unstaged cancers and cancer in situ were excluded for this analysis. Cancers that have not spread past the primary site are staged as local. Those that have spread to the regional lymph nodes are staged as regional, and those that have metastasized are staged as distant.<sup>103</sup> The stage at diagnosis for cases of Wyoming oral/pharyngeal cancers 1999-2008 is illustrated in Figure 25.

**FIGURE 25: STAGE AT DIAGNOSIS OF ORAL/PHARYNGEAL CANCER, WYOMING 1999-2008**



Source: Wyoming Cancer Registry, 1999

## Cancers of the Oral Cavity by Sub-type

Cancers of the oral cavity include cancers of the lip, tongue, salivary gland, floor of the mouth and gums. Data presented in the following section include all incident cases of oral cancer in Wyoming from the Wyoming Cancer Registry from 1999-2008. Figure 26 illustrates the distribution of the subtypes of oral cavity cancers diagnosed from 1999-2008. Tongue and lip cancers were the most frequently diagnosed oral cavity cancers.

**FIGURE 26: CANCERS OF THE ORAL CAVITY BY SUBTYPE, WYOMING 1999-2008**

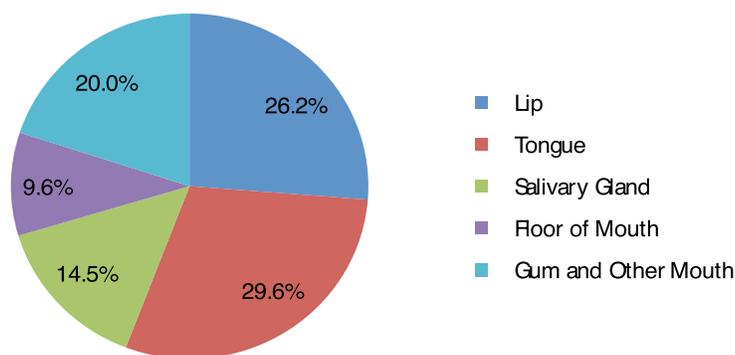


Table 43 gives the age-adjusted incidence rates by year and subtype for oral cavity cancers.

There were 101 cases of lip cancer diagnosed from 1999-2008. The age-adjusted incident rate was 1.9 per 100,000. Of the 101 cases, 83 occurred in males.

There were 114 cases of tongue cancer diagnosed from 1999-2008. The age-adjusted incident rate was 2.1 per 100,000. Of the 114 cases, 77 occurred in males.

There were 56 cases of salivary gland cancer diagnosed from 1999-2008. The age-adjusted incident rate was 1.08 per 100,000. Of the 56 total cases 31 occurred in males.

There were 37 cases of cancer of the floor of the mouth from 1999-2008. The age-adjusted rate was 0.69 per 100,000. Of the 37 cases, 25 occurred in males.

Cancers of the gum include the cheek mucosa, the buccal cavity, the hard and soft palate and the vestibule of the mouth. There were 77 cases diagnosed from 1999-2008. Of the 77 cases, 51 occurred in males.

**TABLE 43: ORAL CANCER AGE-ADJUSTED INCIDENCE RATES BY YEAR BY SUBTYPE, WYOMING 1999-2008\***

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Lip	2.42	2.52	1.96	2.61	0.79	3.89	0.97	1.66	2.05	1.26
Tongue	1.8	1.96	1.14	1.53	2.65	1.3	3.02	2.17	1.9	3.44
Salivary Gland	0.66	0.58	0.61	2.08	0.84	1.27	0.58	1.04	1.79	1.09
Floor of Mouth	1.29	1.23	0.75	0	0.79	0.93	0.98	0.22	0.45	0.47
Gum and Other Mouth	1.55	1.4	1.02	0.78	2.17	1.32	0.86	1.4	1.51	2.56

\*Rates are per 100,000 and age-adjusted to the 2000 US Standard Million (18 age groups) standard.  
Source: Wyoming Cancer Registry, 1999-2008

## Cancers of the Pharynx by Sub-type

Cancers of the pharynx include the nasopharynx, tonsils, oropharynx, and the hypopharynx. Data presented in the following section includes all incident cases of pharyngeal cancer in Wyoming from the Wyoming Cancer Registry, 1999-2008. Figure 27 illustrates the distribution of the subtypes of pharyngeal cancers diagnosed from 1999-2008. Tonsil cancers were the most frequently diagnosed pharyngeal cancers.

**FIGURE 27: CANCERS OF THE PHARYNX BY SUBTYPE, WYOMING 1999-2008**

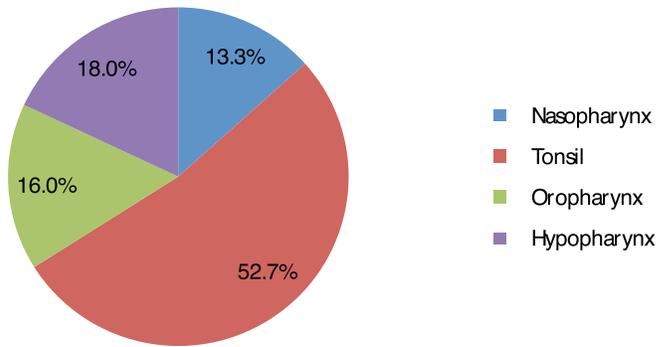


Table 44 gives the age-adjusted incidence rates by year and sub-type for pharyngeal cancers.

There were 20 cases of cancer of the nasopharynx diagnosed from 1999-2008. The age-adjusted incident rate was 0.39 per 100,000. Of the 20 cases, 51 occurred in males.

There were 79 cases of tonsil cancer diagnosed from 1999-2008. The age-adjusted incident rate was 1.42 per 100,000. Of the 79 cases, 63 occurred in males.

There were 24 cases of cancer of the oropharynx diagnosed from 1999-2008. The age-adjusted incident rate was 0.46 per 100,000. Of the 24 cases, 15 occurred in males.

There were 27 cases of cancer of hypopharynx cancer diagnosed from 1999-2008. The age-adjusted incident rate was 0.51 per 100,000. Of the 27 cases, 18 were among males.

**TABLE 44: PHARYNGEAL CANCER INCIDENCE AGE-ADJUSTED INCIDENCE RATES BY YEAR BY SUBTYPE, WYOMING 1999-2008\***

Year	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008
Nasopharynx	0.59	0.46	0.17	0.17	0.76	0.81	0	0	0.33	0.63
Tonsil	0.59	1.4	0.76	0.74	0.88	2.17	1.38	1.63	1.98	2.43
Oropharynx	0.61	0.23	0.56	0.63	0.16	0.77	0	0.69	0.18	0.77
Hypopharynx	0.9	1.13	0.36	0.81	0.16	0.38	0.45	0.14	0.32	0.47

\*Rates are per 100,000 and age-adjusted to the 2000 US Standard Million (18 age groups) standard. Source: Wyoming Cancer Registry, 1999-Source: 2008

## DISCUSSION

Tobacco use is a major risk factor for oral cancers discussed above. There are many common public health focused interventions intended to reduce tobacco usage and save lives. These interventions, some of which have been deployed successfully in Wyoming, include extensive education efforts, requiring vendor licenses to sell over the counter tobacco products and in vending machines, restrictions on sales of tobacco to minors, restrictions on indoor smoking, increases in tobacco excise taxes, and restrictions on tobacco advertising. In fact, WDH has taken the pro-active step of purchasing an anti-tobacco sponsorship from a traditionally smokeless tobacco dominated forum, Cheyenne Frontier Days, to encourage a reduction of tobacco usage among traditional rodeo participants and attendees.

The State of Wyoming provides a Quitline for people who use tobacco to obtain counseling at no cost. Additionally, the Medicaid fee-for-service program in Wyoming provides coverage for tobacco dependence treatment, as well as coverage for individual and group counseling.

Smoking cessation is a strong tool for prevention of oral cancers. Early detection of oral cancers will lead to increased survival rates. Individuals seeking regular dental care are more likely to receive regular oral cancer screenings.

## DENTAL WORKFORCE AND CAPACITY

Wyoming currently has 263 actively practicing dentists. Over 56% of these dentists are over the age of 51. Approximately 45% of all dentists graduated from a Wyoming high school. Wyoming dentists receive their dental education from Nebraska at the highest rate (50%), followed by Illinois (6%), and Missouri (5%). According to the most recent Wyoming Healthcare Commission Statistical Handbook, Laramie County has the most practicing dentists in the state (17% of the state total), while Niobrara County presently has no practicing dentist. Laramie and Natrona counties' dentists currently account for nearly one-third of all practicing dentists in the state.<sup>104</sup>

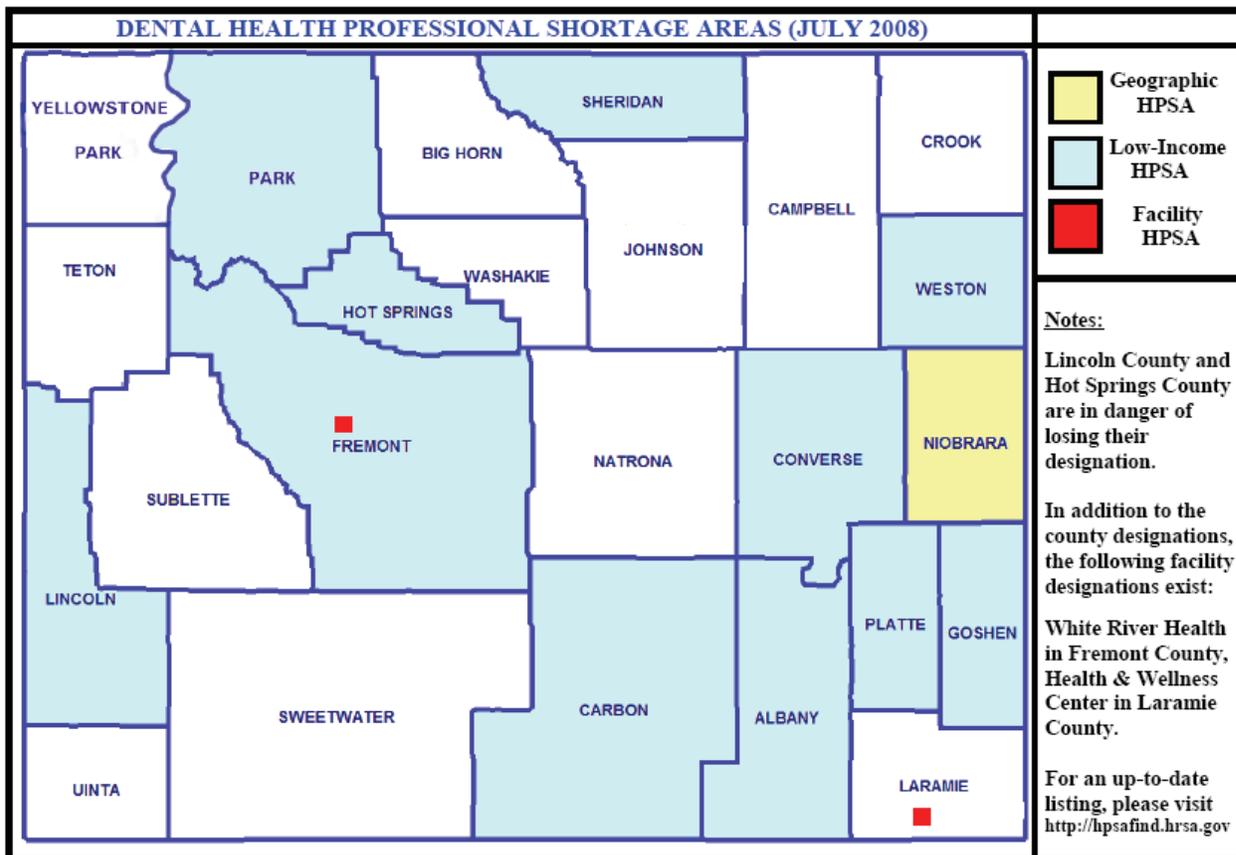
## Dental Health Professional Shortage Areas

HPSA is a designation given to a population, geographic area, or facility based on the ratio of population to providers. Areas without a sufficient number of healthcare providers, as defined by HRSA, are given the HPSA designation and are eligible for a variety of federally funded programs. HPSA's are categorized by type of care—medical, dental, or mental health—and then further classified by the type of shortage.

In Wyoming, low income and geographic shortages are the two designations given to dental HPSA's. Low income shortages exist when the number of dentists is fewer than necessary to support the low income population. Geographic shortages exist when the population a dentist is expected to serve exceeds 5000 persons. Twelve of Wyoming's 23 counties have Dental Care HPSA's—11 low income and one geographic.<sup>105</sup> Counties without Dental Care HPSA's include Big Horn, Campbell, Crook, Johnson, Sublette, Sweetwater, Teton, Uinta, Washakie, and Weston (Figure 28).

Barriers to accessing care in Wyoming may exist independently of the HPSA designations bestowed upon a county by the Federal Government. County lines are political designations that can enclose a variety of terrain and communities. As a result, HPSA designations may not accurately reflect the needs or care of the population residing within county limits. Long drive times and geographic barriers such as rugged mountain ranges may discourage a person from seeking care within their county of residence. They may turn to a closer community in another county, or not seek care at all. Utilization of dental care among all age groups is traditionally lower in rural areas than in urban.<sup>87, 91, 106</sup> This may result from fewer services, increased barriers to care, or even attitudes toward seeking dental care.<sup>87, 91, 106</sup>

FIGURE 28: DENTAL HEALTH PROFESSIONAL SHORTAGE AREAS, WYOMING, JULY 2008



## **ACCESS TO DENTAL CARE COMMUNITY HEALTH CENTERS**

Wyoming has two Federally Qualified Health Centers. Community Health Center of Central Wyoming (CHCC) is located in Casper, Wyoming. CHCC has a dental clinic which presently employs three dentists to provide care. The Cheyenne Health and Wellness Center (CHWC) is located in Cheyenne, Wyoming. CHWC does not have a dental clinic at this time but contracts with a local dentist to provide care.

## **LOAN REPAYMENT PROGRAM**

The Wyoming Office of Rural Health estimates that 205,000 Wyoming residents live in a dental HPSA. To remove the HPSA designation, the state will need a minimum of 7 additional dentists.<sup>107</sup> Measures are currently being taken to recruit and retain dentists in Wyoming. Programs include the National Health Service Corps Loan Repayment and Scholars Program and the Wyoming Healthcare Professional Loan Repayment Program. These programs use loan repayment or scholarships as incentives to draw providers to areas of greatest need, but are not specific to oral healthcare providers.

The National Health Service Corps Loan Repayment Program awards federal funds to healthcare professionals working in designated HP-SAs. Practitioners must commit to work in the HPSA for at least two years, agree to work full time, and see Medicare/Medicaid patients on a sliding fee scale.<sup>108</sup> In return, they receive \$50,000 in loan repayment with the opportunity for continued funding with additional years of service. Funds are disbursed by HRSA with the help of stimulus funds from the American Recovery and Reinvestment Act of 2009. In 2008 and 2009, 26 new awards were granted in Wyoming for a total of 29 participants. Of those participants, there is one dentist and one dental hygienist.<sup>105</sup>

The National Health Service Corps Scholar Program is a scholarship program for students enrolled at an accredited healthcare training program in an eligible primary care discipline who agree to work in a HPSA with a high need for two years. Wyoming currently has two participants in this program.<sup>105</sup>

The Wyoming Healthcare Professional Loan Repayment Program offers healthcare professionals up to \$90,000 in loan repayments in exchange for three years of service in an area of greatest need.<sup>105</sup> The program began in 2005 through Wyoming Statutes 9-2-118 and 9-2-119 and has 191 total participants, 14 of whom are dentists.<sup>105</sup> Because the program is state funded, practitioners do not have to work in a federally designated HPSA to receive the award. The Office of Rural Health is responsible for assessing areas of greatest need and awarding funds appropriately.

The Wyoming-Nebraska Dental Education program (WY-DENT) allows students who are residents of Wyoming to attend the University of Nebraska College of Dentistry or Creighton University School of Dentistry at a contracted price. To be considered for the program, a student or their parent/guardian must be a legal Wyoming resident who has lived in the state for more than 5 years. Each university may choose up to four students annually for the program for a total of 8 participants per year. The remainder of educational costs is paid for by the State of Wyoming, as a loan on the student's behalf. Upon graduating, the student may repay the debt by either making payments totaling the cost of education plus interest, or by practicing dentistry in Wyoming for 3 years. WY-DENT students who choose to practice in Wyoming must dedicate 10% of their time to patients on Medicaid and SCHIP.

## **DENTIST SURVEY**

### **METHODS**

All Wyoming dental offices were contacted via telephone for a brief survey in 2010. Dental offices were asked for a current address, the number of dentists practicing in that office, if the dentist accepted Medicaid patients including new Medicaid patients, CSHCN, and adults with special health care needs. The resulting list was then compared to the Wyoming Board of Examiners current dental license list. Any discrepancies were researched. Wyoming currently has 263 practicing dentists. There are 222 general dentists, six pediatric dentists, 21 orthodontists, 5 endodontists, 3 periodontists, and 8 oral and maxillofacial surgeons. Of the six pediatric dentists, two are also orthodontists.

### **RESULTS MEDICAID PROVIDERS**

Overall, 66.8% of dentists in Wyoming reported accepting Medicaid. The proportion of dentists that reported accepting Medicaid varied by county, with the highest proportion found in seven counties: Big Horn, Crook, Hot Springs, Platte, Sublette, Washakie, and Weston (Table 45). There are currently no dental care providers in Niobrara County.

**TABLE 45: PERCENT OF DENTAL PROVIDERS WHO REPORTED ACCEPTING MEDICAID BY COUNTY**

<b>STATE/ County</b>	<b>Percent Of Dental Providers That Reported Accepting Medicaid</b>
Wyoming	66.8%
Albany	33.3%
Big Horn	100.0%
Campbell	42.9%
Carbon	80.0%
Converse	25.0%
Crook	100.0%
Fremont	73.3%
Goshen	50.0%
Hot Springs	100.0%
Johnson	66.7%
Laramie	55.9%
Lincoln	90.0%
Natrona	79.4%
Niobrara	N/A
Park	64.3%
Platte	100.0%
Sheridan	28.6%
Sublette	100.0%
Sweetwater	64.7%
Teton	92.3%
Uinta	75.0%
Washakie	100.0%
Weston	100.0%

## CHILDREN TO DENTAL PROVIDER RATIO

Overall, there are 598.7 children ages 0 to 18 years per dental care provider in Wyoming. The ratio of children ages 0 to 18 years per dental care provider varied by county, with the highest ratio occurring in Crook County (1504.0). Washakie County had the lowest ratio of children per dental care provider at 282.9 (Table 46). There are currently no dental care providers in Niobrara County.

**TABLE 46: RATIO OF CHILDREN AGES 0 TO 18 YEARS PER DENTAL CARE PROVIDER BY COUNTY**

<b>STATE/ County</b>	<b>Ratio Of Children Per Dental Care Provider</b>
Wyoming	598.7
Albany	580.5
Big Horn	740.0
Campbell	843.7
Carbon	739.8
Converse	827.8
Crook	1504.0
Fremont	680.0
Goshen	696.0
Hot Springs	431.5
Johnson	628.7
Laramie	694.0
Lincoln	466.6
Natrona	560.2
Niobrara	N/A
Park	440.9
Platte	884.5
Sheridan	481.3
Sublette	705.7
Sweetwater	666.8
Teton	331.4
Uinta	511.9
Washakie	282.9
Weston	726.5

## MEDICAID ENROLLED CHILDREN TO DENTAL PROVIDER RATIO

Overall, the ratio of children ages 0 to 18 years enrolled in Medicaid per dental care providers that reported accepting Medicaid for Wyoming was 172.5. This ratio varied by county, with the highest ratio occurring in Converse County (711.0) while Teton County had the lowest ratio at 16.4 (Table 47). There are currently no dental care providers in Niobrara County

**TABLE 47: RATIO OF CHILDREN AGES 0 TO 18 YEARS ENROLLED IN MEDICAID PER DENTAL CARE PROVIDER WHO REPORTED ACCEPTING MEDICAID BY COUNTY**

<b>STATE/ County</b>	<b>Ratio Of Children Enrolled In Medicaid Per Dental Care Providers Accepting Medicaid</b>
Wyoming	172.5
Albany	265.5
Big Horn	120.8
Campbell	271.2
Carbon	210.3
Converse	711.0
Crook	264.0
Fremont	329.3
Goshen	409.0
Hot Springs	129.0
Johnson	156.5
Laramie	226.3
Lincoln	97.1
Natrona	139.2
Niobrara	N/A
Park	157.6
Platte	249.0
Sheridan	271.8
Sublette	91.0
Sweetwater	162.6
Teton	16.4
Uinta	133.0
Washakie	62.3
Weston	111.5

## MEDICAID PROVIDERS

All children enrolled in Medicaid are entitled to comprehensive dental services under the EPSDT program. According to Wyoming Medicaid claims data, in FY2009, 35.4% of Medicaid eligible children ages 0 to 18 years received a preventive dental service. EqualityCare paid claims reports verify 182 of the 263 practicing dentists in Wyoming filed claims from July 2009 through May 2010. Wyoming also has 44 out-of-state providers.

# CONCLUSIONS

Fluoride is an important issue to consider as a critical influence in the oral health of the people of Wyoming. The school fluoride survey discovered that a majority of the schools had drinking water with fluoride below the optimal level. While there were no differences in fluoride level by type of water supply (community vs. private well), the proportion of water supplies with fluoride level at or above the optimal range was significantly greater among actively fluoridated water supplies than nonfluoridated water supplies. Community water fluoridation is a cost effective public health intervention that affects the entire population and can reduce caries 50-70%.<sup>19</sup> A comprehensive fluoride study should be completed to obtain an accurate picture of community fluoride levels and to identify potential solutions to increase the number of communities with optimal fluoride levels.

In addition to addressing fluoride in improving oral health, interventions must be implemented as early in life as possible. Pregnant women are an important population group to target. Poor oral health and periodontal disease can result in low birth weight and preterm birth.<sup>24</sup> When pregnant women in Wyoming were surveyed, more than one third reported having a dental problem in the past six months, with the percentage significantly higher among women 18 to 19 years of age. This is especially important to note because women 18 to 19 years of age are already at higher risk for poor birth outcomes.<sup>39</sup> It will be important to educate women 18 to 19 years of age on the importance of dental care and prenatal care.

When pregnant women were asked about their knowledge of oral health, the majority did not know that dental caries is an infectious disease that is caused by bacteria and can be passed from mother or father to child or that if you have untreated cavities in your mouth your baby/child is more likely to have cavities in both their baby and permanent teeth. Because caries can be passed from caregiver to child and because there is a direct relationship between maternal caries and decay in children's teeth, families should be educated about the importance of oral care during and after pregnancy.<sup>28</sup>

These education efforts should also include medical professionals providing prenatal care to pregnant women. Because very few women reported that someone discussed oral health during their prenatal care visits, dentists and COHCs should partner with physicians to encourage dental care during pregnancy. This will help pregnant women understand the importance of dental care in order to minimize the health risks for themselves and their infants.

Efforts to promote oral health education and prevention to parents of toddlers and preschool children should be increased to include all counties in Wyoming. At present, thirteen counties have COHCs who provide pre-school programs of dental screenings, fluoride varnish applications, oral health education for children and parents, and referrals for dental treatment. COHC and local dentist's collaboration is necessary to provide referrals, emergency treatment, and continued for children under 4 years of age. Pediatricians and primary care physicians should provide risk assessments and fluoride varnish applications to children from six months through four years of age. Appropriate referrals to dentist should be made by one year of age.

ime screening location to determine oral health. Results from the 2008-2009 and the 2009-2010 indicate specific population should be targeted for prevention and treatment. In both studies, children eligible for FRL as well as children from racial and ethnic minorities were more likely to have decay. This confirms results from previous studies.<sup>1, 45</sup> Interventions should be targeted to schools with a high percentage of children eligible for FRL and those with high minority enrollment.

The number of providers available influences oral health in a community. In schools located in counties with a high ratio of children to providers, there was a higher prevalence of untreated decay. Conversely, schools located in communities with a low ratio of children to providers had a higher prevalence of treated decay and a higher prevalence of sealants. These results support increasing the number of dentists in Wyoming.

Visiting the dentist is critical in maintaining optimal oral health in adults. Dental insurance is associated with seeking dental care, frequency of dental care, and unmet oral health needs. The most commonly reported barriers to receiving dental care are lack of financial resources and lack of dental insurance.

Another important factor associated with oral health is education level. Adults with less than a high school education were more likely to have missing teeth. Tooth loss was also associated with insurance coverage. Adults with health insurance were less likely to have missing teeth compared to uninsured adults. This supports the continuation of the adult Medicaid dental program.

Chronic disease is another important factor related to oral health. People with diabetes are less likely to visit the dentist and more likely to have missing teeth. People with diabetes should be encouraged to seek regular preventive dental care.

Tobacco use is a risk factor for periodontal disease and oral cancer. Wyoming adults who smoked or used smokeless tobacco were less likely to report having a dental visit. Efforts should be made to educate tobacco users on the negative influence of tobacco use on oral health, importance of regular dental care and encourage tobacco cessation.

Oral health is especially important for older adults. Chronic disease and medications can impact the risk of oral health problems in this population. In addition, many seniors do not have dental insurance, which is not currently a part of Medicare. Less than half of Wyoming seniors reported visiting the dentist in the past six months, and 30% reported having a dental problem in the past six months. Among seniors who reported having unmet dental needs, the most common reasons were lack of financial resources and lack of dental insurance. Dentures are another important issue for seniors. Nearly half of seniors surveyed had dentures. Dental visits are important for people with dentures to ensure proper fit and to be examined for other oral health conditions.

# RECOMMENDATIONS

1. A better understanding of community fluoride levels statewide will enable cost effective, targeted strategies for improvement of oral health in these communities. A survey to map fluoride levels should be considered. Results from this survey would assist communities wishing to initiate community water fluoridation. Dentists and physicians will utilize this information when prescribing fluoride supplements.
2. Expand the most cost effective oral disease prevention measure by educating local communities about the importance of community water fluoridation, better ascertaining the level of fluoridation in their water currently, and demonstrate a linkage to the oral health of their children. According to the CDC, the installation cost of fluoridation equipment, to prevent far costlier interventions at a later time, is approximately \$15.00 per person with operating cost thereafter of \$2.00 per person.
3. Determine which communities utilize centralized water fluoridation, and develop strategies to assist with regulating and maintaining proper fluoridation levels.
4. Provide a model ordinance for cities and counties to utilize when debating fluoride level adjustments to their water supply. The model should include average cost per person to implement and maintain fluoridation, and should address the potential for use of government and non-government grant money for cities and rural water districts.
5. Continue and expand cost effective prevention programs, such as the fluoride mouth rinse and varnish programs, and health provider reimbursement incentives, to address the shortage of community water fluoridation.
6. Educate and encourage residents living in areas with low levels of fluoride to seek guidance on fluoride supplementation from their dentist, physician, and school nurse, or community oral health coordinator.
7. Continue and expand the highly successful Community Oral Health Coordinator (COHC) Program to support and sustain the development of regional safety net dental hubs in Community Health Centers. The COHCs perform outreach and education regarding oral disease prevention and oral hygiene (brushing, flossing, and diet) for parents, pregnant women, and children. Oral health programs are also conducted for local governments, school officials, and community organizations. The COHC conduct dental screenings and referrals for to dentists for treatment (triage), fluoride varnish applications, and fluoride mouth rinse programs. The COHC help people navigate the public health system to get the dental care they need by making arrangements with local dentists to see the referred children.
8. Pilot expanded duty COHC programs in targeted communities to develop the team Dental Home approach for delivering care. The COHC, with the supervision of a dentist, would work within the underserved community to provide prophylaxis (cleanings), apply dental sealants and fluoride treatments. The COHC may need to be certified by the American Dental Association.
9. WDH should communicate to the WYDENT program and WyDA the data regarding the communities with the least served populations and accompanying oral health data from the OHI Study, to assist in targeted dental care efforts in these rural areas to meet the need.
10. Continue WDH presentations on oral hygiene and care of dentures to staff in Wyoming nursing homes. WDH also provides materials for presentations made by the nursing home's staff dentist.
11. Develop a diverse statewide network of Dental Champions which promotes oral health through community, regional, and statewide initiatives.
12. Revive the Oral Health Coalition to develop and advocate for oral health policy.
13. Continue the presence and support of a full-time state dental director as an indication of state commitment to addressing oral health problems.
14. Create a Wyoming Oral Health Plan. A key element in successful oral health policy is the development and maintenance of a state oral health improvement plan that, through a collaborative public-private process, selects appropriate strategies for target populations, establishes integrated interventions, and sets priorities for the state. Examples include:
  - a. COHCs and dentists should target prevention efforts toward schools with a high percentage of children eligible for FRL programs and schools with a high minority enrollment.
  - b. WDH should partner Wyoming Medicaid and dentists to initiate programs at the local level to provide emergency and continued care and Dental Homes for school age children.
  - c. Efforts should be made to increase the number of providers in areas with high child to provider ratios. COHCs should also target interventions in these areas.
  - d. Create incentives and encourage partnerships between nursing homes and local dentists to provide oral healthcare for their residents. Additional studies should include the nursing home population.
  - e. Expand oral disease prevention measures, especially school-linked oral health programs, use of fluoride varnish and dental sealants, and community water fluoridation.
  - f. The State of Wyoming should encourage all school districts to require a dental assessment of children entering kindergarten to not only assess oral health, but to create an opportunity to educate caregivers about the importance of personal responsibility preventing oral decay.

15. Increase the promotion of programs like “Text4Baby” that send periodic text messages to new mothers with oral health information that is relevant to their baby based on his or her stage of development. Partnerships between WyDA, WDH, and hospitals to distribute educational materials to new moms.
16. Better education for those in a position to stop the cycle of oral disease, including pregnant women, parents of young children, and caregivers of vulnerable populations concerning the important connection between oral health and overall health.
17. Better promote healthy childhood nutrition, especially pre-school and school nutrition programs.
18. Increase the Medicaid dental provider network through increased program funding, incentives, and outreach.
19. Promote oral health as part of health reform initiatives at both the state and federal levels.
20. Collaborate with medical professionals and other healthcare providers to integrate oral healthcare, including fluoride varnish application, with general health promotion strategies. This will be specifically effective with each of the targeted populations. For example, physicians who provide obstetrical care and dentists could provide oral health education for their patients including instructions on preventing Early Childhood Caries and encouraging parents to establish a Dental Home for infants by one year of age.
21. Continue efforts to enact Clean Indoor Air laws and ordinances at both the community and statewide level.
22. Continue efforts to educate the public of the extreme health risks of tobacco usage.
23. Continue Quitline support for Wyoming’s smokers and Medicaid coverage for tobacco dependence treatment.
24. Invest in dental workforce expansion for underserved areas and vulnerable populations through workforce development initiatives such as the Advanced Education in General Dentistry (AEGD) clinical residency program, other expanded dental residency opportunities, and the use of Extended Care Permits (ECP) for dental hygienists.
25. Expand the duties of auxiliary dental staff, such as dental hygienists and dental assistants, with the direct supervision of a dentist.
26. Continue and expand the success of WYDENT, including improved student pipeline efforts to grow Wyoming’s own future dentists with roots in the state, to improve long term access to care in rural and underserved areas of the state.
27. Formalize a relationship between the Wyoming Health Resources Network and the WyDA to maximize use of existing healthcare workforce recruitment infrastructure.

# APPENDIX A: ABBREVIATIONS

ASTDD:	Association of State and Territorial Dental Directors	UNMC:	University of Nebraska Medical Center
BMI:	Body Mass Index	UW:	University of Wyoming
BRFSS:	Behavioral Risk Factor Surveillance System	WDE:	Wyoming Department of Education
CDC:	Centers for Disease Control and Prevention	WDH:	Wyoming Department of Health
CHCC:	Community Health Center of Central Wyoming	WIC:	Women Infants and Children Program
CHWC:	Cheyenne Health and Wellness Center	WOHC:	Wyoming Oral Health Coalition
COHC:	Community Oral Health Coordinators	WY:	Wyoming
CSH:	Children’s Special Health	WyDA:	Wyoming Dental Association
CSHCN:	Children with Special Health Care Needs		
ECC:	Early Childhood Caries		
EPSDT:	Early and Periodic Screening, Diagnosis, and Treatment		
FPL:	Federal Poverty Level		
FRL:	Free and Reduced Lunch		
FY:	Fiscal Year		
HP 2010:	Healthy People 2010		
HPSA:	Health Professional Shortage Area		
HRSA:	Health Resources Services Administration		
IRB:	Institutional Review Board		
LIHPSA:	Low Income Health Professional Shortage Area		
MFH:	Maternal and Family Health Section		
NHANES:	National Health and Nutrition Examination Survey		
OHI:	Oral Health Initiative		
OHS:	Oral Health Section		
ppm:	Parts Per Million		
PRAMS:	Pregnancy Risk Assessment Monitoring System		
RUCA:	Rural Urban Commuting Area		
SCHIP:	State Children’s Health Insurance Program (Kid Care CHIP)		
U.S.:	United States		



Wyoming Department of Health  
Oral Health Survey of Pregnant Women

Thank you for completing this oral health study. Your responses will be anonymous, and the information we collect will help us to improve the health of Wyoming women and children. Please only fill out this survey if you are 18 years of age or older.

1. What is your age? \_\_\_\_\_
2. What city do you currently live in? \_\_\_\_\_
3. *Before* you got pregnant with this baby, did you have any other babies who were born alive?  
 No  
 Yes → How many \_\_\_\_\_
4. Do you describe yourself as Spanish, Hispanic, or Latina?  
 Yes       No
5. Which of the following would you say is your race? **(Check all that apply)**  
 White                                       Black  
 Asian                                         Native Hawaiian or Other Pacific Islander  
 American Indian or Alaskan Native     Other [specify] \_\_\_\_\_
6. What kind of health insurance or health care coverage do you currently have?  
 Health insurance from your job or the job of your husband, partner, or parents, or that you/someone else purchased directly  
 Medicaid  
 Indian Health Service  
 Other - please tell us: \_\_\_\_\_  
 I do not have health insurance
7. Do you have any kind of insurance that pays for some or all of your dental care? Include insurance from a job or that you or someone else paid for (not from a job)  
 No       Yes       I don't know
8. During the past 6 months, did you have a toothache or other dental problem?  
 No       Yes
9. About how long has it been since you last visited a dentist? Include all types of dentists, such as orthodontists, oral surgeons, and all other dental specialists, as well as dental hygienists. (Check one)  
 Less than 1 year  
 1-3 years  
 More than 3 years  
 I have never been to the dentist → *Go to Question 11*
10. What was the main reason that you last visited a dentist? (Check one)  
 I went in on my own for check-up, exam or cleaning  
 I was called in by the dentist for check-up, exam or cleaning  
 Something was wrong, bothering or hurting me  
 Went for treatment of a condition that dentist discovered at earlier check-up or examination  
 Other: \_\_\_\_\_
11. During the past 12 months, was there a time when you needed dental care but could not get it?  
 No → *Go to Question 13*       Yes

12. The last time you could not get the dental care you needed, what was the **main reason** you couldn't get care? (Check one)

- I could not afford it
- Not a serious enough problem
- I did not have insurance
- I had trouble getting an appointment
- Dentist hours are not convenient
- I did not have a way to get there
- Dentist did not take Medicaid/insurance
- I don't like/trust/believe in dentists
- No dentist was available
- I didn't know where to go
- Wait is too long in clinic/office
- Other (Please Describe): \_\_\_\_\_

13. In the next section, we are trying to find out what women think about oral health. For each question, please mark whether you agree or disagree

- |  |                                |                                   |
|--|--------------------------------|-----------------------------------|
| a. Sugary drinks and foods such as fruit juice, soda and/or candy will increase the risk of your baby/child having tooth decay.          | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| b. Cavities can cause serious health problems in your children.  | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| c. Cavities in children are preventable.   | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| d. Cavities in baby teeth are not important because baby teeth will fall out.  | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| e. Baby teeth are important because they help to hold space for the permanent teeth to come in.  | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| f. Healthy baby teeth allow your child to maintain a healthy body weight and normal growth throughout their life.                        | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| g. Dental "cavities" is an infectious disease that is caused by bacteria and can be passed from mother or father to their child.         | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| h. If you have untreated cavities in your mouth, your baby/child is more likely to have cavities in both their baby and permanent teeth. | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| i. Putting your child to bed with a bottle of milk is bad for their teeth.   | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |
| j. Your oral health is an important part of your overall health and well-being   | <input type="checkbox"/> Agree | <input type="checkbox"/> Disagree |

14. When are you planning to take your child in for their first dental check-up? (Check one)

- At 6 months of age
- At 12 months of age
- At 18 months of age
- At 3 years of age
- When all of my child's baby teeth have been lost
- When my child complains about pain in their mouth

15. During any of your prenatal care visits, did a doctor, nurse, or other health care worker talk with you about your oral health?
- No       Yes       I have not had a prenatal care visit
16. During any of your prenatal care visits, did a doctor, nurse, other health care worker talk with you about your baby's oral health?
- No       Yes       I have not had a prenatal care visit
17. When do you think is the best time to be seen by a dentist during pregnancy? (check one)
- 1<sup>st</sup> Trimester  
 2<sup>nd</sup> Trimester  
 3<sup>rd</sup> Trimester  
 It doesn't matter  
 You should not go to the dentist during pregnancy
18. During this pregnancy, have you been, or do you plan to go to a dentist for routine care (teeth cleaning or regular check up)?
- No       Yes
19. During this pregnancy, have you had problems with your teeth or gums?
- No       Yes → *Go to Question 20*
20. Did you go to the dentist for treatment of the problem?
- No       Yes

Thank you for completing the survey. Please complete the card attached below

# THIRD GRADE SCREENING INSTRUMENT

STUDENT NUMBER:

Screen Date:	School Name:	Grade (Number + Teacher Initial)
Age:	Gender: circle Male                      Female	Screeener's Initials:
Untreated Decay: circle entire answer  <b>0</b> = No Untreated cavities  <b>1</b> = Untreated cavities		Treated Decay: circle entire answer  <b>0</b> = No treated decay  <b>1</b> = Treated decay
Sealants on Permanent Molars: circle entire answer  <b>0</b> = No sealants  <b>1</b> = Sealants		Treatment Urgency: circle entire answer  <b>0</b> = No obvious problem  <b>1</b> = Early dental care  <b>2</b> = Urgent care
Comments:		
Height (in Centimeters to the nearest 10 <sup>th</sup> of a cm):		Weight (in Kilograms):



6. Do you have any kind of insurance that pays for some or all of your MEDICAL OR SURGICAL care? (Include health insurance obtained through employment or purchased directly, as well as government programs like Medicaid or Medicare)

Yes                       No

7. Do you have any kind of insurance that pays for some or all of your DENTAL CARE? (Include health insurance obtained through employment or purchased directly, as well as government programs like Medicaid)

Yes                       No

8. Do you have full or partial dentures?

Yes                       No → (Go to Question 11)

9. How long have you had dentures? \_\_\_\_\_ Years    \_\_\_\_\_ Months

10. Have you ever had your dentures replaced or relined?

Yes                       No (Go to Question 12)

11. When was the last time you had dentures replaced or relined?

Five years ago or less                       Greater than five years ago

12. What is your age? \_\_\_\_\_ Years

13. In what county do you currently reside? \_\_\_\_\_

14. If you had an infection, growth, or sore in your mouth, from whom would you seek diagnosis and treatment?

Dentist                       Physician or other primary healthcare provider     Pharmacist

Comments on dental health among Wyoming senior citizens:

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**THANK YOU FOR PARTICIPATING**

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