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# **The 2007-2008 School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children**

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Wyoming  
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# The 2007-2008 School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children

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We wish to thank the many dedicated school nurses throughout Wyoming. This report would not have been possible without their hard work and cooperation.



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## Introduction

Asthma and diabetes are two serious chronic diseases that have increased among children in the United States.<sup>1,2</sup> The purpose of this survey was to evaluate the current prevalence of these conditions among Wyoming public school children. These data will be used to track trends over time and to identify areas where improvements are needed in safety, educational resources, and increased awareness of asthma and diabetes.

The demographic and geographic features of Wyoming hinder many residents from accessing healthcare. Wyoming is a frontier-rural state with 5.1 persons per square mile. It is the least populated state in the United States, with an estimated total population of 522,830 in 2007.<sup>3,4</sup> Wyoming ranks 46<sup>th</sup> of the 50 U.S. states in the total number of physicians. There are 18.1 per 10,000 Wyoming residents, including 52 licensed pediatricians and one pediatric specialist.<sup>5</sup> Other barriers to accessing healthcare in Wyoming include long travel distances, lack of insurance, and poverty.

The most current estimates for Wyoming indicate the 2004 total asthma costs for the state exceeded \$42 million, with \$24 million in direct healthcare costs and \$18 million in indirect costs.<sup>6</sup> From July 2002 through June 2003 there were 5,982 hospitalizations in Wyoming with diabetes listed as a discharge diagnosis' at a total cost of \$84,863,029.<sup>7</sup>

Currently, there is no continuous and comprehensive surveillance for asthma or diabetes in children in Wyoming. Beginning in 2002, the optional Childhood Asthma module was added to the Wyoming Behavioral Risk Factor Surveillance System (BRFSS) every other year. Another potential source of data, the Wyoming Hospital Discharge Database, cannot adequately assess the burden of asthma or diabetes hospitalizations because there are no tertiary care centers in the state and many Wyoming children must be treated in out-of-state hospitals.

*"The School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children"* was developed as a surveillance tool to measure current asthma and diabetes prevalence within the school children of Wyoming. The initial survey was conducted in 2003 to collect data on asthma prevalence and medication use.<sup>8</sup> The survey was expanded in 2005 to include questions about diabetes.<sup>9</sup> The 2007 survey gathers information on asthma and diabetes prevalence and requests information about diabetes practices within the Wyoming public school system. While the response rate has exceeded 70% for each survey year, 2007 was the first year that the survey did not include responses from all Wyoming counties. The survey results will be considered representative of Wyoming due to the response rate of 79.6%.

## Methods

*The School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children* was developed using methodology similar to that used for Connecticut's *Survey of the Prevalence of Asthma Among School Age Children*.<sup>10</sup> It was also an adaptation of school nurse surveys conducted in Wyoming in 2003 and 2005.<sup>8,9</sup> The forms from the 2005 study were reviewed and revised for the 2007 survey by members of the School Age Children Workgroup of the Wyoming Diabetes Advisory Council, an advisory team including representatives from the Wyoming Department of Health, the Wyoming Department of Education, other partner agencies, and parents of children with diabetes.

A letter explaining the purpose of the survey (Appendix A) and the survey form (Appendix B) were sent to the school nurse at each of Wyoming's 353 public schools in November of 2007. In addition to providing basic information about their school, nurses were asked to identify the number of students with an asthma diagnosis. Of those with an asthma diagnosis, nurses were asked to report the number using bronchodilators while at school. Nurses were asked to report the total number of students at their school with a diabetes diagnosis and to specify the number of students with type 1 and type 2 diabetes. Questions were added to this year's survey regarding individualized education plans (IEP) and 504 plans for students with asthma or diabetes. Additionally, questions about school policies related to diabetes management care were asked.

Schools that did not respond to the survey were reminded by mail with a post card, followed by a repeat mailing of the survey and instructions. A final reminder was made by telephone.

Disease prevalence was calculated using the total number of students reported by the school nurse to have the disease (asthma or diabetes) out of the total number of students in the school. School numbers were combined by districts to arrive at the district prevalence. District numbers were then combined by county to determine the county prevalence. Diabetes prevalence was broken down into the prevalence of type 1 and type 2 diabetes and into the percent of all diabetes that is type 2. Prevalence data for individual schools is not reported. Data were analyzed utilizing Microsoft Excel 2007 and Epi Info 3.4.3.

## Response Rates

Overall, 79.60% of Wyoming public schools responded to the survey. Only four of Wyoming's 48 school districts did not respond. All counties, except for Hot Springs County, are represented in the survey. Sufficient data was collected to provide reliable prevalence values for each county, with the exception of Hot Springs County.

# Summary of 2007 Key Findings: Asthma

- **Over 79% of Wyoming public schools responded to the asthma questions in this survey. The results include information on 70,653 students.**
- **The overall prevalence of asthma in Wyoming public school children was 7.38%.**
- **Asthma prevalence in Wyoming school districts ranged from 1.86% to 12.50%.**
- **Asthma prevalence in Wyoming counties ranged from 3.02% to 11.25%.**
- **There was no significant difference in asthma prevalence among counties by eligibility for the free/reduced lunch (FRL) program.**
  - **7.84% (Confidence Interval (CI) 7.29%-8.39%) of children had asthma in counties with the highest percentage of children who were eligible for FRL.**
  - **7.76% (CI 7.22%-8.30%) of children had asthma in counties with the lowest percentage students who were eligible for the FRL program.**
- **The asthma prevalence among children living in urban areas was significantly higher than that found in rural areas (RR: 1.26, 95% CI: 1.18-1.35).**
- **Children in rural areas were more likely to have a bronchodilator, keep it with the school nurse, and have a signed form allowing them to keep it on their person than children in urban areas.**
- **Children in rural areas were more likely to have an IEP and a 504 plan than children in urban areas.**
- **In counties with 10% or greater minority population, asthma prevalence was significantly higher than in counties with less than a 10% minority population [Relative risk (RR): 1.15, (95% CI: 1.08-1.21)].**
- **Of children with asthma, 52% used a bronchodilator at school. Of these, 21% keep the medication in the school nurse's office while 18% had signed forms allowing them to keep their medication with them while in school. The remainder did not specify where the inhaler was kept.**

# Summary of 2007 Key Findings: Diabetes

- Over 79% of Wyoming public schools responded to the diabetes questions in this survey. The results include information on 70,653 students.
- The overall prevalence of diabetes in Wyoming public school children was 0.38%. The prevalence of type 1 diabetes was 0.32% and type 2 diabetes prevalence was 0.05%.
- Among Wyoming public school children with diabetes, 14% had type 2 diabetes.
- Diabetes prevalence in Wyoming school districts ranged from 0% to 1.21%, and in Wyoming counties ranged from 0% to 0.64%.
- Diabetes prevalence varied in counties by percentage of students eligible for FRL:
  - In counties with fewer than 20% of the students eligible for FRL, the prevalence of diabetes was 0.27%.
  - In counties with more than 40% eligible for FRL, the prevalence of diabetes was 0.41%.  
  
[RR: 1.52, (95% CI: 0.92-2.52)].
- Type 2 diabetes prevalence was not significantly different between school districts with differing percentages of children living in families in poverty:
  - In school districts where <15% of the children lived in families in poverty, the prevalence of type 2 diabetes was 0.02% (CI -0.02%-0.06%) .
  - In school districts where 15-20% of the children lived in families in poverty, the prevalence of type 2 diabetes was 0.06% (CI 0.04%-0.08%).
  - In school districts where >20% of the children lived in families in poverty, the prevalence of type 2 diabetes was 0.03% (CI -0.01%-0.07%).
- The diabetes prevalence among children living in rural areas (0.40%) was slightly higher than that found in urban areas (0.37%).
- Of children with type 1 diabetes, 45% overall had an insulin pump.



## Asthma Background

From 1979 to 1994, asthma in the U.S. increased by 102%. Approximately 23 million Americans currently have asthma.<sup>11,12</sup> Of these, 6.8 million are children under 18 years of age.<sup>13</sup> Pediatric asthma prevalence is especially concerning because “the most rapid increase in cases of asthma has occurred in children under five” according to the American Lung Association of Texas.<sup>14</sup> The National Health Interview Survey 2006 data reported that children under 18 years of age had higher asthma prevalence (9.4%) than adults over age 18 (7.3%).<sup>13</sup>



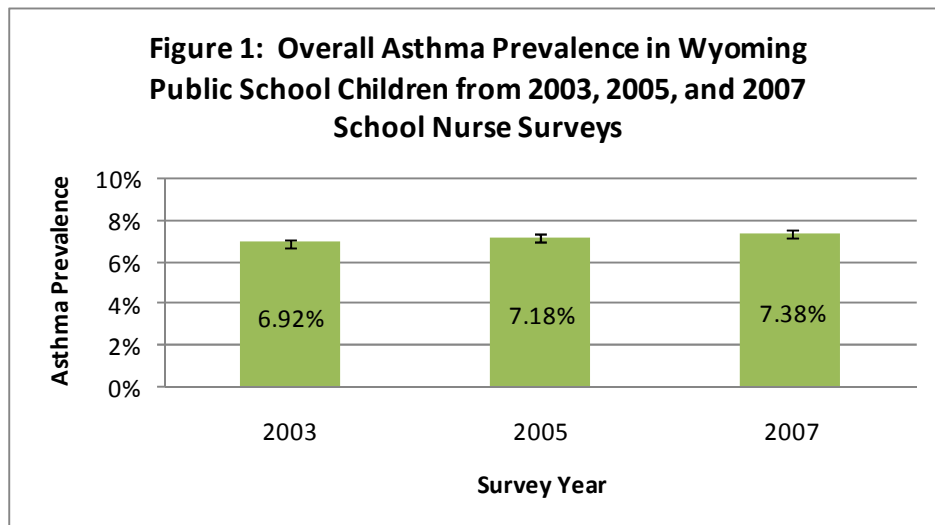
Costs associated with asthma have had a large impact on the U.S. economy. In 2007, the estimated direct healthcare costs for asthma totaled \$14.7 billion, including \$6.2 billion specifically for prescription drugs. Indirect costs added up to \$5 billion for a total asthma cost of \$19.7 billion for one year.<sup>2</sup> Asthma was also the leading cause of school absenteeism due to chronic conditions, accounting for 12.8 million lost school days in 2003.<sup>15</sup>

Data from the 2007 National Survey of Children's Health show that 9.0% of U.S. children have current asthma, which is slightly higher than the 6.9% prevalence among Wyoming children.<sup>16</sup> In 2008, results from the optional Childhood Asthma module of the Behavioral Risk Factor Surveillance System (BRFSS) estimated that the prevalence of lifetime asthma was 8.4% among Wyoming residents under the age of 18.<sup>17</sup> The School Nurse Survey of Asthma Prevalence in Wyoming Public School Children was conducted in 2003 as part of the Environmental Council of the States' National Childhood Asthma Prevention Campaign. This survey estimated asthma prevalence among Wyoming public school children to have been 6.92%.<sup>8</sup> A follow-up survey in 2005 estimated asthma prevalence at 7.18%.<sup>9</sup>

## Asthma Results

In 2007, the asthma prevalence in Wyoming was 7.38%. Figure 1 illustrates the prevalence of asthma from all three studies. While the asthma prevalence in 2007 was significantly higher than in 2003 [6.92% (CI 6.73%-7.11%) vs. 7.38% (CI 7.18%-7.57%)], the 2005 and 2007 results are not significantly different. Table 1 shows the percentage of response and asthma prevalence by school district. Table 2 shows the response and asthma prevalence by county. Asthma prevalence was reported as the percentage of children with asthma for each school district and county. Prevalence for individual schools was not reported.

### 2007 Overall Asthma Prevalence in Wyoming Public School Children 7.38%



### School Districts

Asthma prevalence in Wyoming school districts ranged from 1.86% to 12.50%. The lowest prevalence for school districts was seen in Sublette County School District #9 (1.86%) and in Big Horn County School District #1 (2.20%). The highest school district prevalence was seen in Sheridan County School District #3 (12.50%) and in Uinta County School District #1 (12.30%).

### Counties

When the data were aggregated by county, asthma prevalence ranged from 3.02% to 11.25%. The lowest prevalence for counties was seen in Lincoln County (3.02%) and in Johnson County (3.96%). The highest county prevalence was seen in Uinta

County (11.25%) and Niobrara County (10.05%). Hot Springs County is not included in the analysis.

<b>School District</b>	<b># of Schools Responding</b>	<b># of Schools in District</b>	<b>Response (%)</b>	<b>Total # Students Included</b>	<b>Prevalence (%)</b>
Albany County #1	17	18	94.4	3,522	7.61
Big Horn County #1	5	6	83.3	502	8.37
Big Horn County #2	3	3	100.0	648	6.94
Big Horn County #3	3	3	100.0	495	6.87
Big Horn County #4	4	4	100.0	338	7.40
Campbell County #1	18	20	90.0	6,023	9.63
Carbon County #1	0	8	0.0	0	NA
Carbon County #2	7	7	100.0	678	6.34
Converse County #1	4	8	50.0	1729	7.29
Converse County #2	4	5	80.0	679	6.33
Crook County #1	10	10	100.0	1,125	4.8
Fremont County #1	8	8	100.0	1,731	4.68
Fremont County #2	3	3	100.0	225	5.33
Fremont County #6	2	3	66.7	308	11.34
Fremont County #14	3	3	100.0	566	7.60
Fremont County #21	0	2	0.0	0	NA
Fremont County #24	3	3	100.0	332	6.02
Fremont County #25	5	6	83.3	1,744	10.38
Fremont County #38	2	2	100.0	325	11.38
Goshen County #1	11	11	100.0	1,818	8.42
Hot Springs County #1	0	3	0.0	0	NA
Johnson County #1	7	7	100.0	1,288	3.96
Laramie County #1	30	32	93.8	12,767	8.55
Laramie County #2	4	6	66.7	721	4.85

<b>School District</b>	<b># of Schools Responding</b>	<b># of Schools in District</b>	<b>Response (%)</b>	<b>Total # Students Included</b>	<b>Prevalence (%)</b>
Lincoln County #1	0	4	0.0	0	NA
Lincoln County #2	9	9	100.0	2,586	3.02
Natrona County #1	28	34	82.4	10,705	7.33
Niobrara County #1	4	4	100.0	368	10.05
Park County #1	1	7	14.3	377	6.10
Park County #6	7	7	100.0	2,166	6.05
Park County #16	1	1	100.0	125	9.60
Platte County #1	10	10	100.0	1,114	7.36
Platte County #2	3	3	100.0	224	10.71
Sheridan County #1	3	7	42.9	454	2.20
Sheridan County #2	10	10	100.0	3,075	6.31
Sheridan County #3	4	4	100.0	96	12.50
Sublette County #1	4	4	100.0	945	6.3
Sublette County #9	4	4	100.0	700	1.86
Sweetwater County #1	6	15	40.0	2,935	5.21
Sweetwater County #2	4	10	40.0	1,116	6.54
Teton County #1	6	9	66.7	1,607	4.36
Uinta County #1	3	8	37.5	919	12.30
Uinta County #4	4	4	100.0	710	9.86
Uinta County #6	2	3	66.7	415	11.33
Washakie County #1	5	5	100.0	1,301	9.15
Washakie County #2	1	1	100.0	96	8.33
Weston County #1	5	5	100.0	775	10.19
Weston County #7	3	3	100.0	280	7.86

**Table 2: Asthma Prevalence and Response Rate by County**

School District	# of Schools Responding	# of Schools in District	Response (%)	Total # Students Included	Prevalence (%)
Albany County	17	18	94.4	3,522	7.61
Big Horn County	15	16	93.8	1,983	7.36
Campbell County	18	20	90.0	6,023	9.63
Carbon County	7	15	46.7	678	6.34
Converse County	9	13	69.2	2,408	7.02
Crook County	10	10	100.0	1,125	4.80
Fremont County	26	31	83.9	5,231	7.82
Goshen County	11	11	100.0	1,818	8.42
Hot Springs County	0	0	0	0	NA
Johnson County	7	7	100.0	1,288	3.96
Laramie County	34	38	89.5	13,488	8.36
Lincoln County	9	13	69.2	2,586	3.2
Natrona County	28	24	82.4	10,705	7.33
Niobrara County	4	4	100.0	368	10.05
Park County	9	15	60.0	2,668	6.22
Platte County	13	13	100.0	1,338	7.92
Sheridan County	17	21	81.0	3,625	5.96
Sublette County	8	8	100.0	1,645	4.26
Sweetwater County	10	25	40.0	4,051	5.58
Teton County	6	9	6.7	1,607	4.36
Uinta County	9	15	60.0	2,044	11.25
Washakie County	6	6	100.0	1,397	9.09
Weston County	8	8	100.0	1,055	9.57

## Low Income

Low income was measured in two ways. The first method analyzed the percentage of students eligible for FRL based on 2006 data from the Wyoming Department of Education.<sup>18</sup> Analysis included results from the 2005 and 2007 surveys. Data from the 2003 survey was not comparable due to a change in data collection for FRL. The second method used Small Area Income & Poverty Estimates for 2005 for children ages 5 to 17 years living in families in poverty from the US Census Bureau.<sup>19</sup>

For the 2007 survey, school districts were categorized by the percentage of students eligible for FRL in 2006. Figure 2 illustrates results from the 2007 survey. The lowest asthma prevalence (6.61%) occurred in districts with 20-29% students eligible for FRL, while the highest prevalence (8.98%) was found in districts with more than 50% of the students eligible.

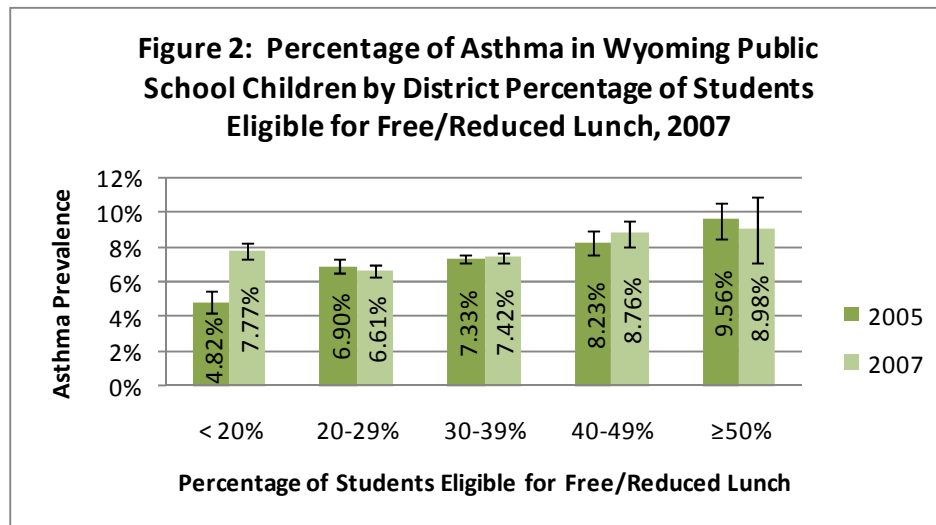
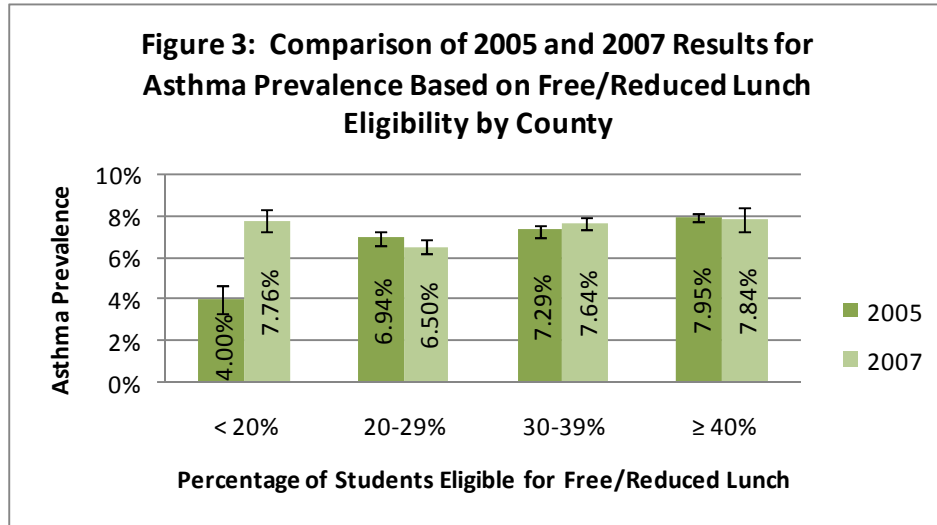


Figure 2 also illustrates a comparison of the results from the 2005 and 2007 surveys. The only significant difference in asthma prevalence from this period occurred in school districts with fewer than 20% of students eligible for FRL. The asthma prevalence increased significantly from 4.82% (CI 4.21%-5.43%) in 2005 to 7.77% (CI 7.27%-8.27%) in 2007. There were no significant differences in asthma prevalence in the other FRL categories.

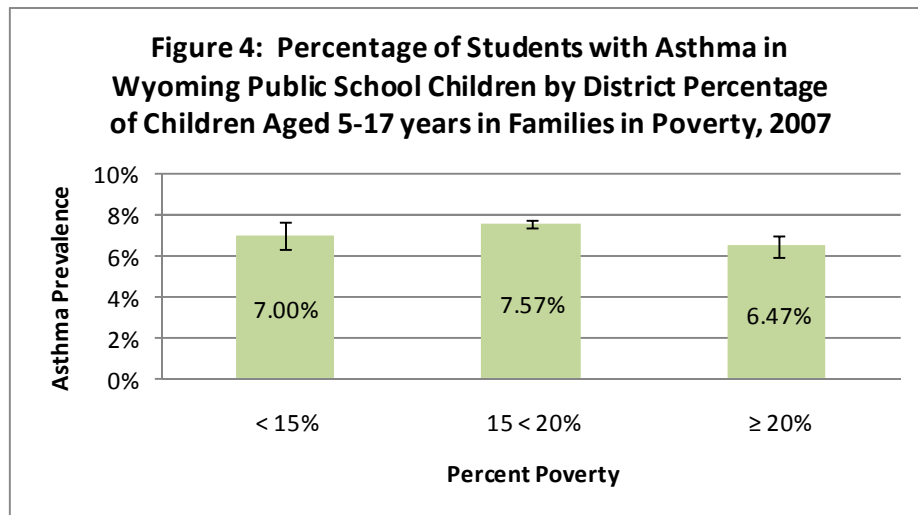
In 2005, survey results showed an increase in asthma prevalence with an increased FRL eligible population in school districts. This pattern was not repeated in 2007 due to a dramatic rise in asthma prevalence among the less than 20% FRL population in 2007.

The 2007 school district data combined by county indicated counties with 20-29% percent of students eligible for FRL had the lowest asthma prevalence at 6.50%. Counties with the highest percentage of students eligible for FRL ( $\geq 40\%$ ) had the highest asthma prevalence (7.84%). These results are presented in Figure 3.



There is a statistically significant difference between the 2005 and 2007 survey results for asthma prevalence in counties where fewer than 20% of students were eligible for FRL. The asthma prevalence increased from 4.00% (CI 3.34%-4.66%) in 2005 to 7.76% (CI 7.22-8.30%) in 2007.

Figure 4 shows the 2007 asthma prevalence by the school district percentage of children ages 5 to 17 years of age in a family living in poverty. Asthma prevalence was greatest in districts with 15-20% of the children in poverty and significantly higher than in districts with  $>20\%$  of the children age 5-17 in families in poverty [RR: 1.17, (CI: 1.08-1.27)].



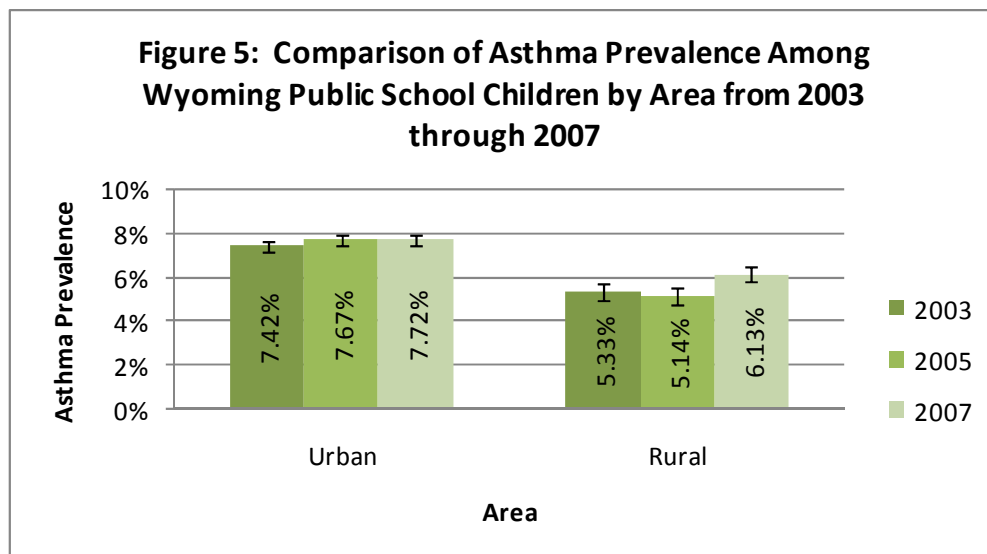
## Urban and Rural Areas



While much of Wyoming is rural, the U.S. Census Bureau delineates several communities in Wyoming as urban areas and urban clusters. A complete list can be found in Appendix C. An urban area is defined as a “densely settled territory” and in general has a minimum population density of 1,000 people per square mile. An urban cluster is also a “densely settled territory” with between 2,500 and 50,000 people. Urban is defined in this survey as a combination of both urban areas and urban clusters, and all other areas are considered rural.<sup>20</sup> The urban classification has remained consistent since the 2003 survey.

In 2007, the asthma prevalence for urban areas (7.72%) was significantly higher than that of rural areas at 6.13% (Figure 5) [RR: 1.26, (95% CI: 1.18-1.35)].

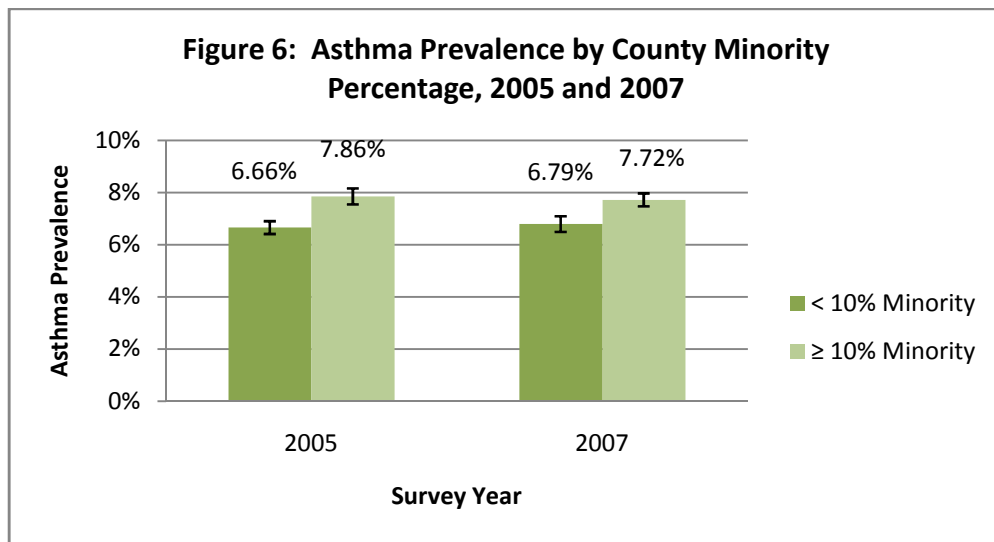
Wyoming’s urban asthma prevalence has increased minimally, while rural asthma prevalence has shown an overall significant increase in prevalence from 5.33% (CI 4.99%-5.68%) in 2003 to 6.13% (CI 5.77%-6.49%) in 2007. Despite the increase in asthma prevalence in rural students in 2007, asthma prevalence among urban Wyoming public school students continues to be significantly higher.





## Minority Populations

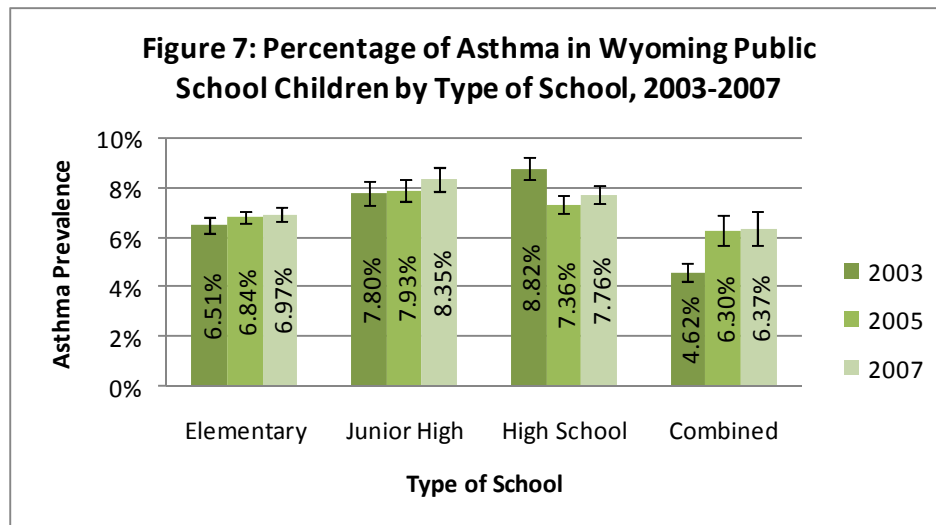
Minority populations in Wyoming were defined using the US Census Bureau 2008 State and County Quickfacts data for Wyoming.<sup>21</sup> Counties were divided by those with less than 10% minority population versus those with 10% or more minority population. Figure 6 shows asthma rates to be significantly higher in counties with larger minority populations. Wyoming counties where minorities comprised 10% or more of the population had an asthma prevalence rate of 7.72% compared to 6.79% in counties with <10% of the population comprised of minorities [RR: 1.14, (95% CI 1.08-1.20)]. These results were similar to those from 2005 as shown in Figure 6.



According to the U.S. Census Bureau's 2008 QuickFacts, American Indians make up 2.5% of Wyoming's total population.<sup>21 24</sup> A large portion of Wyoming's American Indian population resides on the Wind River Reservation, located in Fremont County. Asthma prevalence in Fremont County was significantly higher for those schools on the Wind River Reservation versus those not located on the reservation [RR: 1.17, (CI: 0.92-1.48)].

## Type of School

Asthma prevalence also differed by the type of school. Figure 7 illustrates the asthma prevalence by the types of schools that were surveyed by year of survey. In 2007, the prevalence of asthma for junior high and high schools was significantly greater than in elementary schools and combined schools. Combined schools consisted of various combinations of grade levels from kindergarten through 12<sup>th</sup> grade. The distribution of asthma prevalence was similar among each school type through each survey with junior high and high schools having the highest asthma prevalence each year.



## Asthma Medications-Bronchodilators

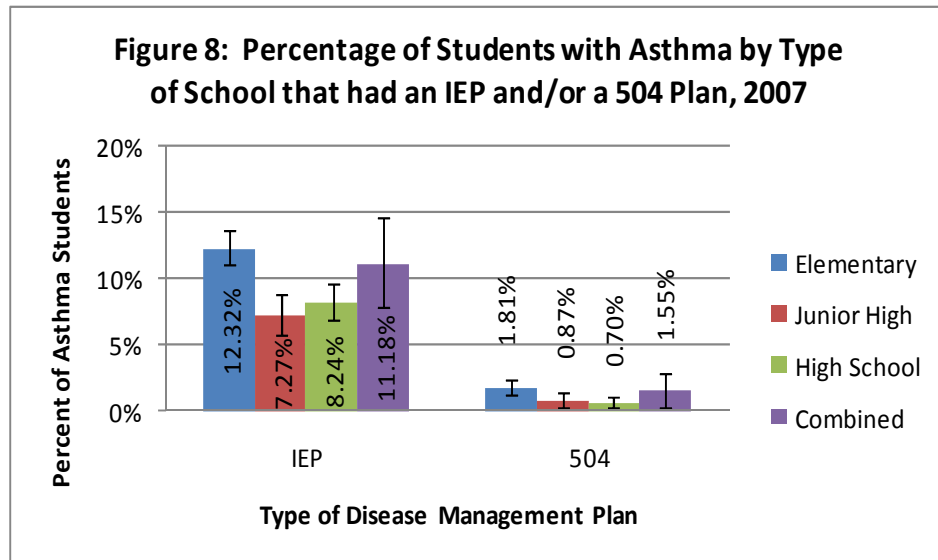
School nurses were asked to record the number of children with an asthma diagnosis who used bronchodilators at school. Bronchodilators are inhaler medications prescribed to children with asthma. These medications open airways by relaxing the smooth muscles of the lungs. Of the students who were reported to have an asthma diagnosis, 52.05% used bronchodilator inhalers at school. Of these students, 20.78% kept their inhalers in the nurse's office, 18.17% had a signed form that allowed them to keep their bronchodilator inhalers with them while at school, and the remainder was unspecified.

## Asthma Management at School

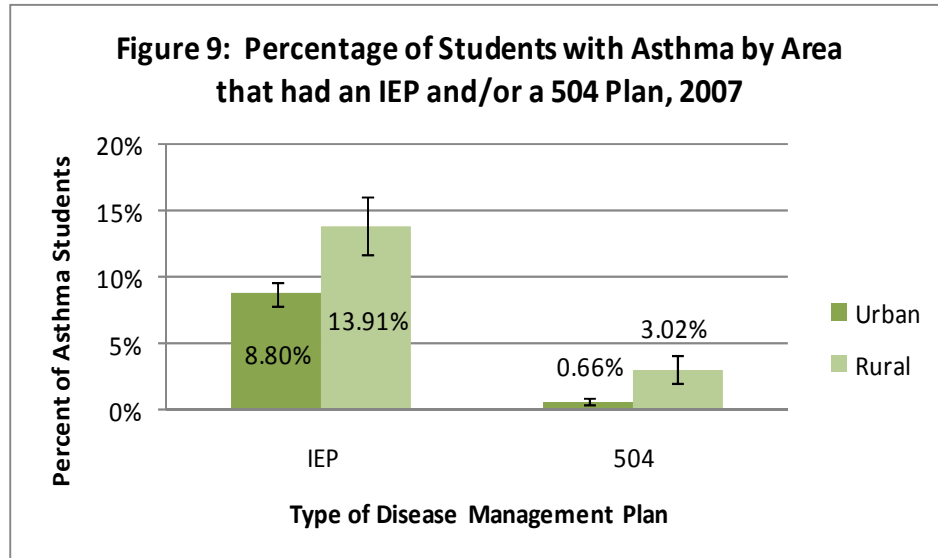
Asthma management at Wyoming public schools is maintained by agreements with children, parents, school nurses, and school staff. Parents and schools are encouraged to develop 504 plans to define accommodations for students with chronic conditions such as, asthma, to allow these students to perform at the same level as other students. An IEP may also be developed to address educational

issues. Of all the students with a known asthma diagnosis in Wyoming public schools, 10% had an IEP established and 1.3% had a 504 plan.

The distribution of IEP's and 504 plans varied among school type and between urban and rural areas. Figures 10 and 11 show these results. Figure 8 illustrates differences in the number of IEPs and 504 plans by the type of school. Elementary and combined schools had a higher percentage of asthma students with IEPs and 504 plans than the junior high and high schools. All schools had a significantly higher proportion of IEPs versus 504 plans for students with asthma.



Wyoming public school children with asthma in rural areas had a higher percentage of IEPs and 504 plans compared to urban public school children, as shown in Figure 9. The percentage of IEPs in rural areas was significantly higher than in urban areas [RR: 1.25 (95% CI 1.03-1.52)]. The percentage children with 504 plans was also significantly higher in rural areas compared to urban areas [RR: 3.64, (95% CI 2.15-6.17)].



## Asthma Discussion

Two previous school nurse surveys for asthma prevalence in Wyoming public school children were conducted in 2003 and 2005.<sup>8,9</sup> Although the response rates have been similar among all of the surveys (76%, 77%, and 80% respectively), caution must be exercised when comparing the results of these studies because the source of data collected was not identical. For example, in the previous two surveys, Carbon County School District #1 had the lowest prevalence, and Hot Springs County School District #1 had the highest prevalence. Neither school district was represented in the 2007 survey due to the lack of submission of a completed survey.

While the underlying causes for childhood asthma are likely a combination of environmental and genetic factors, there has been a concerted effort to find associations with asthma to enhance prevention efforts. These factors include socio-economic status, race, and geographic location.

Counties with the highest percentage of students eligible for FRL had the highest asthma prevalence in each of the three surveys. This relationship was also observed at the school district level. This confirms findings in literature which report that asthma is more prevalent in lower socioeconomic groups.<sup>22</sup> In 2003 and 2005, the lowest asthma prevalence was in districts with the lowest percentages of students eligible for FRL. However, in 2007 the asthma prevalence was lowest in the 20-29% FRL group. It is unknown if children who qualify for FRL actually have asthma as children were not directly asked their eligibility.

Wyoming urban areas had a significantly higher prevalence of asthma than rural areas in each of the three school nurse surveys. Although this seems to be a common trend nationally, it is interesting that Wyoming follows the same pattern despite the smaller urban populations found in the state.<sup>23</sup> Urban and rural asthma

prevalence has also been consistent since 2003. Only one noticeable increase, occurred from 2005 to 2007 in the rural areas. This increase could be a result of different schools participating in the 2007 survey.

All types of schools had an increase in asthma prevalence from 2003 to 2007. Since 2003, asthma prevalence has been consistently lowest in combined schools, while junior high has had the highest prevalence in the last two surveys. In the 2007 survey, only two of the 29 combined schools were located in urban areas with the remaining 27 in rural areas. As previously stated, rural areas tend to have a lower asthma prevalence than urban areas. In addition, a drop in prevalence from junior high to high school could be due to a lack of reporting asthma to school nurses as students attempt to manage their own disease as they mature.



The analysis of the last two surveys, conducted in 2005 and 2007, briefly addressed race/ethnicity as a potential factor in asthma prevalence. Census data was used to determine if the county minority population was either greater or less than 10%.<sup>21</sup> Asthma prevalence increased in all populations from 2005 to 2007. However, counties with a 10% or larger minority population had significantly higher asthma prevalence than counties with a population with less than 10% minorities. However, it should be noted that asthma prevalence and race/ethnicity data were not collected at the individual level, but through separate surveys. An association between race and asthma cannot be determined by this study.

Identifying asthma prevalence and trends is critical to help target prevention efforts in Wyoming. Goals from the Healthy People 2010 (HP 2010) initiative established by the CDC and National Institutes of Health (NIH) include: a reduction in the number of school/work days missed by persons with asthma due to asthma, a reduction in hospital emergency department visits for asthma, and an increase in the proportion of persons with asthma who receive asthma care according to the National Asthma Education Prevention Program guidelines.<sup>11</sup> Wyoming's surveillance of childhood

asthma has been limited and was not added to the Behavioral Risk Factor Surveillance System (BRFSS) until 2004. The BRFSS survey is weighted to represent all children in Wyoming under the age of 18, and the school nurse survey represents only Wyoming public school children from kindergarten through high school. This may help to explain the differences in prevalence estimates between the 2008 BRFSS (8.4%) and the 2007 school nurse survey (7.38%).<sup>17</sup> Both estimates are lower than the estimated prevalence of current asthma 9.0% (CI 8.6%-9.5%) of U.S. children aged 0 to 17 years from the 2007 National Survey of Children's Health.<sup>16</sup>

There are several limitations to this study. The policies for reporting students' health conditions to school nurses vary between schools. Students mature and learn to manage their own asthma. They may not report chronic conditions to the school nurse, so the true prevalence of asthma may be underreported. In addition, low socioeconomic status cannot be inferred for higher prevalence because the students eligible for FRL were not surveyed directly. Information was obtained indirectly through the representing school nurse. There may be an association between asthma and socioeconomic status, but further studies are needed. Childhood obesity and its potential association with asthma was not addressed in this survey. Recent national attention to the growing weight problem in children has led to research, which has shown evidence that obese children have a higher prevalence of asthma.<sup>25,26</sup> There was no ongoing surveillance of childhood obesity in Wyoming children at the time of this study. Finally, despite the high participation from the schools, the same schools were not represented in each survey. This could impact the true representation of asthma, especially if participation changes included districts or counties with different minority populations or socioeconomic status.

## Asthma Program and Education Recommendations



Based on data from the 2007 School Nurse Survey, the following recommendations are made. If implemented, these actions would strengthen asthma efforts in Wyoming and lead to improved health outcomes for children with asthma.

- ❖ Establish and implement an asthma program, to include a surveillance system for tracking asthma in Wyoming residents, asthma research, and targeted interventions by the State of Wyoming.
- ❖ Establish an asthma program funded by consistent and stable funding sources, to include adequate staffing and become located within the Wyoming Department of Health.
- ❖ Facilitate the formation of an asthma coalition with collaboration from partners from all sectors to address asthma at the community level and facilitated by the State of Wyoming.
- ❖ Develop policies for training Wyoming public school staff and coaches to recognize and respond to asthma attacks.
- ❖ Educate the parents of students in Wyoming schools about the state law allowing students to carry asthma rescue medication.
- ❖ Continue asthma surveillance in children through the use of the school nurse survey and the BRFSS child module through the Wyoming Department of Health.



## Diabetes Background

In June 2008, the Centers for Disease Control and Prevention (CDC) released a report showing that 24 million people or approximately 8% of the U.S. population had diabetes. This report also stated that diabetes prevalence in all age groups has increased.<sup>1</sup> Results from the National Health Interview Survey from 2007 indicated that 23.6 million U.S. residents were diagnosed with diabetes.<sup>27</sup> Based on 2002-2003 data, new cases for those younger than 20 years old developed at a rate of 19.0 per 100,000 for type 1 diabetes and 5.3 per 100,000 for type 2 diabetes as determined by *SEARCH for Diabetes in Youth*, a multi-center study funded by CDC and National Institutes for Health (NIH).<sup>28</sup>

According to the 2008 Behavioral Risk Factor Surveillance Survey (BRFSS), 7.4% of Wyoming residents over the age of 18 had diabetes, which is slightly less than the national prevalence of 8%.<sup>17</sup> Diabetes prevalence among Wyoming residents under age 18 was estimated to be 0.8% by the 2008 Wyoming BRFSS, which is slightly higher than the national estimate of 0.20%.<sup>17</sup> The 2005 School Nurse Survey for Asthma and Diabetes Prevalence in Wyoming School Children also reported Wyoming's prevalence of diabetes to be higher than the national estimate (0.34%).<sup>9</sup>

Costs associated with diabetes are high. In 2007, direct costs including medical care and services were estimated at \$116 billion, and indirect costs including disability, work loss and premature mortality were estimated at \$58 billion for a total of \$174 billion attributable to diabetes.<sup>27</sup>





## Diabetes Results

The overall response rate for the 2007 survey was 79.6% of Wyoming public schools. Table 3 shows diabetes prevalence by school district, and Table 4 shows diabetes prevalence by county. Diabetes prevalence was reported as overall prevalence and then split by type of diabetes (1 or 2) when appropriate. Caution should be used in interpreting diabetes data due to small numbers. The number (n) of cases is presented where appropriate.

### 2007 Overall Diabetes Prevalence in Wyoming Public School Children 0.38%

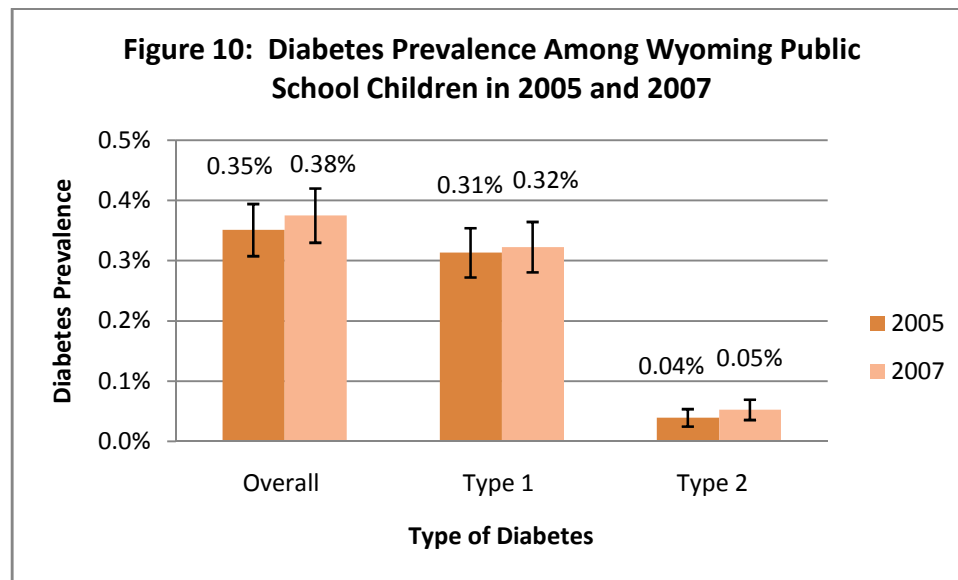


Figure 10 illustrates no significant change in the distribution of diabetes prevalence between the 2005 and 2007 surveys [RR 6.16, (CI 4.35-8.72)].

### School Districts

Diabetes prevalence among Wyoming school districts in 2007 ranged from 0% to 1.21%. The lowest prevalence for school districts (0%) was seen in Fremont County School District #6, Johnson County #1, Park County District #16, Sheridan County Districts #1 and #3, and Washakie County District #2. The highest school district prevalence was seen in Big Horn School District #3 (1.21%, n=6). Big Horn School District #3 (1.01% n=5) and Uinta School District #6 (0.96% n=4) had the highest prevalence of type 1 diabetes. Carbon County School District #2 (0.59% n=4) and

Fremont County School District #2 (0.44%, n=1) had the highest prevalence of type 2 diabetes. School district data are presented in Table 3.

### **Counties**

When data were combined by county, diabetes prevalence ranged from 0% to 0.64%. The lowest prevalence was seen in Johnson County (0%). The highest prevalence was seen in Washakie County (0.64%, n=6) and Carbon County (0.59% n=4). Several counties reported 0% in type 1 and/or type 2 diabetes. Crook County (0.53%, n=6) had the highest type 1 prevalence, followed by Sublette County (0.49%, n=8). Type 2 diabetes prevalence was highest in Carbon County (0.59%, n=4) and in Sheridan County (0.25%, n=9). County data are presented in Table 4.

**Table 3: Diabetes Prevalence by School District**

School District	Total # Students Included	Prevalence (%)	Type 1 Prevalence (%)	Type 2 Prevalence (%)	% of all Diabetes that was Type 2
Albany County #1	3,522	0.31	0.31	0.00	0
Big Horn County #1	502	0.20	0.20	0	0
Big Horn County #2	648	0.31	0.31	0	0
Big Horn County #3	495	1.21	1.01	0.20	16.7 (n=1)
Big Horn County #4	338	0.30	0.30	0	0
Campbell County #1	6,023	0.22	0.20	0.02	7.7(n=1)
Carbon County #1	NA	NA	NA	NA	NA
Carbon County #2	678	0.59	0	0.59	100.0
Converse County #1	1,729	0.52	0.40	0.12	22.2(n=2)
Converse County #2	679	0.44	0.44	0	0
Crook County #1	1,125	0.53	0.53	0	0
Fremont County #1	1,731	0.35	0.23	0.12	33.3(n=2)
Fremont County #2	225	0.44	0	0.44	100.0(n=1)
Fremont County #6	308	0	0	0	0
Fremont County #14	566	0.35	0.18	0.18	50.0(n=1)
Fremont County #21	NA	NA	NA	NA	NA
Fremont County #24	332	0.30	0.30	0	0
Fremont County #25	1,744	0.63	0.57	0.06	9.1(n=1)
Fremont County #38	325	0.62	0.31	0.31	50.0(n=1)
Goshen County #1	1,818	0.22	0.22	0	0
Hot Springs County #1	NA	NA	NA	NA	NA
Johnson County #1	1,288	0	0	0	0
Laramie County #1	12,767	0.33	0.30	0.02	7.1
Laramie County #2	721	0.28	0.28	0	0

**Table 3 (Page 2 of 2): Diabetes Prevalence by School District**

School District	Total # Students Included	Prevalence (%)	Type 1 Prevalence	Type 2 Prevalence	% of all Diabetes that was Type 2
Lincoln County #1	NA	NA	NA	NA	NA
Lincoln County #2	2,586	0.46	0.46	0	0
Natrona County #1	10,705	0.41	0.39	0.03	6.8
Niobrara County #1	368	0.27	0.27	0	0
Park County #1	377	0.80	0.80	0	0
Park County #6	2,166	0.51	0.37	0.14	27
Park County #16	125	0	0	0	0
Platte County #1	1,114	0.27	0.27	0	0
Platte County #2	224	0.45	0	0.45	100.0 (n=1)
Sheridan County #1	454	0	0	0	0
Sheridan County #2	3,075	0.59	0.29	0.29	50.0
Sheridan County #3	96	0	0	0	0
Sublette County #1	945	0.63	0.63	0	0
Sublette County #9	700	0.29	0.29	0	0
Sweetwater County #1	2,935	0.27	0.27	0	0
Sweetwater County #2	1,116	0.45	0.36	0.09	20.0 (n=1)
Teton County #1	1,607	0.25	0.25	0	0
Uinta County #1	919	0.22	0.22	0	0
Uinta County #4	710	0.28	0.28	0	0
Uinta County #6	415	0.96	0.96	0	0
Washakie County #1	1,301	0.69	0.46	0.23	33.3
Washakie County #2	96	0	0	0	0
Weston County #1	775	0.26	0.26	0	0
Weston County #7	280	0.36	0.36	0	0

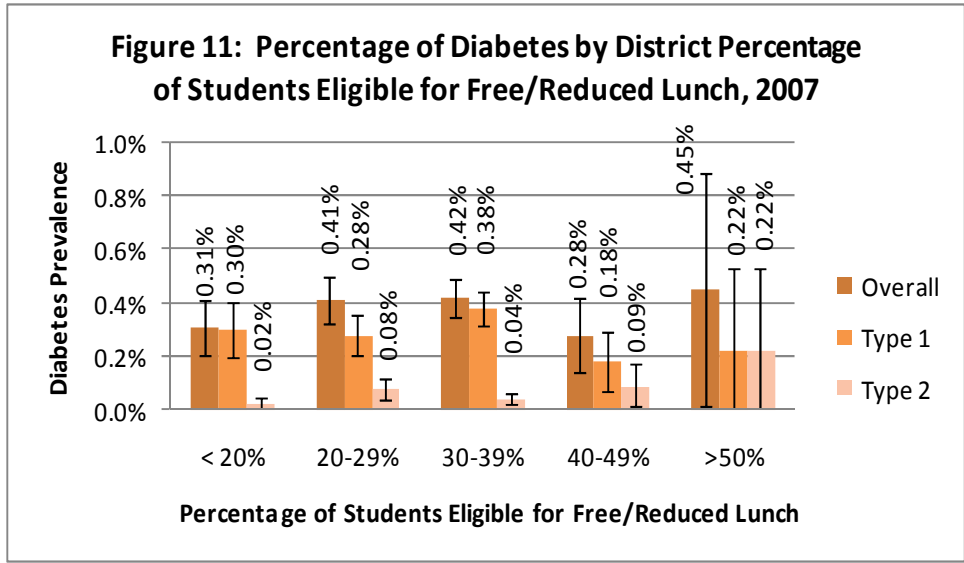
**Table 4: Diabetes Prevalence by County**

School District	Total # Students Included	Prevalence (%)	Type 1 Prevalence	Type 2 Prevalence	% of all Diabetes that was Type 2
Albany County	3,522	0.31	0.31	0	0
Big Horn County	1,983	0.50	0.45	0.05	10.0 (n=1)
Campbell County	6,023	0.22	0.20	0.02	7.7(n=1)
Carbon County	678	0.59	0	0.59	100.0 (n=4)
Converse County	2,408	0.50	0.42	0.08	16.7 (n=2)
Crook County	1,125	0.53	0.53	0	0
Fremont County	5,231	0.44	0.32	0.11	26.1 (n=6)
Goshen County	1,818	0.22	0.22	0	0
Hot Springs County	NA	NA	NA	NA	NA
Johnson County	1,288	0	0	0	0
Laramie County	13,488	0.33	0.30	0.02	6.8 (n=3)
Lincoln County	2,586	0.46	0.46	0	0
Natrona County	10,705	0.41	0.39	0.03	6.8 (n=3)
Niobrara County	368	0.27	0.27	0	0
Park County	2,668	0.52	0.41	0.11	21.4 (n=3)
Platte County	1,338	0.30	0.22	0.07	25 (n=1)
Sheridan County	3,625	0.50	0.25	0.25	50 (n=9)
Sublette County	1,645	0.49	0.49	0	0
Sweetwater County	4,051	0.32	0.30	0.02	7.7 (n=1)
Teton County	1,607	0.25	0.25	0	0
Uinta County	2,044	0.39	0.39	0	0
Washakie County	1,397	0.64	0.43	0.21	33.3 (n=3)
Weston County	1,055	0.28	0.28	0	0

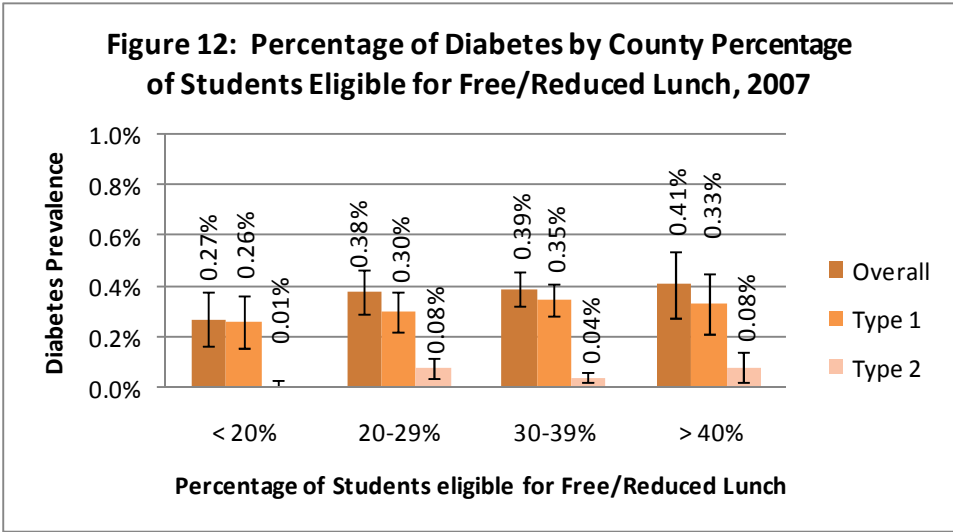
### Low Income

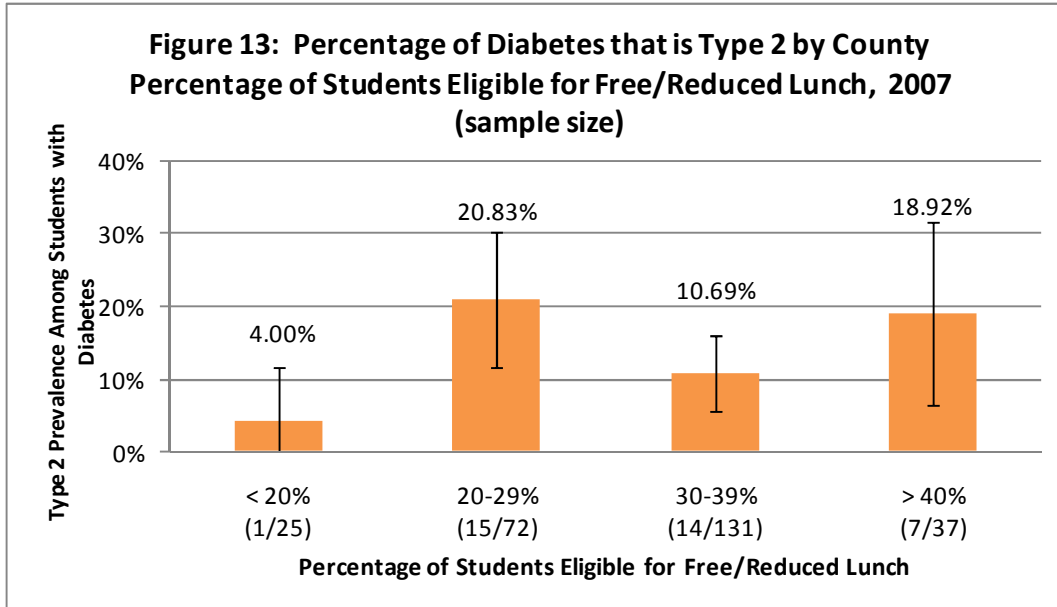
Low income was measured by two methods. The first method analyzed the percentage of students eligible for FRL based on 2006 data from the Wyoming Department of Education.<sup>18</sup> The second method used Small Area Income & Poverty Estimates for 2005 children ages 5 to 17 years living in families in poverty.<sup>19</sup>

School districts were categorized by the percentage of students eligible for FRL in 2006.<sup>18</sup> As shown in Figure 11, the overall diabetes prevalence was highest in districts having the highest FRL eligibility. However, the prevalence was not significantly higher than those districts with 20-29% [RR 1.08, (95% CI: 0.40-2.95)] or 30-39% eligibility [RR 1.08, (95% CI 0.39-3.05)]. Type 1 prevalence in districts with 30-39% of students eligible for FRL was highest (0.38%) whereas type 2 prevalence was highest (0.22%) in districts with >50% of students eligible. There was no distinct pattern in overall, type 1, or type 2 diabetes prevalence among the FRL eligibility groups.

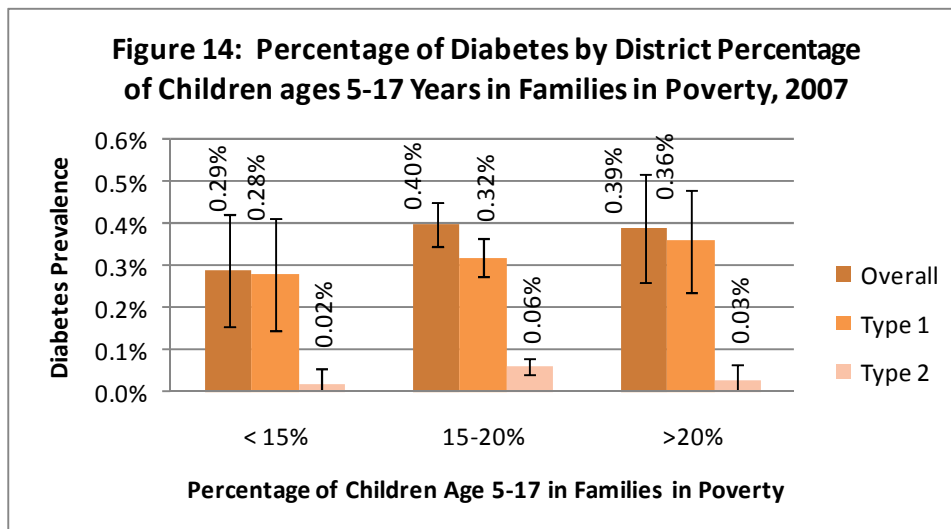


When data were combined by county, overall diabetes prevalence did not differ significantly among the different groups of students eligible for FRL. The percent of type 1 diabetes was similar between combined, junior high, and high schools. Prevalence did not differ significantly in other types of schools when compared to type 1 prevalence in elementary schools. Prevalence of type 2 diabetes was highest (0.08%) among the counties with 20-29% and 50% or more of FRL eligibility (see Figure 12). When the percent of overall diabetes that was type 2 was compared by the percentage of children in a county eligible for FRL, there was no significant difference between the categories. This is shown in Figure 13.



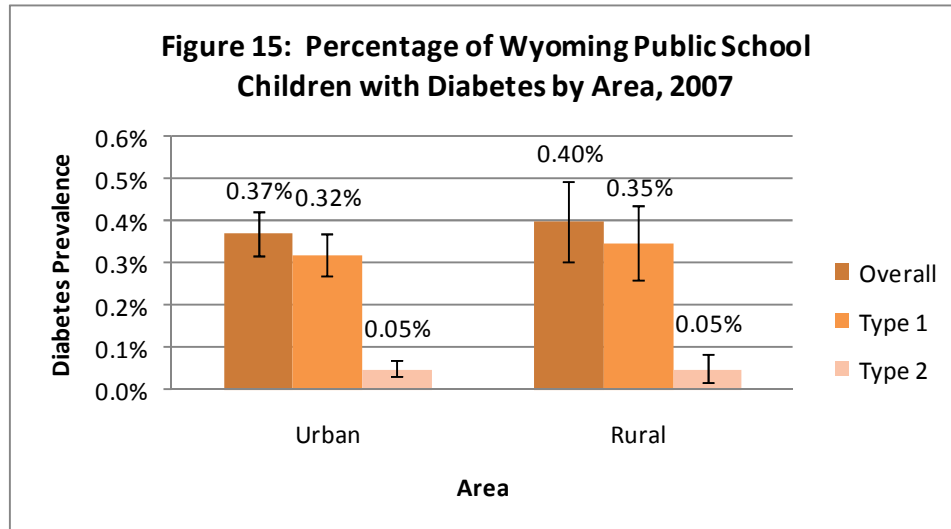


Low income was also measured using Small Area Income & Poverty Estimates for children ages 5 to 17 years living in families in poverty from the U.S. Census Bureau.<sup>19</sup> The prevalence of all types of diabetes was not significantly different between any of the poverty categories and corresponding type of diabetes (Figure 14).

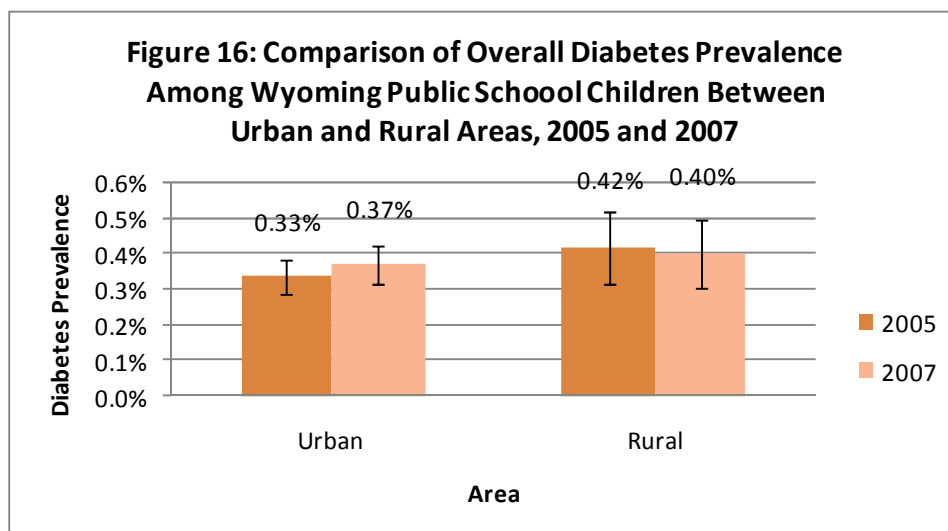


## Urban and Rural Areas

Urban and rural classification was determined using the same methodology described previously and is available in Appendix C.<sup>20</sup> There is no significant difference in diabetes prevalence between urban and rural areas (Figure 15).



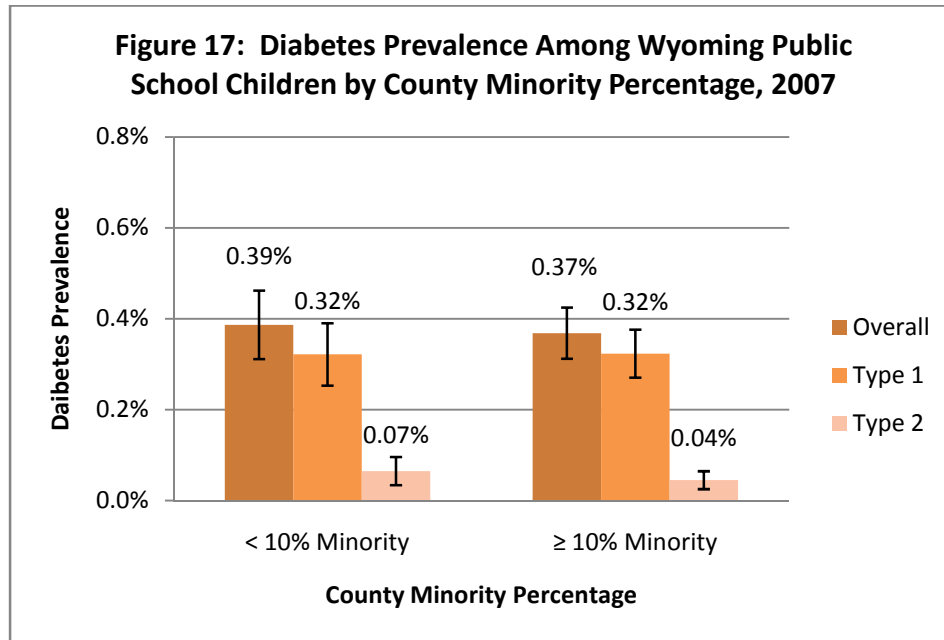
There was an increase in overall diabetes in urban populations and a slight decrease in overall diabetes prevalence in rural populations from the 2005 to the 2007 survey. However, these changes were not significant (Figure 16).





## Minority Populations

Minority populations in Wyoming were defined using the U.S. Census Bureau 2008 State and County Quickfacts data for Wyoming and counties.<sup>21</sup> Counties were divided by those with less than 10% minority population versus those with 10% or more minority population. There was no statistical difference in diabetes prevalence between the two categories (Figure 17).



American Indians make up 2.5% of Wyoming's total population.<sup>21,24</sup> A large portion of Wyoming's American Indian population resides on the Wind River Reservation, located in Fremont County. Unlike asthma, diabetes prevalence in Fremont County was not significantly different for those schools on the Wind River Reservation versus those not located on the reservation [RR: 1.03, (CI: 0.15-2.84)].

## Type of School

Diabetes prevalence was also analyzed by type of school. As shown in Figure 18, overall prevalence for diabetes was significantly greater for junior high [0.49% (CI 0.37%-0.61)] and for high school students [0.53% (CI 0.43%-0.63%)] when compared to diabetes prevalence in elementary students [0.25% (CI 0.25%-0.30%)]. Type 1 diabetes prevalence for both junior high [0.44% (CI 0.32%-0.56%)] and high school students [0.44% (CI 0.34%-0.54%)] was also significantly higher than that for elementary students [0.23% (CI 0.18%-0.28%)]. Combined schools had the highest prevalence of type 2 diabetes at 0.14%. The prevalence of type 2 diabetes was

significantly higher in both high schools [0.09% (CI 0.05%-0.13%)] and combined schools [0.14% (CI 0.04%-0.24%)] than in elementary schools [0.02% (CI 0.01%-0.03%)].

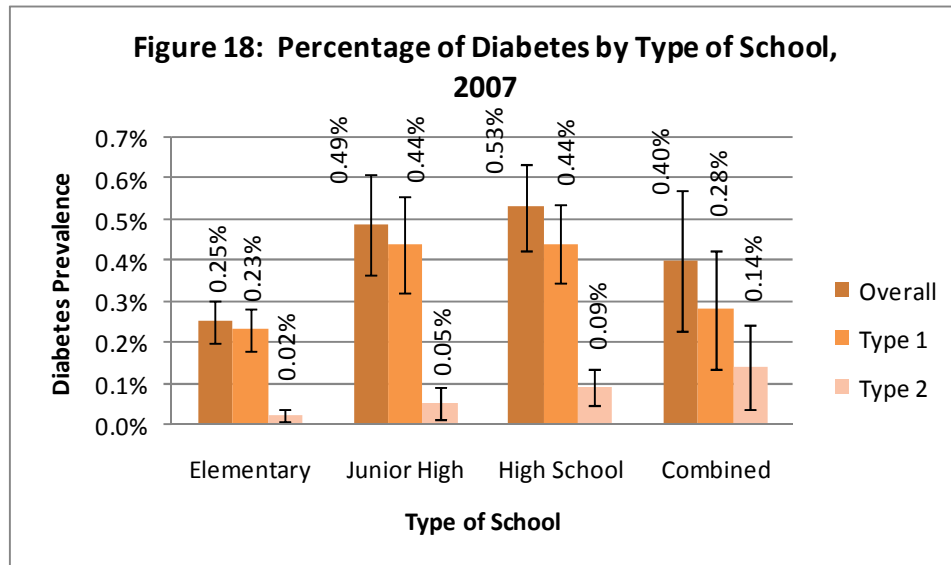
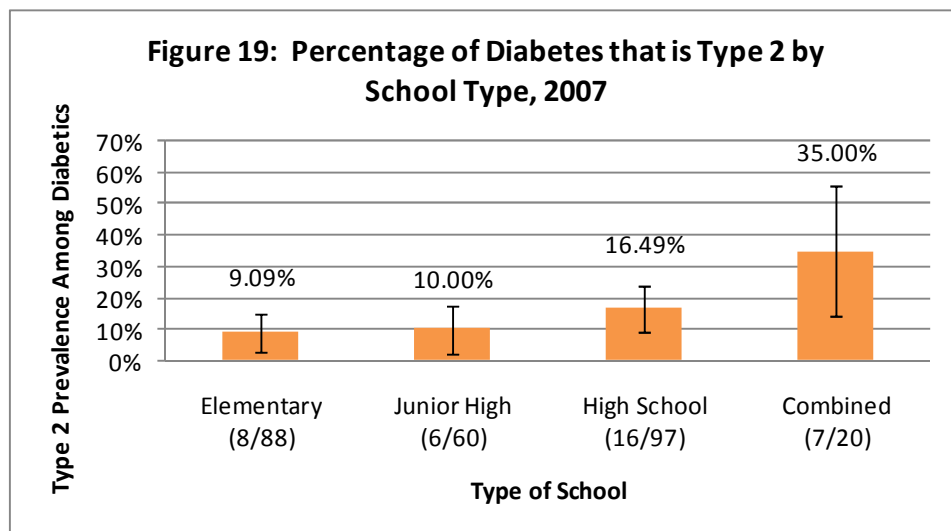


Figure 19 shows the percentage of overall diabetes that was type 2 by type of school. While there appears to be a progressive increase in the percentage of type 2 diabetes from elementary schools to junior high and high schools, there is no significant difference in the percentage between any of the school types.



### Diabetes Medications

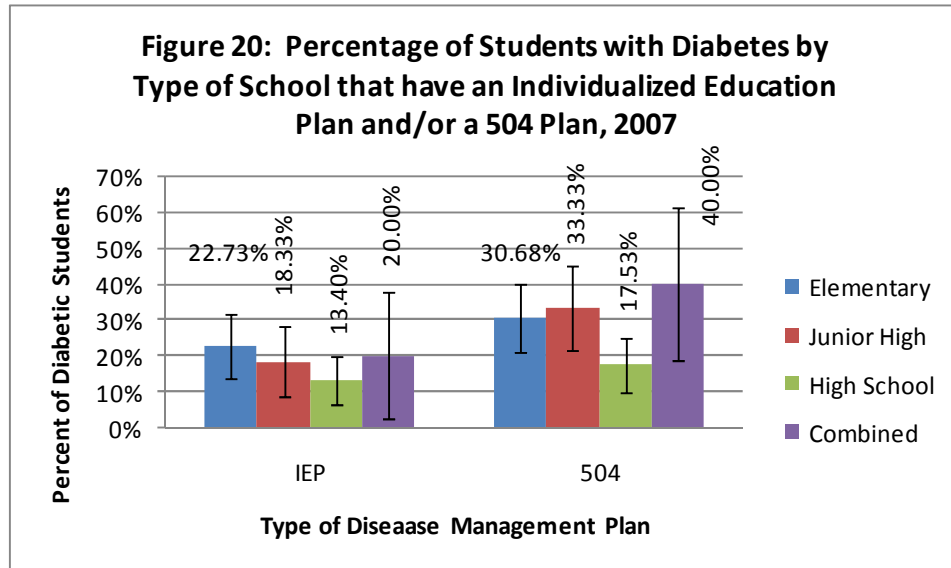
School nurses were asked to report the number of children with type 1 diabetes who had an insulin pump. Of the students that were reported to have type 1 diabetes, 45% had an insulin pump. In rural areas, 55.17% of students with type 1 diabetes had insulin pumps compared to 40.76% in urban areas, but this difference was not significant. Use of insulin

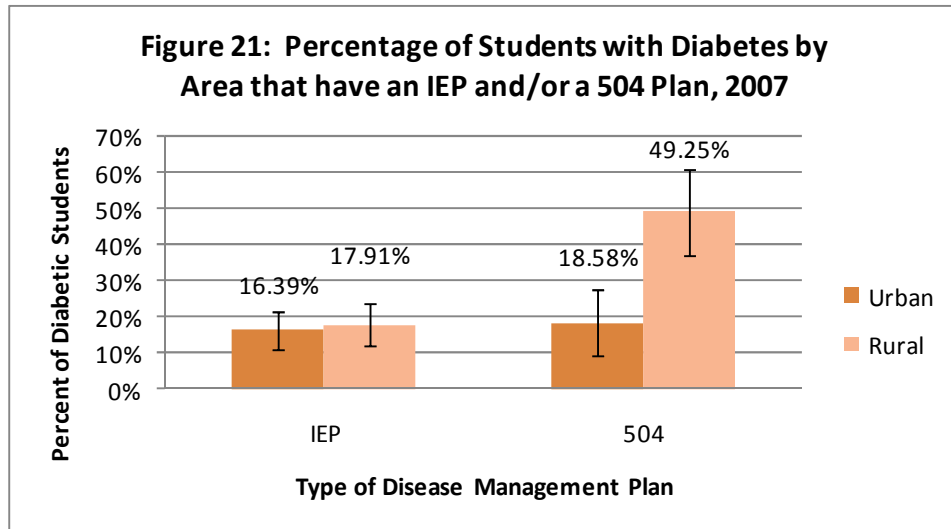
pumps also differed by school type. Excluding combined schools, there was an increased percentage of pump use with increased grade levels. Of children with type 1 diabetes, 29% in elementary schools used an insulin pump compared to 40% in junior high and 57% in high schools. However, these differences were not statistically significant.

### Diabetes Management at School

Diabetes management at Wyoming public schools is planned through agreements with children, parents, school nurses, and school staff. Parents and schools are encouraged to develop 504 plans to define accommodations for students with chronic conditions like diabetes to allow these students to perform at the same level as other students. An IEP may also be developed to address educational issues. Of all the students with a known diabetes diagnosis in Wyoming public schools, 18% had an IEP established, and 27% had a 504 plan.

The distribution of IEP's and 504 plans varied among school type (Figure 20) as well as between urban and rural areas (Figure 21). More students with diabetes had IEPs and 504 plans in elementary, junior high, and combined schools compared to high schools. For all students with diabetes, 504 plans were more prevalent than IEPs. Rural students with diabetes were 2.7 times more likely to have a 504 plan than urban students [RR 2.7, (CI 1.8-3.9)].





### Wyoming Public School Health Policies for Diabetes

In order to learn more about school health policy for diabetes, nurses were asked specific questions about diabetes supplies, training, testing, care, and education within the school. Multiple answers were allowed for many of these questions. Response rates were relatively low. Answers given do not infer an institutional policy. The general findings are:

- ❖ The majority (68%) of schools require parents of students with diabetes to bring diabetic supplies to school. Only a few schools maintain diabetic supplies for students.
- ❖ The majority (70%) of teachers and staff were trained to detect symptoms of high/low blood sugar emergencies. Many of the schools not training teachers and staff had students with diabetes in their school.
- ❖ Most teacher/staff training occurred annually. However, training was also provided on an “as needed” basis.
- ❖ Diabetes training was primarily provided by the school or head school nurse. Parents, diabetes educators and some other medical staff also provided some training.
- ❖ The majority (61%) of schools allowed students to self-administer insulin. The majority of schools that did not allow this were elementary schools. Forty-three schools indicated that allowing self-administration of insulin was a school policy.
- ❖ Most schools (67%) allowed children to test their blood sugar in classrooms/other sites in school. Those that did not were primarily elementary schools.

- ❖ A majority of schools (55%) reported that trained school staff were considered responsible for diabetes care during field trips.
- ❖ Peer diabetes education was addressed in about half of schools.
- ❖ Issues discussed with parents of students with diabetes include medical, school accommodations, learning, psychosocial and financial.
- ❖ A majority (58%) of school nurses were aware of the American Diabetes Association Medical Management Plan.

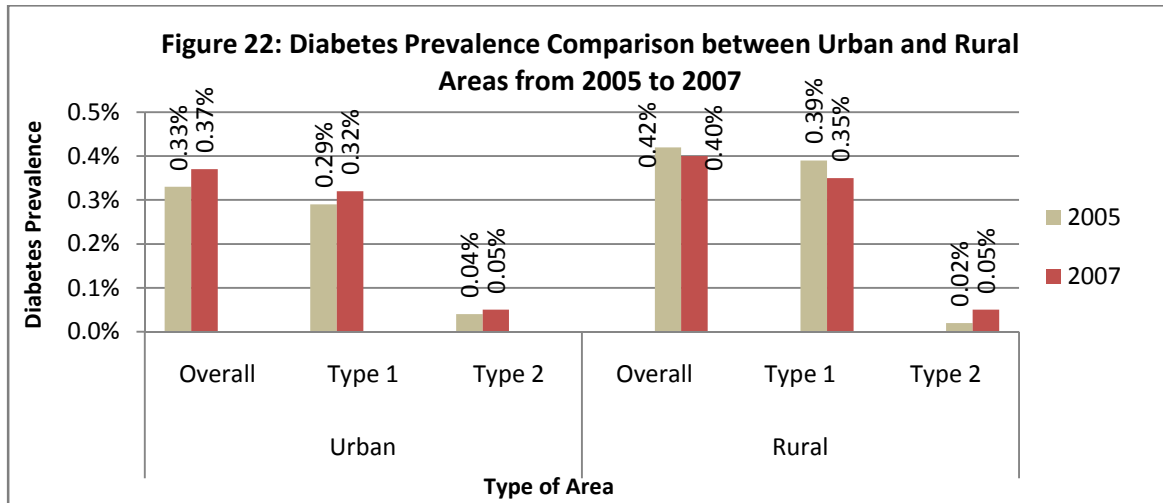
## Diabetes Discussion

This was the second school nurse survey that collected diabetes data from Wyoming public schools. While a trend analysis requires at least three years of data, valuable information can still be gained from two years of information. The data help to generate hypotheses for future analysis and can be used to identify areas in greatest need of assistance.

The national childhood diabetes prevalence estimate from 2007 was 0.20%.<sup>1</sup> Diabetes prevalence values from the 2005 and 2007 School Nurse Surveys for Asthma and Diabetes Prevalence in Wyoming Public School Children were 0.34% and 0.38% respectively.<sup>9</sup> The 2007 estimate is nearly double the national estimate. This is especially concerning considering that diabetes cases are thought to be underreported.<sup>28</sup> Increased awareness of diabetes may play a role in the increase seen in diabetes prevalence among Wyoming public school children over the past few years.

Risk factors for developing diabetes, especially type 1, are not well understood. In this survey socioeconomic status, rurality, type of school, and race/ethnicity were analyzed to find differences in prevalence. Consistency of data collection for the 2005 and 2007 surveys allow for some of these comparisons to be made between these surveys.

There was little difference in diabetes prevalence between the schools when assessing urban versus rural location. These results were different from 2005 estimates which found that both overall and type 1 diabetes prevalence was much higher in rural areas than in urban areas. Figure 22 shows the results from 2005 to 2007. The explanation for the differences in diabetes prevalence by rural and urban location could be due to student relocation, students moving in or out the school system, or participation of different schools between the two surveys.



Race/ethnicity is a factor in diabetes. The 2008 report on national diabetes prevalence states that the rate of diabetes diagnosis in the U.S. is highest among Native Americans and Alaska Natives (16.5%) and lowest among whites (6.6%).<sup>1</sup> However, disparities in diabetes prevalence between counties with <10% minority population versus  $\geq$ 10% minority population were not seen in the results of this survey. No significant difference was found in the 2005 or 2007 surveys.

While parents and schools are encouraged to develop 504 plans for students with diabetes, more rural students had 504 plans than urban students. Although 504 plans are highly recommended, some schools offer alternative plans that may be referred to by a different name. It is unknown if these plans were counted or excluded as a 504 plan in survey responses.

Many schools with no students with diabetes during the 2007-2008 school year did not complete the portion of the survey addressing school health policies for diabetes. It is unknown whether these schools have a strategy to address these questions should a student with diabetes attend their school.

While this survey could not address all factors which may be associated with diabetes, it provides surveillance data and allows diabetes prevalence in children to be followed over time. This information will be important in future prevention efforts.

## Diabetes Recommendations



Based on data from the 2007 School Nurse Survey, the following recommendations are made. If implemented, these actions would strengthen efforts for pediatric diabetes in Wyoming and lead to improved health outcomes for children with diabetes.

- ❖ Develop protocols and minimum standards for the care of students with diabetes in Wyoming school districts.
- ❖ Develop a plan to ensure consistent diabetes education and training across the state for school personnel through the Wyoming Department of Education in conjunction with the State of Wyoming.
- ❖ Develop standardized forms for 504 plans and diabetes medical management plans through the Wyoming Department of Education.
- ❖ Continue diabetes surveillance in children using the school nurse survey and the BRFSS child module through the Wyoming Department of Health.
- ❖ Educate parents of students with diabetes in Wyoming schools about the importance of having a 504 and medical management plan and/or an IEP in place for students with diabetes.

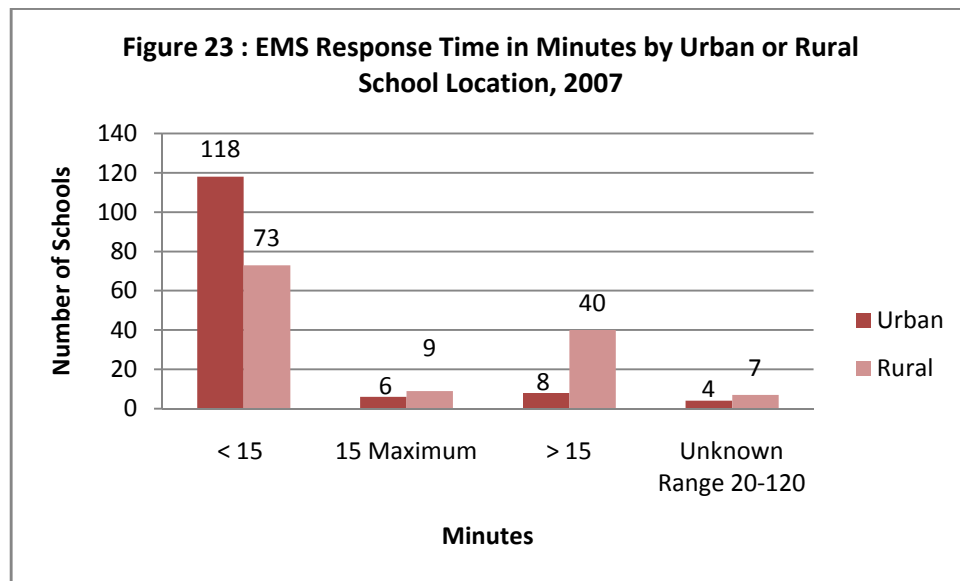
# Access to Care at School

## School Nurse Availability

Nurses were asked how many schools they serve, if their school building had a nurse at least some of the time, and if so, how often during the week. Survey responses indicate that nurses serve an average of 2.3 schools each, with the range from 1 to 9. The number of schools served, however, was not indicative of the number of students one nurse might manage. The average number of students per nurse was 571, with a range of 43 to 1520. Ten nurses/schools were omitted from this calculation due to missing or inconsistent information. Fifteen surveys (5.4%) specified there was no school nurse available at their school building. Six surveys (2%) omitted this information. Of schools that reported having a school nurse, school nurses were present at least some portion of the day from ¼ day to 5 days per week.

## Emergency Medical Service

Nurses were asked the Emergency Medical Service (EMS) response time for each school. EMS response times were recorded from the surveys as the longest possible time for the EMS arrival if a time range was given. Schools were divided into either urban or rural areas and then into time categories of less than 15 minutes, 15 minutes maximum, more than 15 minutes, and unknown.



As shown in Figure 23, urban schools have shorter EMS response times than rural schools. While 87% of urban schools could receive EMS treatment in less than 15 minutes, only 57% of rural schools could receive EMS treatment in <15 minutes.

It should be noted that the survey question asked specifically about EMS arrival time. Other emergency service or first responders may exist especially for those schools that indicated a



long EMS response time. That information was not requested on the survey nor was there an option to indicate alternative emergency care.

## **Limitations**

There are several limitations associated with data from this survey. Not all schools in these counties responded to this survey, and school nurses may be differentially aware of diabetes prevalence within their schools. This may lead to asthma or diabetes being underreported.

As children get older, they are more likely to have been diagnosed with asthma or diabetes, but may be less likely to report their condition to the school nurse as they develop self-management skills. This may affect the school nurses' ability to accurately report the prevalence of asthma or diabetes in a school.

Several factors that appear to be associated with asthma and diabetes, including children in poverty, FRL eligibility, rurality and minority populations, are collected independently of this survey. Any apparent associations with these factors are only hypotheses and must be investigated further to determine true correlations.

## References

1. Centers for Disease Control and Prevention. Press Release: *Number of People with Diabetes Increases to 24 Million*. June 2008.  
<http://www.cdc.gov/media/pressrel/2008/r080624.htm>
2. American Lung Association. Epidemiology and Statistics Unit. Research and Program Services. Trends in Asthma Morbidity and Mortality. 2007.
3. U.S. Census Bureau: State and County Quickfacts. (based on 2000 Census) 17-Nov 2009. <http://quickfacts.census.gov/qfd/states/56000.html>.
4. U.S. Census Bureau. State and County Data. Wyoming 2007. <http://www.census.gov/>
5. National Center for Health Statistics. Health, United States, 2005 With Chartbook on Trends in the Health of Americans. Hyattsville, Maryland: 2005.
6. Agency for Healthcare Research and Quality, Estimate of Indirect, Direct and Total Cost Burden of Asthma by State, for 50 States, District of Colombia, and Puerto Rico, 2004. [http://www.ahrq.gov/qual/asthmacare/asthmat1\\_3.htm](http://www.ahrq.gov/qual/asthmacare/asthmat1_3.htm)
7. Wyoming Department of Health. Diabetes Prevention and Control Program. Defining the Burden of Diabetes in Wyoming.
8. Wyoming Department of Health. The School Nurse Survey of Asthma Prevalence in Wyoming Public School Children. 2004.
9. Wyoming Department of Health. The School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children. 2005.
10. Schwab, Nadine, Cullen, Mark and Schwartz, Joseph. A Survey of the Prevalence of Asthma Among School Age Children in Connecticut. Environment & Human Health, Inc: 2000.
11. U.S. Department of Health and Human Services. Healthy People 2010: Understanding and Improving Health. 2nd ed. Washington, DC: U.S. Government Printing Office, November 2000.
12. Centers for Disease Control and Prevention. National Center for Health Statistics. <http://www.cdc.gov/nchs/fastats/asthma.htm>
13. Centers for Disease Control and Prevention. National Center for Health Statistics. National Health Interview Survey, 1982-2006. Analysis by the American Lung Association, Research and Program Services Division using SPSS and SUDAAN
14. American Lung Association of Texas. Asthma: An Impact Assessment. 2002.
15. Center for Disease Control and Prevention. National Center for Environmental Health, Asthma, About the Program: Asthma's Impact on Children and Adolescents. <http://www.cdc.gov/asthma/children.htm>
16. National Survey of Children's Health, 2007. <http://www.nschdata.org/DataQuery/DataQueryResults.aspx>
17. Wyoming Department of Health. Wyoming 2008 Behavioral Risk Factor Surveillance System. <http://wdh.state.wy.us/brfss/brfssdata.aspx>

18. Wyoming Department of Education. Statistical Report Series. 2006 Summary by District Total with Free/Reduced Lunch Eligibility Counts.  
[http://www.k12.wy.us/statistics/stat2/2006\\_enrollment\\_with\\_free\\_reduced.pdf](http://www.k12.wy.us/statistics/stat2/2006_enrollment_with_free_reduced.pdf)
19. US Census Bureau. Small Area and Income Estimates for State Estimates for 2005.  
<http://www.census.gov/hhes/www/saipe/saipe.html>
20. U.S. Census Bureau. Census 2000 Urban and Rural Classification.  
[http://www.census.gov/geo/www/ua/ua\\_2k.html](http://www.census.gov/geo/www/ua/ua_2k.html)
21. U.S. Census Bureau: State and County QuickFacts. Data derived from Population Estimates, Census of Population and Housing, Small Area Income and Poverty Estimates, State and County Housing Unit Estimates.
22. Apter A, Reisine S, Affleck G, Barrows E, ZuWallack R. The influence of demographic and socioeconomic factors on health related quality of life in asthma. 1999. *Journal of allergy and clinical immunology*, 103:72-78.
23. Naleway A. 2004. Asthma and Atopy in Rural Children: Is farming protective? *Clinical Medicine and Research* 2 5-12.
24. U.S. Census Bureau. 2006 QuickFacts. Fremont County. Wyoming State.  
<http://quickfacts.census.gov/qfd/states/56/56013.html>
25. Gilliland FD, Berhane K, Islam T, McConnell R, Gauderman WJ, Gilliland SS, Avol E, Peters JM. 2003. Obesity and the Risk of Newly Diagnosed Asthma in School-age Children. *American Journal of Epidemiology* 158 (5): 406-415.
26. Figueroa-Munoz JI, Chinn S, Rona RJ. 2001. Association Between Obesity and Asthma in 4-11 Year Old Children in the UK. *Thorax* 56: 133-37.
27. Centers for Disease Control and Prevention. Diabetes Public Health Resources National Diabetes Fact Sheet 2007.  
[http://www.cdc.gov/diabetes/pubs/pdf/ndfs\\_2007.pdf](http://www.cdc.gov/diabetes/pubs/pdf/ndfs_2007.pdf)
28. National Diabetes Information Clearinghouse. National Diabetes Statistics 2007. Prevalence of Diagnosed and Undiagnosed Diabetes in the United States, All Ages, 2007. Prevalence of Diagnosed Diabetes in People Younger than 20 Years of Age, United States, 2007.  
<http://diabetes.niddk.nih.gov/dm/pubs/statistics/index.htm#allages>

## Appendix A: School Nurse Survey Letter



# Wyoming Department of Health

Dave Freudenthal, Governor

Brent D. Sherard, M.D., M.P.H.  
Director and State Health Officer

October 15, 2007

Dear Wyoming School Nurse:

The Community and Rural Health Epidemiology Section of the Wyoming Department of Health is again conducting the School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children with the assistance of the Diabetes Advisory Council of the Wyoming Diabetes Prevention and Control Program. This survey follows the methodology used in previous school nurse surveys of asthma and, later, diabetes prevalence conducted in 2003 and 2005.

Currently there is no continuous, comprehensive asthma or diabetes surveillance in our state. In 2002, 2004 and 2006, questions on asthma in children were added to the Wyoming Behavioral Risk Factor Surveillance System (BRFSS). The 2004 BRFSS results indicated 7.2% of Wyoming children had current asthma. The results of the 2005 school nurse survey were identical with 7.18% of Wyoming public school children reported to have current asthma. Questions on diabetes in children were added to the 2006 BRFSS. The complete 2005 School Nurse Survey of Asthma and Diabetes Prevalence in Wyoming Public School Children report can be accessed at <http://asthma.wyoming.gov>.

We are asking school nurses to participate in this new survey because they understand the significance of pediatric asthma and diabetes and can provide data for most children ages 5 to 19 in the state. The survey can usually be completed in 15-20 minutes with data that is generally readily available. The survey questions will help determine the prevalence of asthma and diabetes in Wyoming school children and provide information on school policies and practices associated with these chronic diseases. No record reviews are required, and no personal identifying information should be included.

We are asking nurses to complete a separate survey for each school they serve. You can complete the survey online at <http://asthma.wyoming.gov> by clicking on the School Nurse Survey link **or** you can return the survey in the enclosed, postage-paid envelope. If you are completing the survey electronically, please note that nurses who need to report on more than one school may enter multiple surveys from the same computer. However, you must complete each survey in the same session in which you start. Once you have closed the survey, you may not come back to it. Please submit a survey for each school only once. We are asking everyone to complete the survey by November 16, 2007. If you have any questions, please call me at (307) 777-8787 or send an e-mail to [acrots@state.wy.us](mailto:acrots@state.wy.us).

To ensure the accuracy of the data, we hope to receive completed surveys from every Wyoming school. The information gathered will be used to better quantify the scope of pediatric asthma and diabetes in Wyoming and to direct future intervention strategies. The final report will be shared with school nurses, school administrators, public health officials, researchers, health care providers, state officials, parents and other interested parties.

Thank you for your assistance in this important public health endeavor. Best wishes for a healthy and productive school year.

Sincerely,

A handwritten signature in cursive script that reads "Angela R. Crotzenberg".

Angela Crotzenberg, MS  
Epidemiology Section Chief  
Community and Rural Health Division

# Appendix B: School Nurse Survey

## SURVEY OF ASTHMA AND DIABETES PREVALENCE IN WYOMING PUBLIC SCHOOL CHILDREN Individual School Survey – Fall 2007

Date Completed \_\_\_\_\_ School District \_\_\_\_\_

Name of School \_\_\_\_\_ Total # of students on the date completed\* \_\_\_\_\_

**Please circle or shade each grade present in your school:**

Grades Present	K	1	2	3	4	5	6	7	8	9	10	11	12
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Information about the **school nurse** completing this survey:

Name: \_\_\_\_\_ Phone \_\_\_\_\_

Including this school, total # of schools you serve \_\_\_\_\_ E-mail \_\_\_\_\_

What is your degree? LPN RN BSN MSN Other Please describe: \_\_\_\_\_

***We prefer that the school nurse complete this survey. If someone other than the school nurse is completing this form, please indicate your name and title below:***

Name: \_\_\_\_\_ Title \_\_\_\_\_ Phone \_\_\_\_\_

**\*For all answers to this survey only include children in Kindergarten through 12<sup>th</sup> grade. Do not include preschoolers in count.**

1. Total # students diagnosed with Asthma or Reactive Airway Disease (RAD).	1. _____
2. Of the students in #1, total # with a prescription for bronchodilator inhalers (non-nebulizer).	2. _____
3. Of the students in #2, total # that keep their bronchodilator inhalers (non-nebulizer) in the office and/or with the school nurse.	3. _____
4. Of the students in #2, total # that have a signed form allowing them to keep their bronchodilator inhalers with them while in school.	4. _____
5. Of the students in #1, total # that have an Individualized Education Plan (IEP).	5. _____
6. Of the students in #1, total # that have a 504 plan.	6. _____
7. Total # students diagnosed with Diabetes.	7. _____
8. Of the students in #7, total # with Type I diabetes.	8. _____
9. Of the students in #7, total # with Type II diabetes.	9. _____
10. Of the students in #7, total # with insulin pumps.	10. _____
11. Of the students in #7, total # that have an Individualized Education Plan (IEP).	11. _____
12. Of the students in #7, total # that have a 504 plan.	12. _____

13. Does your school building have a school nurse at least some of the time? If yes, how many days per week?	13. <input type="checkbox"/> a. Yes _____ Days per week <input type="checkbox"/> b. No
14. If a health emergency occurred, approximately how long would it take emergency medical services (EMS) to respond to your school?	14. _____ minutes <input type="checkbox"/> No EMS available
15. Are parents of students with diabetes responsible for bringing their diabetic supplies to school?	15. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No <input type="checkbox"/> c. Both parents and the school provide supplies.
16. Are teachers and staff in your school trained to detect the symptoms of high and low blood sugar emergencies?	16. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No
16a. If you answered yes to #16, how often does training occur?	16a. <input type="checkbox"/> a. Monthly <input type="checkbox"/> b. Yearly <input type="checkbox"/> c. Every other year <input type="checkbox"/> d. Only new staff are trained <input type="checkbox"/> e. Other Please Describe: _____
17. Who provides diabetes training to teachers and staff in your school?	17. <input type="checkbox"/> a. School Nurse <input type="checkbox"/> b. Diabetes Educator <input type="checkbox"/> c. Other medical provider <input type="checkbox"/> d. Parents <input type="checkbox"/> e. Other: Please describe _____
18. Do you allow children with diabetes to self-administer insulin? If yes, please indicate if this is a formal school policy.	18. <input type="checkbox"/> a. Yes <input type="checkbox"/> This is a formal school policy <input type="checkbox"/> b. No
19. Are children with diabetes allowed to test their blood sugar in classrooms/other sites in school?	19. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No
20. Who is responsible for diabetes care during field trips?	20. <input type="checkbox"/> a. School Nurse <input type="checkbox"/> b. Trained school staff <input type="checkbox"/> c. The child's parent <input type="checkbox"/> d. Other: Please describe _____
21. Do you address the psycho-social aspects of diabetes such as peer education in your school?	21. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No
22. What types of issues are discussed with parents of students with diabetes? (Please check all that apply)	22. <input type="checkbox"/> a. Medical <input type="checkbox"/> b. Psycho-social <input type="checkbox"/> c. Learning <input type="checkbox"/> d. Accommodations in school <input type="checkbox"/> e. Other: Please describe _____
23. Are you aware of the October 2006 Wyoming Board of Nursing's ruling on teaching the administration of glucagon to non-licensed personnel?	23. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No
24. Are you aware of the American Diabetes Association (ADA) Medical Management Plan?	24. <input type="checkbox"/> a. Yes <input type="checkbox"/> b. No

Thank you for your assistance in conducting this important survey. This information will be used to improve the lives of Wyoming children with asthma and diabetes. Please return this survey by **December 7, 2007** to the Epidemiology Section Chief, Community and Rural Health Division, Wyoming Department of Health, 6101 N Yellowstone Ave, Ste 420, Cheyenne, WY 82002.

## Appendix C: Designated Urban Areas/Clusters in Wyoming

### Urban Areas

Casper  
Cheyenne

### Urban Clusters

Buffalo  
Cody  
Douglas  
Evanston  
Gillette  
Green River  
Jackson  
Kemmerer  
Lander  
Laramie  
Newcastle  
Powell  
Rawlins  
Riverton  
Rock Springs  
Sheridan  
Thermopolis  
Torrington  
Wheatland  
Worland

Designated by the U.S. Census Bureau for the 2000 Census