

# Chronicles

Volume 4, Issue 2

June 2012

## Prevalence of Overweight and Obesity among Students in the Anchorage School District, 1998-1999 through 2010-2011

Contributed by Clint Farr, MS, Andrea Fenaughty, PhD, Charles Utermohle, PhD, and Karol Fink, MS, RD.

### Abstract

The Anchorage School District (ASD) and the Alaska Division of Public Health (DPH) have determined the prevalence of overweight and obesity among students in the Anchorage School District. This report summarizes the prevalence of overweight and obesity among pre-kindergarten (pre-K) through 12th grade ASD students during the 2010-2011 school year, and updates trend analyses of overweight and obesity among pre-K through 12th grade ASD students since the 1998-1999 school year. Trained school staff collected height and weight measurements from students in pre-K to 12th grade each year. Data collected between the 1998-1999 and 2010-2011 school years were validated. A total of 263,370 records were analyzed for the entire 13-year period. Student body mass indexes (BMIs) were calculated from height and weight values from each record and then categorized according to the National Center for Health Statistics weight status categories. In 2010-2011, 2% of students were underweight, 62% were at a healthy weight and 36% were overweight or obese. The prevalence of overweight and obesity (combined) increased between the 1998-1999 and 2002-2003 school years; since 2002-2003, this prevalence declined slightly but statistically significantly. As found previously, a high percentage of kindergarten and 1st grade students arrive at school already

overweight or obese. Prevention efforts therefore must be implemented, not only within schools, but throughout communities in a manner that will address obesity among these youngest Alaskans.

*Suggested Citation:* Alaska Section of Chronic Disease Prevention and Health Promotion. Prevalence of Overweight and Obesity among Students in the Anchorage School District, 1998-1999 through 2010-2011. Chronicles Volume 4, Issue 2, June 2012. Contributed by Clint Farr, MS, Andrea Fenaughty, PhD, Charles Utermohle, PhD, and Karol Fink, MS, RD.

### Introduction

The United States is experiencing an obesity epidemic. From 1980 to 2010, obesity prevalence among US adults increased from 13.4% to 35.7%.<sup>1</sup> In Alaska, the percentage of adults who are overweight or obese has increased steadily from 49% in 1991 to 67% in 2010 (Figure 1). The majority of this increase is attributable to the



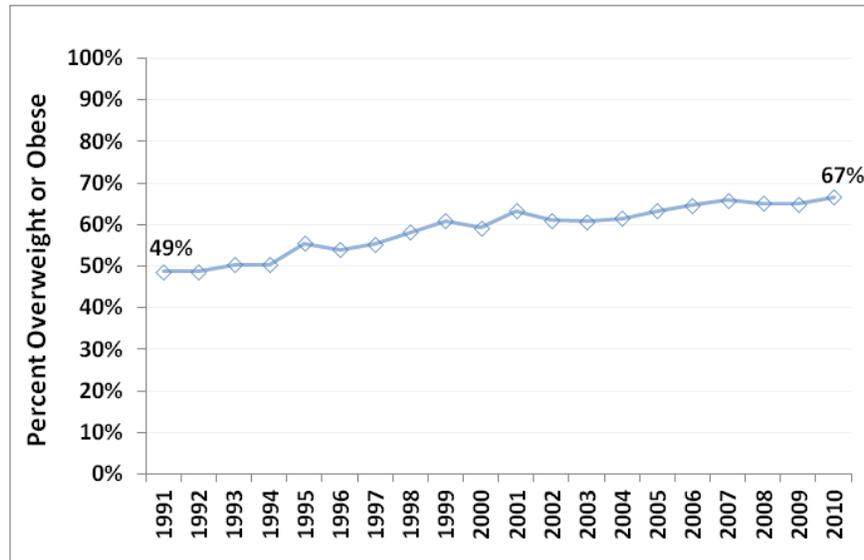
State of Alaska, Sean Parnell, Governor

Department of Health and Social Services,  
William J. Streur, Commissioner

Division of Public Health,  
Ward Hurlburt, MPH, MD,  
Chief Medical Officer and Director

Andrea Fenaughty, PhD,  
Chronicles Coordinator

Figure 1. Trend in Prevalence of Overweight/Obesity (BMI  $\geq$  25.0), Alaska Adults, 1991-2010



Source: AK BRFSS

adult obesity rate, which has doubled from 13% in 1991 to 27% in 2010.<sup>2</sup>

The increasing obesity rate in Alaska is increasing medical costs as well. Researchers estimate \$459 million a year is spent in Alaska just on the direct medical expenditures related to health complications of obesity.<sup>3</sup> Indirect costs such as lost productivity and absenteeism due to obesity only increase this figure.

The prevalence of overweight and obesity among children tripled in the US since 1980. Today 16.9% of US children and adolescents aged 2-19 years are obese (defined as children at or above the 95th percentile on CDC BMI-for-age growth chart).<sup>1</sup> Some national data suggest the rate of increase in children's obesity may be slowing. A national survey of children aged 2 to 4 enrolled in federal nutrition programs from 1998 to 2008 found children's BMI increased steadily from 12.4% in 1998 to 14.5% in 2003, but subsequently remained stable through 2008.<sup>4</sup> A recent study from New York City shows not just a plateau but a significant decrease in the prevalence of obesity among kindergarten through 8th grade students between 2006-07 and 2010-11.<sup>5</sup>

Overweight and obesity in children and adolescents increases risks for health and medical conditions including Type 2 diabetes, fatty liver disease, joint problems, asthma, and sleep apnea.<sup>6</sup> Compared to those in other weight categories, obese children have a higher prevalence of cardiovascular disease (CVD) risk factors, including high blood pressure and high cholesterol. In one study, 70% of obese children had at least 1 CVD risk factor, and 39% had 2 or more of these risk factors.<sup>7</sup> Childhood obesity is also associated with greater risk for psychological problems, social stigmatization, discrimination, and poor academic performance.<sup>8</sup> For example, obese youth are less likely to earn A's and B's in high school relative to healthy weight youth.<sup>9,10</sup>

Overweight and obese children and adolescents have an increased risk of being overweight or obese as adults. In one study, about 80% of children who were overweight at 10-15 years old were obese adults at age 25.<sup>11</sup> Overweight and obese adults, in turn, have a higher risk of premature death than healthy weight adults. Overweight and obese adults have an increased risk of coronary heart disease, Type 2 diabetes,

musculoskeletal disorders, sleep apnea, asthma, psychological disorders, and cancer of the endometrium, colon, kidney, gallbladder, and breast (postmenopausal).<sup>8</sup> Nationally, mortality from heart disease and many other chronic diseases has been decreasing since the 1980s;<sup>12</sup> however, the increase in obesity may put this progress at risk. Despite decreases in rates of incidence and mortality from many types of cancer since the 1990s, incidence has increased for several cancers that are associated with excess weight, including cancer of the pancreas and kidney, and adenocarcinoma of the esophagus.<sup>13</sup> Health scientists project that, due to obesity, today's children may be the first generation to have a shorter life expectancy than their parents.<sup>14</sup>

### Overweight and Obese Children in Alaska

Obesity prevalence information for specific subpopulations of young Alaskans is available from statewide programs and agencies that routinely measure and record height and weight data. These data sources include the Alaska Women, Infants and Children (WIC) Program, the Childhood Understanding Behaviors Survey (CUBS), the Alaska Oral Health Basic Screening Survey on kindergarteners, the Alaska Youth Risk Behavior Survey (YRBS), and school-based measurements conducted and recorded as part of students' health records. (For descriptions on these data sources go to this link: [http://www.hss.state.ak.us/dph/chronic/obesity/pubs/Obesity\\_DataSources.pdf](http://www.hss.state.ak.us/dph/chronic/obesity/pubs/Obesity_DataSources.pdf).)

Data from these sources consistently show alarming levels of childhood overweight and obesity in Alaska. The 2010 records from the Alaska WIC Program indicate that 20% of 2 to 4 year-old WIC participants are overweight, and an additional 21% are obese.<sup>15</sup> The most recent Alaska CUBS Program data (2010 and 2011) show that 17% of Alaskan 3 year-olds are overweight, and an additional 24% are obese.<sup>15</sup> Similarly, data from the most recent (2010-2011) Alaska Oral Health Screening Survey of Kindergarteners indicate that 19% of kindergartners are

overweight, and an additional 16% are obese.<sup>16</sup> The 2011 Alaska YRBS showed that 28% of high school males and 24% of females were above a healthy weight.<sup>17</sup> As the YRBS is based upon students' self-reported measures of height and weight, these data may underestimate prevalence of overweight and obesity.<sup>18</sup>

### School-Based Weight Status Measurement

Directly measured student height and weight data eliminates the problem of self reporting bias due to individuals underestimating their weight and overestimating their height. School-based measurement of student weight status is widely accepted for surveillance as it provides an objective way to identify prevalence, monitor trends, and evaluate outcomes of interventions.<sup>19</sup>

Nationwide, 15 states require school districts to measure or assess students' height and weight.<sup>20</sup> The State of Alaska does not require any of Alaska's 54 school districts to collect height and weight data nor to report on student weight status. However, student height and weight are measured and recorded as part of routine health screenings in many school districts that employ school nurses.<sup>21</sup>

To date, the Alaska Division of Public Health (DPH) has partnered with 3 Alaska school districts to collect, analyze, and report data from routinely collected student height and weight screenings. The first such partnership was in 2004 when the Anchorage School District first looked at the prevalence of overweight and obesity within its student body.<sup>22</sup> Among students whose BMIs were analyzed from the 1998-1999 to 2002-2003 school years, 62% were at a healthy weight, 18% were overweight, and another 18% were obese.<sup>22</sup> A follow-up report to ASD summarized data through the 2007-2008 school year.<sup>23</sup> Again, 62% of the children were at a healthy weight, 18% were overweight, and 18% were obese.<sup>23</sup> DPH has also worked with the Matanuska-Susitna Borough School District (MSBSD) on a similar project.<sup>24</sup> For the 2009-2010 school year, 71% of assessed MSBSD students were at a healthy weight, 14%

were overweight, and 12% were obese.<sup>24</sup> DPH also assisted with a pilot study in the Homer geographic region of the Kenai Peninsula Borough School District (KPBSD) to provide that district similar information; a borough-wide analysis will be implemented next year.<sup>25</sup>

This current report summarizes the extent of overweight and obesity among students in pre-kindergarten (pre-K) through 12th grade in the ASD during the 2010-2011 school year, and provides an update on the trend in overweight and obesity prevalence among pre-K through 12th grade students in the ASD since 1998-1999.

## Methods

### Sample

Sample data were collected from schools in the Anchorage School District (ASD) from the 1998-1999 to the 2010-2011 academic school years. ASD school nurses or designated staff routinely collect several health indicators during health screenings conducted primarily in kindergarten, 1st, 3rd, 5th, and 7th grades. Each data point included the date and the age of the student at the time of measurement. Age was measured

in days and expressed as a decimal. Height and weight measurements are entered into an electronic database. Student height and weight measurements were extracted from this database. All personal identifiers were removed and student data were assigned unique identification numbers. Height was measured to an eighth of an inch and weight to an integer.

Height and weight values were screened for accuracy and values that were not biologically plausible were removed. Only 1 measurement per student per school year was included in the dataset. Of the 284,028 assessments from 1998-1999 to 2010-2011 reported, a final sample of 263,370 biologically plausible measurements was available for analysis. For the study period, the height and weight values represented 41% of total student enrollment of children from pre-K to 12th grade in the Anchorage School District. Percentages are much higher within kindergarten, 1st, 3rd, 5th, and 7th grades where health screenings regularly occur. Height and weight measurements in the other grades were taken as convenience samples. Table 1 shows percentage of total student enrollment included in the sample by year and grade.

**Table 1: BMI Study Sample as a Percentage of Official Student Enrollment, by Grade and Year, Anchorage School District, 2001-2002 to 2010-2011**

Grade	1998-1999	1999-2000	2000-2001	2001-2002	2002-2003	2003-2004	2004-2005	2005-2006	2006-2007	2007-2008	2008-2009	2009-2010	2010-2011
<b>Pre-K</b>	5%	61%	61%	81%	80%	73%	77%	75%	77%	81%	65%	76%	62%
<b>K</b>	14%	88%	91%	97%	95%	91%	87%	90%	93%	96%	91%	88%	92%
<b>1<sup>st</sup></b>	53%	69%	67%	69%	64%	63%	84%	77%	78%	86%	79%	68%	67%
<b>2<sup>nd</sup></b>	3%	21%	15%	18%	19%	16%	64%	27%	22%	21%	22%	17%	15%
<b>3<sup>rd</sup></b>	66%	85%	88%	91%	93%	93%	87%	88%	92%	95%	94%	89%	90%
<b>4<sup>th</sup></b>	4%	18%	15%	16%	15%	14%	63%	24%	21%	19%	20%	14%	13%
<b>5<sup>th</sup></b>	20%	81%	85%	86%	91%	89%	86%	88%	91%	90%	87%	85%	89%
<b>6<sup>th</sup></b>	1%	8%	13%	17%	17%	14%	59%	23%	20%	18%	18%	13%	13%
<b>7<sup>th</sup></b>	1%	14%	24%	75%	81%	81%	73%	81%	90%	88%	90%	86%	82%
<b>8<sup>th</sup></b>	0%	0%	3%	8%	15%	12%	17%	25%	14%	11%	13%	11%	11%
<b>9<sup>th</sup></b>	0%	0%	0%	3%	4%	7%	22%	15%	14%	13%	13%	9%	6%
<b>10<sup>th</sup></b>	0%	0%	0%	1%	13%	18%	66%	75%	74%	68%	65%	60%	56%
<b>11<sup>th</sup></b>	0%	0%	0%	0%	0%	3%	8%	24%	19%	20%	20%	15%	14%
<b>12<sup>th</sup></b>	0%	0%	0%	0%	0%	0%	2%	5%	9%	9%	8%	5%	5%
<b>Total</b>	<b>13%</b>	<b>31%</b>	<b>32%</b>	<b>38%</b>	<b>40%</b>	<b>39%</b>	<b>55%</b>	<b>50%</b>	<b>49%</b>	<b>49%</b>	<b>47%</b>	<b>44%</b>	<b>43%</b>

Demographic variables included in the dataset were sex, grade, school attended, race, and ethnicity. Only a single race and ethnicity designation was available for each student. Race and ethnicity designations available were American Indian/Alaska Native, Asian, Black or African American, Hispanic/Latino, Native Hawaiian or Pacific Islander, White, or multi-ethnic. Table 2 shows the racial and ethnic distribution of the sample in the ASD 2010-2011 school year.<sup>26</sup>

**Table 2: Racial and Ethnic Distribution of Sample, ASD, 2010-2011**

Race/Ethnicity	Percent of Sample	Number in Sample
American Indian / Alaska Native	9%	1,918
Asian	10%	2,079
Black or African American	7%	1,467
Hispanic/Latino	11%	2,226
Native Hawaiian or Pacific Islander	4%	905
White	46%	9,660
Multi-Ethnic	13%	2,841
<b>Total</b>	<b>100%</b>	<b>21,096</b>

The racial/ethnic composition of the sampled students is almost identical to the distribution of groups across the entire student population in the 2010-2011 school year. American Indian/Alaska Natives made up 9% of the ASD sample and made up 9% of the entire ASD student population. Asian students were 10% of the sample and Native Hawaiian and Pacific Islander students were 4% of the sample. Together, the Asian and Pacific Islander student population accounts for 15% of the ASD student population. African American students were 7% of the sample and 6% of the ASD student population. Hispanic students were 11% of the sample and 10% of the ASD student population. White students were 46% of the sample and 47% of the ASD student population. Students who identify as multi-ethnic were 13% of the sample and were 13% of the ASD student population. The agreement in racial makeup between the sampled students and the ASD

enrolled student population suggests the student sample adequately represents the overall ASD student population in terms of race and ethnicity.

#### Assessment of Overweight and Obesity

Body mass index (BMI) is calculated using weight and height ( $BMI = \text{weight [kg]} / \text{height [m]}^2$ ) and is used to estimate risk of weight-related health problems. BMI is the most extensively used measure because BMI is obtained easily, inexpensively, noninvasively, and quickly. BMI is not a direct measure of body fat but is significantly correlated with body fat.<sup>27</sup> There is no evidence that clinical outcomes related to BMI differ by race, so BMI standards are recognized to apply to all populations.<sup>28, 29</sup>

Because young people, ages 2 to 20 years, are still growing and have a different body composition than adults, their BMI is compared to an age- and sex-specific reference population in order to assess weight status. The corresponding percentile for a given child's BMI, relative to that age- and sex-specific growth curve, determines which weight status category he or she falls into. Table 3 outlines the BMI percentiles for children and adolescents that indicate the categories of: obese, overweight, healthy weight and underweight.<sup>30</sup>

**Table 3: BMI Categories and Percentiles for Children and Adolescents**

BMI Categories for Children and Adolescents	BMI-for-Age and Gender Percentiles for Ages 2-20
Obese	$\geq 95^{\text{th}}$
Overweight	$\geq 85^{\text{th}}$ and $< 95^{\text{th}}$
Healthy Weight	$\geq 5^{\text{th}}$ and $< 85^{\text{th}}$
Underweight	$< 5^{\text{th}}$

BMI should not be used alone to diagnose obesity but can be used to identify children and adolescents who need to be examined further by a health care provider to obtain an informed diagnosis.<sup>27, 31</sup>

## Analysis

BMI-for-age percentile values were calculated for all students with valid height and weight data using SPSS statistical software programs. Reference percentiles came from the National Center for Health Statistics, Centers for Disease Control and Prevention.<sup>30</sup> The BMI-for-age percentile values were calculated for school years 1998-1999 through 2010-2011. Weight status was cross tabulated with demographic variables from the health record including age, sex, grade, and race/ethnicity. SPSS was used to produce prevalence estimates of weight status and 95% confidence intervals. Each student's BMI contributed equally to the analysis; data were not weighted.

SAS was used to test for linear trend using logistic regression, with dichotomized weight status (overweight or obese versus underweight or healthy weight) as the dependent variable and year as the predictor. Because the previous analysis of ASD BMI data noted a break in the trend at the 2002-2003 school year, three sets of regressions were run to test for linear trend:

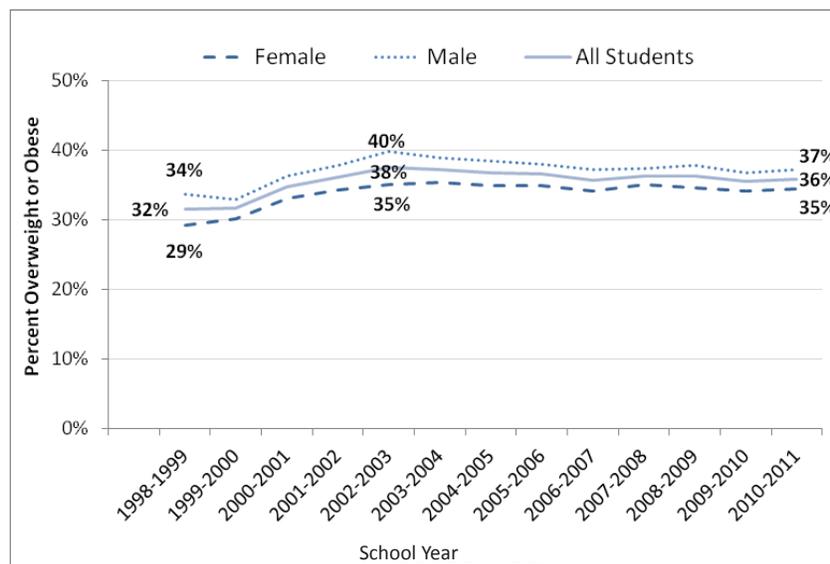
(a) one that examined the linear trend over the entire period, 1998-1999 through 2010-2011; (b) one that examined linear trend from 1998-1999 through 2002-2003; and (c) one that examined linear trend from 2002-2003 to 2010-2011.

## Results

### Trends in Weight Status

Figures 2 and 3 depict the trend in weight status among ASD students over the past 13 years, overall and by sex. Over the entire period, the prevalence of overweight and obesity among students increased slightly but significantly ( $p < .001$ ). The percentage of students who were above a healthy weight (i.e., had a BMI  $\geq$  85th percentile) increased from 32% in 1998-1999 to 36% in the 2011-2012 school year, with a peak of 38% in the 2002-2003 school year.<sup>i</sup> Males were consistently more likely than females to be above a healthy weight. Over the entire 13-year period, there was a statistically significant, increasing linear trend in the percentage of students who were above a healthy weight ( $p < 0.001$ ), i.e., were overweight or obese. The linear trend from 1998-1999 through 2002-2003 was also significant ( $p < 0.001$ )

**Figure 2: Trend in Prevalence of Overweight/Obesity (BMI  $\geq$  85th percentile) by Sex, ASD Students in Grades Pre-K through 12, 1998-1999 through 2010-2011**



Source: ASD student health records

<sup>i</sup> The discrepancy between the earlier Peterson et al.<sup>22</sup> estimate of overweight and obesity (36%) and that found in the current study (38%) is due to slight changes in data extraction methods, which increased the number of valid records that were included in the sample.

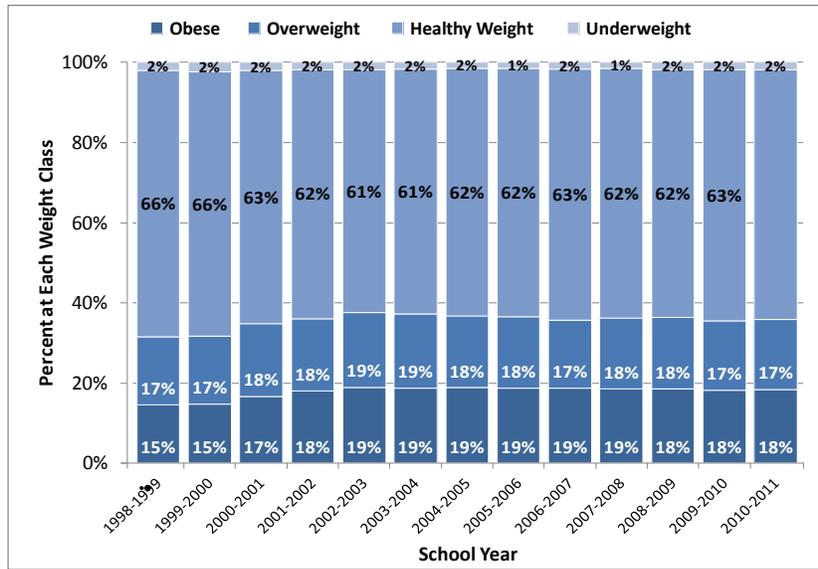
and indicative of an increase.

Looking just at the linear trend from 2002-2003 through 2010-2011, there was a slight but significant decrease in the percentage of students who were above a healthy weight ( $p < 0.001$ ).

Current Weight Status

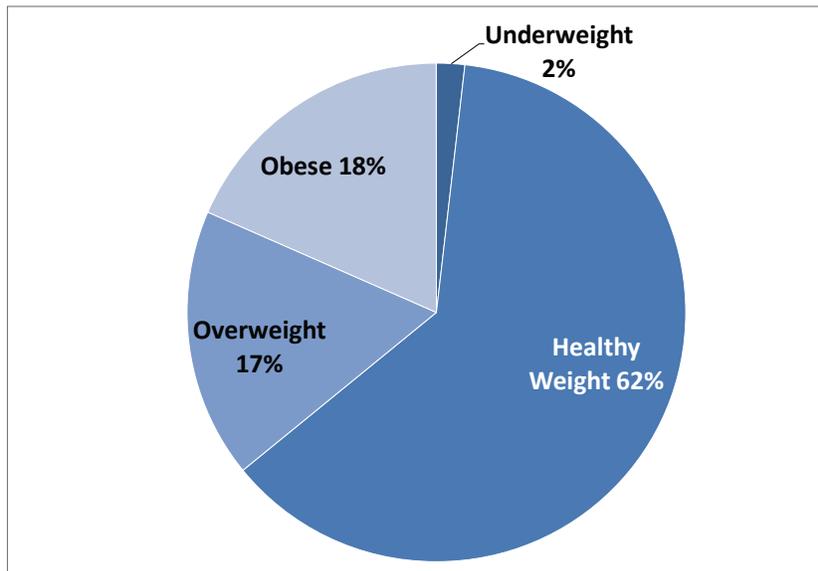
Considering just the most recent year of data, the prevalence of overweight and obesity combined among ASD students in grades pre-K through 12 was 36%; only 2% were underweight (Figure 4).

**Figure 3: Weight Status, by School Year, ASD Students in Grades Pre-K through 12, 1998-1999 to 2010-2011**



Source: ASD student health records

**Figure 4: Weight Status, ASD Student in Grades Pre-K through 12, 2010-2011**



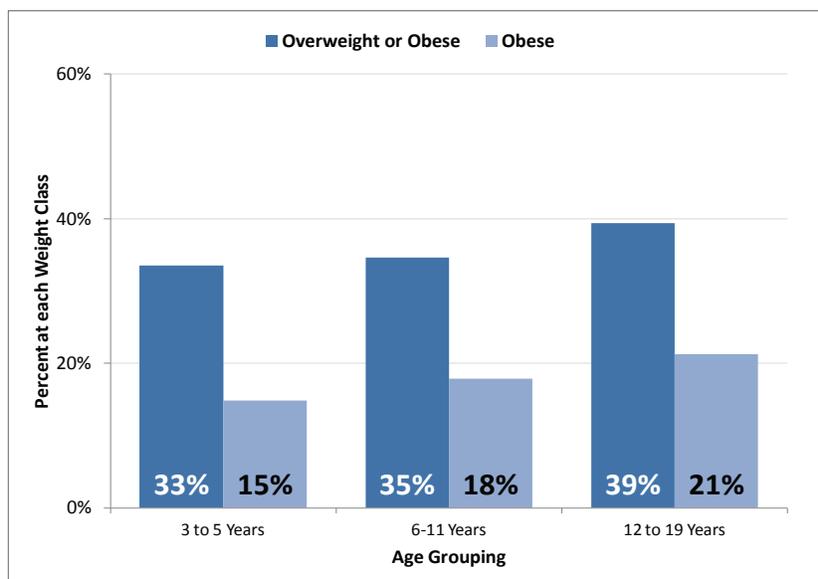
Source: ASD student health records.  
Percentages may not sum to 100% due to rounding

The prevalence of overweight and obesity combined increased along with student age (Figure 5). In the 2010-2011 school year, 33% of 3 to 5 year-olds were overweight or obese and 39% of 12 to 19 year-olds were overweight or obese.

Of children entering kindergarten and 1st grade in 2010-2011, 17% were overweight and 14% were obese; 67% were at a healthy weight (Figure 6).

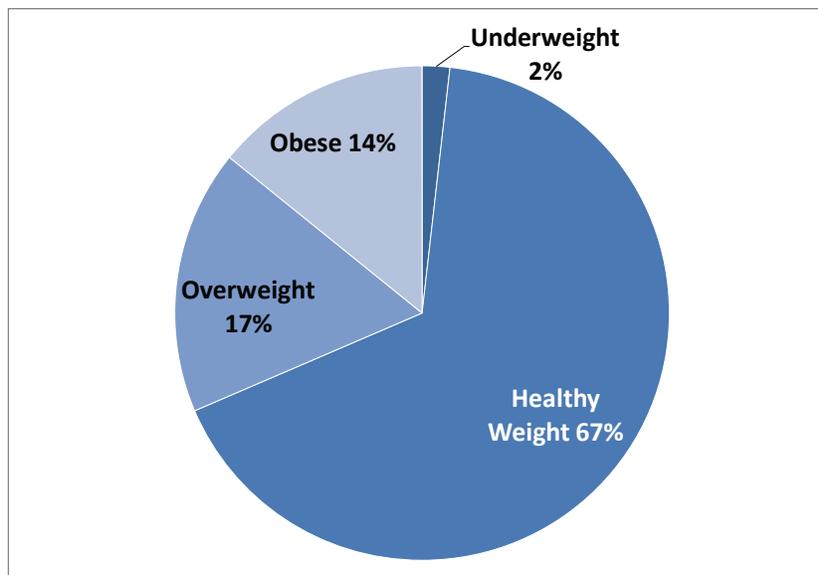
Racial and ethnic minorities make up over half of the sample (Table 2). The 2010-2011 data suggest some significant disparities in the prevalence of overweight and obesity. Nearly 3 in 4 (71%) Pacific Islander students and 45% of Alaska Native and American Indian students were categorized as overweight or obese. White students had the lowest prevalence of overweight and obesity combined (Figure 7).

**Figure 5: Prevalence of Overweight and Obesity ( $\geq 85^{\text{th}}$  Percentile), by Age Grouping, ASD Students in Grades Pre-K through 12, 2010-2011**



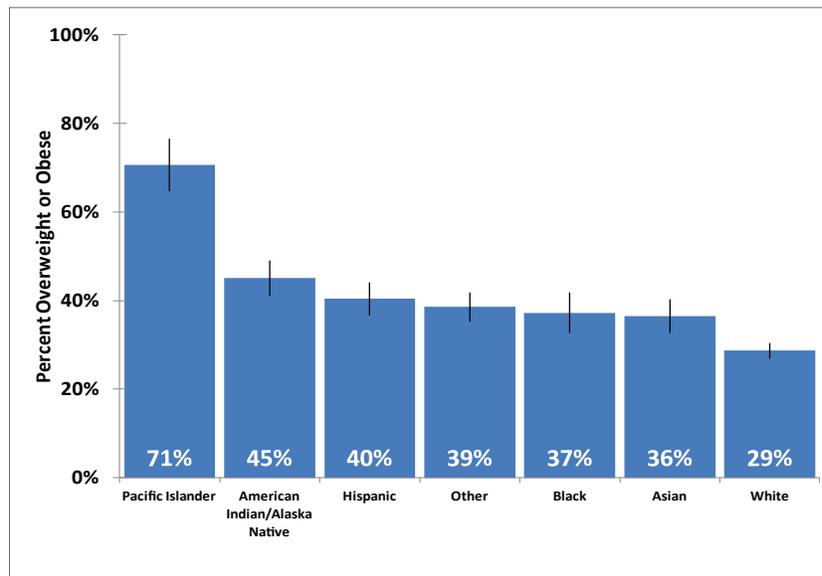
Source: ASD student health records

**Figure 6: Weight Status, ASD Students in Grades K and 1, 2010-2011**



Source: ASD student health records

**Figure 7: Prevalence of Overweight and Obese ( $\geq$ 85th Percentile), by Race/Ethnicity, ASD Students in Grades Pre-K through 12, 2010-2011**



Source: ASD student health records

## Discussion

In the 2010-2011 school year, 36% of this large sample of ASD students were overweight or obese. This suggests student weight status in Anchorage mirrors the national picture; the most recent National Health and Nutrition Examination Survey (NHANES) estimated 31.7% of children and adolescents aged 2-19 years were overweight or obese.<sup>32</sup>

Looking at all grade levels combined, the difference in overweight and obesity rates between boys and girls in the ASD has been decreasing since the 1998-1999 school year. This corresponds with national findings indicating boys no longer have significantly higher overweight and obesity rates than girls.<sup>32</sup>

The proportion of ASD students who are overweight or obese increases with student age. This agrees with national data as well as data from other Alaska school districts.<sup>24,32</sup> Older students are more likely to be above a healthy weight than are younger students. However, many students are entering the school district already overweight or obese; 1 in 3 kindergarten and 1st grade students

are already at risk of poor health outcomes due to weight status.

Two population subgroups show elevated risk: American Indian/Alaskan Natives and Pacific Islanders. Forty-five percent of American Indian/Alaska Native school children meet national criteria for being overweight or obese. Nearly 3 in 4 Pacific Islander students are either overweight or obese. The reasons behind these disparities are likely varied. Cultural differences likely influence nutrition and physical activity which may impact weight status. Regardless of the causes of these disparities, the fact remains that these two subgroups of the ASD student population are at significant risk of obesity-related health outcomes. Given that there is no evidence that clinical outcomes related to BMI differ by race,<sup>29, 31</sup> culturally appropriate prevention efforts need to be developed and implemented in order to reduce these risks.

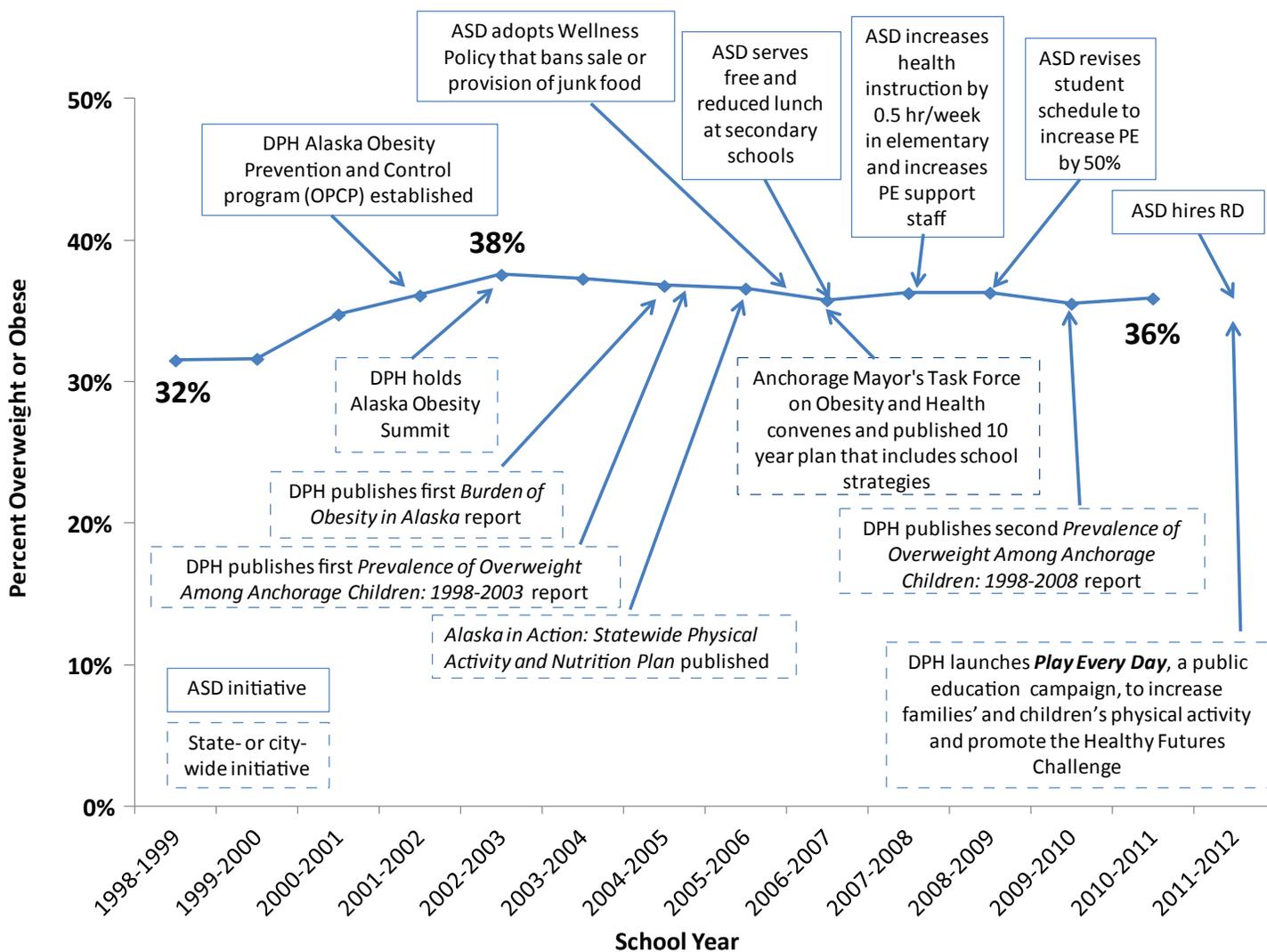
There is good news from this 13-year trend analysis. The rising prevalence of overweight and obesity among ASD students appears to have peaked in the 2002-2003 school year and

subsequently declined, slightly but statistically significantly. Data suggest national rates of childhood obesity rates are stabilizing. Analysis of directly measured youth height and weight data from the National Health and Nutrition Examination Survey (NHANES) found no significant increase in obesity between the periods 1999-2000 and 2007-2008.<sup>32</sup>

Independent of national efforts around childhood obesity prevention, such as First Lady Michelle Obama’s Let’s Move campaign, several Alaska-

and ASD-specific initiatives may have contributed to the changing trend in weight status reported here. Collectively, these initiatives’ intended and likely effects include an increase in awareness of the risks of childhood obesity, changing practices and policy that help prevent obesity, and an increase in the amount of programming and staff resources dedicated to obesity prevention. Notes about these educational, policy, and environmental efforts have been superimposed on the overweight and obesity trend line in Figure 8

**Figure 8: Alaska, Anchorage, and Anchorage School District Obesity Prevention Initiatives**



Source: ASD student health records

and are described in greater detail below.

In recent years, the Alaska Department of Health and Social Services has increased public awareness about the prevalence and risks of obesity. In 2003, the Division of Public Health (DPH) held the first Alaska Obesity Summit and published *The Burden of Overweight & Obesity in Alaska*, Alaska's first ever report on the burden of obesity statewide. In 2004, DPH released *The Prevalence of Overweight among Anchorage Children: A Study of Anchorage School District Data: 1998-2003*.<sup>22</sup> In 2005, DPH engaged professionals and stakeholders to contribute to *Alaska in Action*, the state plan to prevent and control obesity.<sup>33</sup> The plan included dozens of school-based prevention strategies. Another obesity prevention effort involving broad community input was the (Anchorage) Mayor's Task Force on Obesity, which concluded in 2006 with its own evidence-based 10-year plan for Anchorage. Most recently, in 2012 the Alaska Department of Health and Social Services launched a childhood obesity prevention public education campaign. The goals of the campaign are to increase awareness about the risks of childhood obesity, encourage families and children to be physically active, and promote the Healthy Futures physical activity challenge.

In addition to these state- and city-wide efforts, the ASD has implemented a number of its own childhood obesity prevention strategies over the decade, as outlined below.

#### Evidence-Based School Strategies to Prevent Childhood Obesity

1. In June 2006, ASD adopted and implemented a Wellness Policy that banned the sale or provision of soda and junk food in vending machines, school stores, school and administrative offices, school cafeteria fountain drink machines, and fundraisers. Referring to adoption of the Wellness Policy, ASD Superintendent Carol Comeau announced, "It is the right thing to do given the rising number of youth and adults who are overweight."<sup>34</sup> Annually, the superintendent

reviews school policy—including the Wellness Policy—with school leadership to ensure continued compliance.

2. In 2007-2008, the ASD began offering free and reduced lunches to secondary school children, which improved access to healthy lunches for ASD students, regardless of socioeconomic status.
3. In 2007-2008, the ASD adopted a revised elementary student schedule that increased health instruction, including nutrition education, by a half-hour each week. Instruction is provided by a health/SEL specialist.<sup>35</sup>
4. In 2008-2009, the ASD elementary student schedule was revised again to provide a 50% increase in the students' physical education instruction. At that time, Superintendent Comeau again noted the physical education increase is part of the battle against child obesity.<sup>36</sup>
5. In 2008-2009, the ASD hired a full time PE Teacher Support Specialist. This position provides training and technical assistance to physical education (PE) teachers to ensure PE instruction is focused on best practices related to the curriculum. During 2008-2009, this position increased the quality of PE by facilitating the development of grade level expectations and a standardized assessment process.
6. In 2012, the ASD Student Nutrition Department hired a Registered Dietitian to implement the USDA Healthy Hunger Free Kids Act school lunch and competitive food regulations.

Taken together, these practices, policies and programs may be part of the reason overweight and obesity prevalence rates in the ASD appear to be turning around.

#### **Limitations**

There are limitations that must be considered when interpreting body mass index data. Height and weight measurements were not collected through a statistically valid sampling procedure but were obtained as part of the routine school health screening process. Health screenings are

conducted primarily in kindergarten, 1st, 3rd, 5th and 7th grades. Measurements were consistently available for over 60% of the students enrolled in those grades during the 13-year time frame. For some grades and school years, data for over 80% of students was recorded. Height and weight data from students in other grades were collected as convenience samples. All available data from the 1998-1999 to the 2010-2011 school years represented 41% of enrolled students in all grades. It is unlikely that the high prevalence of overweight and obesity is due to selection bias that resulted in the disproportionate selection of students from groups at high risk for being overweight or obese.

Although the school nurses conduct most of the height and weight measurements, variations in the measurement of height and weight may have occurred. The school district has a written protocol for height and weight measurement, and it is made available to school health staff. However, the district did not have the staff or financial resources to guarantee that the measurement procedures were followed at each school. Currently, schools use different types of measurement equipment, and multiple staff members are involved in the measurement process. While the variations in procedure and equipment likely resulted in some degree of random error, it is unlikely the variations would be responsible for systematic under- or over-estimate of weight status.

Finally, this analysis was limited to the variables available from the student health records. Other factors with well-known links to rates of overweight and obesity, such as socioeconomic status,<sup>37</sup> could not be included. Future studies should consider using proxies of this important covariate in an effort to identify the subpopulations at highest risk, with an ultimate goal of developing targeted, effective interventions.

## Conclusion

In spite of the study limitations, the results of this analysis indicate both cause for concern and reason for hope. While too many students are currently overweight or obese, the prevalence has not increased since 2003. In fact, prevalence has decreased slightly since that time. While further study of the impact and effectiveness of changes to policy, practices, and programming in the ASD is needed, the bend in the trend of overweight and obesity prevalence demonstrates that success is possible.

The findings presented in this report emphasize the importance of evaluation and monitoring. These results will help the ASD (a) monitor student health and identify disparate populations; (b) provide a mechanism to evaluate the effectiveness of school wellness policies and efforts to improve school health; (c) strengthen school district grant applications by clearly identifying need and target populations; and (d) potentially catalyze improvements in local physical activity and nutrition policies.

No single practice, policy or program, in school or elsewhere, is likely to be sufficient to reverse the childhood obesity trend. The fact that a high percentage of students are overweight or obese when they enter school indicates that prevention efforts cannot wait until children enter the school system. Nonetheless, schools clearly have a significant role in creating healthy school environments; schools are second only to families in terms of social institutions with potential for influence on the lives of young people.

The Centers for Disease Control and Prevention endorses the Coordinated School Health Program (CSHP),<sup>38</sup> which is a framework for the planning and coordination of school health policies, practices, and programs that can be used for preventing obesity. The CSHP framework centers around eight critical, interrelated components: health education; physical education; health

services; mental health and social services; nutrition services; healthy and safe environment; family and community involvement; and staff wellness. ASD may wish to consider the CSHP approach to decrease obesity prevalence and improve students' health and learning.

However, to decrease childhood obesity statewide, Alaskans will need to work with students, families, communities, schools, childcare centers, worksites, health care, media, and government to fund and implement a coordinated set of comprehensive evidenced-based prevention strategies. Only the combined efforts of all these stakeholders will ensure that Alaska's children have a strong and healthy future.

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