

# Chronicles

Volume 4, Issue 3

November 2012

## Prevalence of Overweight and Obesity among Students in the Kenai Peninsula Borough School District, 2011-2012

Contributed by Myde Boles, PhD, Andrea M Fenaughty PhD, Karol J Fink MS RD, Charles J Utermohle PhD.

### ABSTRACT

The Kenai Peninsula Borough School District (KPBSD) and the Alaska Division of Public Health (DPH) collaborated to determine the prevalence of overweight and obesity among students in the KPBSD. This report summarizes the prevalence of overweight and obesity among pre-kindergarten (pre-K) through 12th grade KPBSD students during the 2011-2012 school year, and describes a subset of students with height and weight measures in both the 2010-2011 and 2011-2012 school years. Trained school staff collected height and weight measurements from students in pre-K to 12th grade. A total of 5,902 records were analyzed for the 2011-2012 school year, and 1,102 records were analyzed for the subset of students with measures in both years. 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 2011-2012, 1.1% of students were underweight, 63.0% were at a healthy weight and 35.9% were overweight or obese. Overweight and obesity varied by population subgroup. Racial and ethnic minorities were at particular risk for overweight and obesity, especially Alaska Native/American Indian students in KPBSD with nearly half of them overweight or obese. Among the students with height and weight measures in both school years, the percentage who were overweight and

obese rose significantly from 30.1% to 35.3%. The higher obesity prevalence among minority children suggests that school districts developing and implementing obesity prevention measures should give consideration to the unique needs of their minority populations.

*Suggested citation for this article:* Boles M, Fenaughty AM, Fink KJ, Utermohle CJ. Prevalence of Overweight and Obesity among students in the Kenai Peninsula Borough School District, 2011-2012. Alaska Department of Health and Social Services, Division of Public Health, Section of Chronic Disease Prevention and Health Promotion, Chronicles, Volume 4, Issue 3, November 2012. Available from <http://dhss.alaska.gov/dph/Chronic/Pages/Publications/Default.aspx>

### INTRODUCTION

Childhood obesity is one of the most serious public health challenges of the 21st century. Overweight and obese children are likely to stay obese into adulthood, are more likely to develop chronic diseases like diabetes and cardiovascular



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

Andrea Fenaughty, PhD,  
Chronicles Coordinator

diseases at a younger age, and are more likely to experience social stigmatization and discrimination.<sup>1,2,3</sup> Overweight and obesity, as well as their related diseases, are largely preventable.<sup>4</sup> A comprehensive strategy for the prevention and management of childhood obesity is a public health priority.

In the United States, about 17% of children and adolescents age 2 through 19 years are obese.<sup>5</sup> Although obesity rates nearly tripled from 1980 to the early years of the 21st century, more recently, national data indicate that between 1999 and 2010 childhood obesity leveled off in female children and adolescents age 2 through 19, but increased in males.<sup>5</sup> Other reports suggest that obesity is declining in certain geographic areas or among certain groups of children.<sup>6,7</sup> There continue to be, however, significant racial and ethnic disparities in obesity prevalence among U.S. children and adolescents.<sup>8</sup>

#### Childhood Obesity in Alaska

For older youth, data from the 2011 Alaska Youth Risk Behavior Survey (YRBS) indicated that 11.5% of high school students in grades 9-12 were obese.<sup>9</sup> YRBS data on weight status are based on students' self-reports of height and weight, which likely provide underestimates of obesity prevalence.<sup>10</sup>

Statewide representative data on obesity prevalence for children younger than high school are limited in Alaska; however, in the Anchorage metropolitan area, the prevalence of obesity among students in kindergarten, 1st, 3rd, 5th, and 7th grades in the Anchorage and Matanuska-Susitna Borough school districts in the 2010-2011 school year was 16.3%.<sup>11</sup> The prevalence of obesity was higher for Alaska Native/American Indian students (20.5%) and for students in lower socioeconomic schools (22.6%).

#### School-Based Weight Status Measurement

School-based measurement of student weight status is widely accepted for surveillance, the purpose of which is to identify prevalence, monitor trends, and evaluate outcomes of interventions.<sup>12</sup> Nationally, 20 states require school districts to measure students' height and weight.<sup>13</sup> The State of Alaska does not require its 54 school districts to collect height and weight, nor does it require reporting on student

weight status; however, student height and weight are measured and recorded as part of routine health screenings in the majority of the 17 Alaska school districts that employ school nurses.<sup>14</sup>

Objectively measured height and weight data are invaluable for understanding the extent of childhood obesity in Alaska. To date, three school districts have collaborated with the Alaska Division of Public Health to assess the prevalence of overweight and obesity among their students. The Alaska Division of Public Health collaborated with the Anchorage School District (ASD) to analyze height and weight data from 1998-1999 to 2010-2011 for students in preschool through 12th grade.<sup>15</sup> 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, but declined significantly from 2002-2003 to 2010-2011. The second Alaska school district to collaborate with the Alaska Division of Public Health was the Matanuska-Susitna Borough School District (MSBSD). Among MSBSD students in grades kindergarten, 1st, 3rd, 5th, and 7th, 2% of students were underweight, 71% were at a healthy weight, and 26% were overweight or obese in 2009-2010.<sup>16</sup> The third school district to collaborate with the Alaska Public Health Division was the Kenai Peninsula Borough School District (KPBSD). This KPBSD collaboration was a result of a request from the Mobilizing for Action through Planning and Partnership (MAPP) coalition in the southern Kenai Peninsula to provide data to allow monitoring of childhood obesity prevalence and evaluation of the coalition's prevention initiatives.

This report presents a cross-sectional analysis of the prevalence of childhood overweight and obesity among KPBSD students for the 2011-2012 school year. A second purpose is to describe the change in overweight and obesity for a subset of students with height and weight measurements in both 2010-2011 and 2011-2012 school years.

## METHODS

### Sample

KPBSD is the fourth largest school district in the state, with 43 schools and an enrollment of 9,222 students in pre-kindergarten through 12th grade (as of October 1, 2011), which represents approximately 7% of Alaska's total student population.<sup>17,18</sup> All pre-kindergarten students qualified for Title 1 services, a federal program that funds education programs for disadvantaged students.

The sample was obtained from the KPBSD electronic student information system. School nursing staff recorded height and weight measurements during school health screenings and entered these data into the health section of the electronic student information system. For the 2011-2012 school year, there were 5,902 student records with valid height and weight measures from 40 schools. A smaller set of 1,754 student records was available for the 2010-2011 school year, but this was considered a start-up year with only 18 schools participating. There were 1,102 students with height and weight measures in both school years.

Height and weight measurements for students in grades pre-kindergarten through 12 were extracted from the database with all personal identifiers removed, and students were assigned a unique identification number. Height was measured to the quarter of an inch and weight to the tenth of a pound. Each data point included date of measurement and date of birth of the student along with demographic variables of sex, grade, and race/ethnicity. Age at time of measurement was computed in decimal years. Only a single race/ethnicity designation of American Indian, Alaska Native, Asian, Black or African American, Hispanic/Latino, Native Hawaiian or Pacific Islander, White, or multi-ethnic (not Hispanic or Latino) was available for each student. Height and weight values were screened for accuracy and biological plausibility.

### Assessment of Overweight and Obesity

Body mass index (BMI) is used to estimate risk of weight-related health problems and is calculated using weight and height. Because children and

adolescents, ages 2 to 18 years, are still growing and have differences in body composition, their BMI is compared to a reference population of youth. BMI percentiles for children and adolescents are determined by age on a sex-specific growth curve.<sup>19,20</sup> BMI-for-age percentiles are: underweight – less than the 5th percentile, healthy weight – 5th percentile to less than the 85th percentile, overweight – 85th percentile to less than the 95th percentile, and obese – equal to or greater than the 95th percentile.

BMI surveillance data are a reliable tool to describe trends in weight status over time among populations and subpopulations. BMI is the most widely used measure because it is easy, inexpensive, noninvasive, and quickly obtained. BMI is not a direct measure of body fat but has been shown to significantly correlate with body fat.<sup>21</sup> It is important to note that BMI should not be used alone to diagnose an individual child as overweight or obese; rather, BMI should be used to identify children and adolescents who need to be examined further by a medical care provider to obtain an informed diagnosis.<sup>22</sup>

### Analysis

BMI-for-age and sex percentile values for age (to the month) at time of measurement 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.<sup>23</sup>

The prevalence of overweight and obesity was determined using the data from the 2010-2011 and the 2011-2012 academic years. Overweight and obesity were further analyzed using demographic information on the age, sex, grade, and race/ethnicity of the students, as well as geographic region (east, south, central) and socioeconomic status (SES) of the schools. The schools in the east region of the district are Cooper Landing, Hope, Moose Pass and Seward schools. Ninilchik and all schools south of Ninilchik are in the south region; all other schools are in the central region. School SES was based on the proportion of students enrolled in the free- and reduced-price lunch program, a proxy measure of SES. Schools with fewer than 45%

of students enrolled in the free- and reduced-price lunch program were classified as higher SES schools. Schools with 45% or more of students in the free- and reduced-price lunch program were classified as lower SES schools.

Observations were weighted to ensure that data were representative of the enrollment population for the 2011-2012 school year. Weighting adjusted the statistical computations so that weighted sample estimates matched known population totals for enrollment by grade and race/ethnicity (White, Alaska Native/American Indian, and all other races/ethnicities). Population enrollment data were obtained from the Alaska Department of Education and Early Development.<sup>17</sup> Analysis weights were calculated as the ratio of population enrollments to the sample size obtained in each grade-race/ethnicity demographic category. Tables and figures show weighted percentages and unweighted counts.

An analysis of the change in weight status among the cohort of 1,102 students who had measures in both 2010-2011 and 2011-2012 school years was performed using the McNemar test for matched pairs. These data were not weighted because the cohort of students was not representative of the enrolled student population. All data were analyzed using Stata v. 11.<sup>24</sup>

## RESULTS

Valid height and weight measurements were obtained for 7,656 (98.9%) of the 7,739 student observations reported in 2010-2011 and 2011-2012. The height and weight values represented 41.3% of total student enrollment (18,549) in the represented grades over the 2-year time period. For the 2011-2012 school, the height and weight values represented 64.0% of total student enrollment (9,222).

The demographics of the study population are shown in Table 1. In 2011-2012, boys comprised 51.2% of the student sample. White students were the largest racial/ethnic group (77.4%), followed by 10.9% Alaska Native/American Indians. There were no observations for 10th and 12th grade students in 2011-2012. More students were from higher SES schools (58.0%) than lower SES schools, and the majority of students were from schools in the central region of the Kenai Peninsula Borough.

**Table 1. Demographics of KPBSD study sample, 2011-2012 school year (n=5,902)**

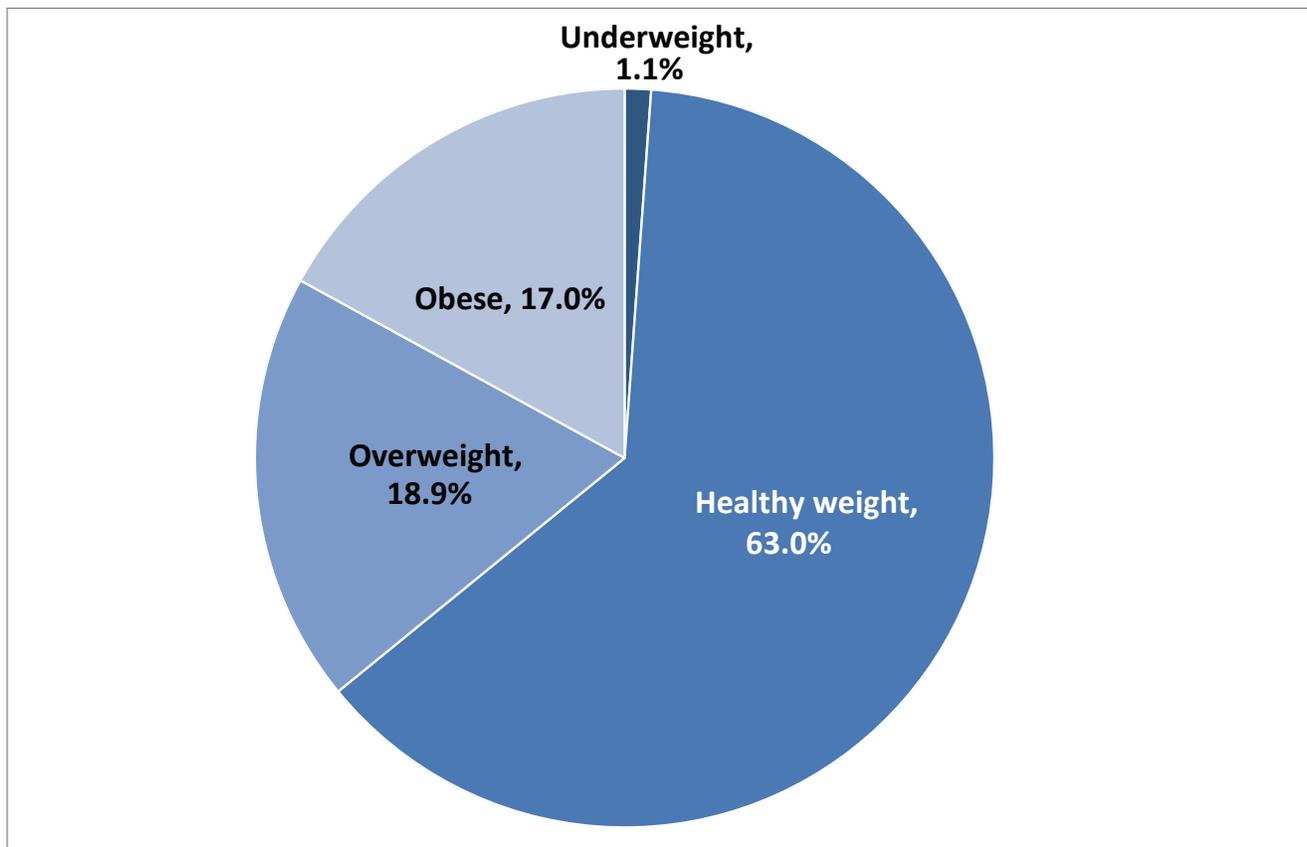
Demographic Characteristics	%*	n*
<b>Sex</b>		
Male	51.2	3,011
Female	48.8	2,891
<b>Race/Ethnicity</b>		
White	77.4	4,534
Alaska Native/American Indian	10.9	630
Asian	1.3	75
Black/African American	0.4	25
Pacific Islander/Native Hawaiian	0.4	24
Hispanic/Latino	3.7	228
Multi-racial/ethnic	6.0	386
<b>Grade</b>		
Pre-kindergarten	2.2	118
Kindergarten	8.6	560
1st	8.5	578
2nd	8.6	460
3rd	8.6	595
4th	8.5	451
5th	8.7	587
6th	8.3	492
7th	9.4	629
8th	9.3	523
9th	9.7	541
11th	9.6	368
<b>Age group</b>		
3-6 years	15.7	1,008
7-10 years	34.1	2,073
11-14 years	36.8	2,236
15-19 years	13.4	585
<b>SES</b>		
Higher SES schools	58.0	3,326
Lower SES schools	42.0	2,576
<b>Geographic region</b>		
East	7.7	452
Central	66.6	3,935
South	25.7	1,515

\*Weighted %, unweighted n

In 2011-2012, the prevalence of overweight and obesity (combined) among KPBSD's public school students was 35.9% with 17.0% of students classified as obese and 18.9% of students classified as overweight (Figure 1). As shown in Table 2, the prevalence of overweight and obesity was significantly higher among boys (37.6%) compared to girls (34.1%). Whites had the lowest prevalence (33.8%) compared to Alaska Natives and American Indians (46.5%) and all other races and ethnicities (40.1%). The prevalence of overweight and obesity was highest among students in the 11-14 years

age group at 38.5%, which was significantly higher than students in the younger age groups. Similarly, the proportion of overweight and obese students in 7th and 8th grades was significantly higher than students in younger grades, except pre-kindergarten students. Although there was only a small number of pre-kindergarten students in the sample, nearly half (42.3%) of them were overweight and obese. There were no differences in overweight and obesity by SES or geographic region, nor were there any differences in overweight alone within any demographic subgroup.

**Figure 1. Weight status of students in KPBSD, 2011-2012 school year (n=5,902)**



Source: KPBSD

Table 2. Prevalence of overweight and obesity in KPBSD, 2011-2012 school year (n=5,902)

Characteristic	% (95% C.I.) Overweight & Obese Combined	% (95% C.I.) Overweight	% (95% C.I.) Obese
<b>Total</b>	35.9 (34.7-37.2)	18.9 (17.9-19.9)	17.0 (16.1-18.0)
<b>Sex</b>			
Male	37.6 (35.9-39.4)	18.7 (17.4-20.2)	18.9 (17.5-20.4)
Female	34.1 (32.4-35.9)	19.0 (17.6-20.5)	15.1 (13.8-16.4)
<b>Race/Ethnicity</b>			
White	33.8 (32.4-35.2)	18.4 (17.3-19.6)	15.4 (14.4-16.5)
Alaska Native/American Indian	46.5 (42.5-50.5)	20.7 (17.6-24.1)	25.8 (22.5-29.4)
All other races/ethnicities	40.1 (36.5-43.7)	20.4 (17.6-23.5)	19.7 (16.9-22.7)
<b>Grade</b>			
Pre-kindergarten	42.3 (33.3-51.9)	24.1 (16.8-33.3)	18.2 (12.1-26.5)
Kindergarten	32.3 (28.6-36.3)	19.5 (16.4-23.0)	12.9 (10.3-15.9)
1 <sup>st</sup>	30.8 (27.2-34.7)	19.5 (16.5-22.9)	11.3 (9.0-14.2)
2 <sup>nd</sup>	32.8 (28.7-37.2)	16.9 (13.7-20.6)	15.9 (12.9-19.6)
3 <sup>rd</sup>	31.9 (28.3-35.8)	17.7 (14.8-21.0)	14.2 (11.6-17.3)
4 <sup>th</sup>	36.6 (32.3-41.2)	15.9 (12.8-19.6)	20.7 (17.2-24.7)
5 <sup>th</sup>	38.7 (34.9-42.7)	19.1 (16.1-22.5)	19.6 (16.6-23.0)
6 <sup>th</sup>	36.7 (32.6-41.1)	18.1 (14.9-21.7)	18.7 (15.5-23.4)
7 <sup>th</sup>	41.8 (38.0-45.7)	22.3 (19.2-25.7)	19.5 (16.6-22.8)
8 <sup>th</sup>	39.0 (34.9-43.3)	19.9 (16.7-23.5)	19.2 (16.0-22.8)
9 <sup>th</sup>	37.6 (33.6-41.8)	20.2 (17.1-23.8)	17.4 (14.4-20.8)
11 <sup>th</sup>	33.9 (29.3-38.9)	16.9 (13.4-21.0)	17.1 (13.6-21.3)
<b>Age group</b>			
3-6 years	32.9 (30.0-35.9)	19.7 (17.4-22.4)	13.1 (11.2-15.4)
7-10 years	34.2 (32.2-36.3)	17.8 (16.3-19.6)	16.4 (14.8-18.0)
11-14 years	38.5 (36.5-40.6)	19.6 (18.0-21.3)	18.9 (17.3-20.6)
15-19 years	36.6 (32.7-40.6)	18.4 (15.4-21.8)	18.2 (15.2-21.5)
<b>SES</b>			
Higher SES schools	35.9 (34.3-37.6)	18.2 (16.9-19.5)	17.8 (16.5-19.2)
Lower SES schools	35.8 (34.0-37.7)	19.9 (18.4-21.5)	16.0 (14.6-17.5)
<b>Geographic region</b>			
East	36.1 (31.7-40.7)	17.3 (14.0-21.1)	18.8 (15.4-22.7)
Central	35.8 (34.3-37.4)	18.5 (17.3-19.8)	17.3 (16.3-18.5)
South	36.0 (33.6-38.5)	20.2 (18.2-22.3)	15.8 (14.0-17.7)

### Comparison of Objectively Measured Weight Status to Self-Reported Weight Status

Among five KPBSD high schools that participated in the 2011 YRBS, 27.1% of students in grades 9 through 12 reported heights and weights that classified them as either overweight or obese (unweighted proportion, unpublished 2011 YRBS data). In these schools, 17.5% of students who responded to the survey were overweight and 9.6% were obese. In comparison, the prevalence (weighted) of overweight and obesity, as measured by school nurses, among 9th and 11th grade students in these same schools was 36.1% (19.9% overweight, 16.2% obese).

### Cohort Analysis

There were 1,102 students who had height and weight measures in 2010-2011 and again in 2011-2012. The prevalence of overweight and obesity in these students in 2010-2011 was 30.1%. The prevalence grew significantly to 35.3% in 2011-2012. Among the 756 students who were at a healthy weight in 2010-2011, 97 (12.8%) were either overweight or obese in 2011-2012. Of the 332 students who were overweight or obese in 2010-2011, 87.7% were still overweight or obese in 2011-2012.

## **DISCUSSION**

Childhood obesity in KPBSD is closely aligned with the national obesity prevalence, as well as with another large school district in Alaska. In the 2011-2012 school year, 17.0% of students in KPBSD were obese. This is comparable to the national rate of 16.9% in 2009-2010 for children ages 2 through 19,<sup>5</sup> but is slightly lower than the obesity rate of 18% in 2010-2011 in the nearby Anchorage School District.<sup>15</sup>

About 36% of students in KPBSD were overweight and obese (combined) in 2011-2012. Overweight and obesity vary by population subgroup, and the results in KPBSD are no exception. In KPBSD, males have higher rates of overweight and obesity than females, and racial and ethnic minorities have higher rates of overweight and obesity than whites. Alaska Natives/American Indians are at particular risk for overweight and obesity. Nearly half of Alaska Native/American Indian students in KPBSD were overweight

or obese, with one quarter of them obese. The reasons for this disparity are not well understood. Regardless of the cause of the disparity, Alaska Native/American Indian children and youth are at significant risk of obesity-related health outcomes.

Typically, the proportion of youth who are overweight and obese increases with age.<sup>5, 15, 16</sup> However, in KPBSD, students in the 11-14 year age range were more likely to be overweight and obese than younger and older students. Despite the higher prevalence in middle school-aged students, many students in the lower grades were also overweight and obese, particularly those in the pre-kindergarten classes. Students entering pre-kindergarten overweight or obese begin school at risk of poor health outcomes and poor academic performance.<sup>25, 26</sup>

The increase in overweight and obesity over time among the cohort of students with height and weight measures in both school years is not surprising given that the proportion of students who are overweight and obese increases with age. It is possible, however, for overweight students to reverse the trajectory toward obesity and achieve a healthy weight. In the KPBSD cohort, 41 (12.3%) of overweight students in 2010-2011 attained a healthy weight in 2011-2012. More research is needed to understand the factors that contributed to this reversal.

KPBSD's childhood obesity prevalence is similar to that found in other jurisdictions. Several national, Alaska-specific, and KPBSD-specific initiatives may impact overweight and obesity prevalence. At the national level, First Lady Michelle Obama's Let's Move campaign has focused on physical activity and nutrition in the effort to reduce childhood obesity.<sup>27</sup> In addition, the State of Alaska supports the United States Department of Agriculture's (USDA) HealthierUS Schools Challenge, a federal program that recognizes schools that have created healthier school environments through nutrition and physical activity.<sup>28</sup> Within Alaska, the Alaska Department of Health and Social Services has undertaken many activities to increase 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.<sup>29</sup> The report was subsequently updated and the most recent issue is available at the DPH website.<sup>30</sup> 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 school-based Healthy Futures physical activity challenge.

In addition to these efforts, KPBSD has implemented a number of its own childhood obesity prevention policies, programs, and practices, as described below.

1. In 2006, KPBSD adopted and implemented a Wellness Policy that banned the sale or provision of unhealthy food and beverages in vending machines, school stores, school and administrative offices, school cafeteria fountain drink machines, and fundraisers that did not meet nutrition standards. The Wellness Policy also specified requirements for physical activity and physical education for students in all grades. That same year, a Wellness Committee, comprised of school board members, principals, teachers, nurse coordinators, administrators, parents, and students was established to support the implementation of the district's Wellness Policy. The Wellness Committee continues to meet semi-annually.
2. KPBSD offers free and reduced breakfasts and lunches to students in 30 sites serving 35 schools and offers the USDA Fresh Fruit & Vegetable Program to 13 schools serving 3,200 primarily elementary school students every day, both of which ensures access to healthy foods for thousands of students.
3. In 2012, 4 KPBSD schools received national recognition for their efforts in the HealthierUS School Challenge. These schools met the USDA's award-winning criteria for improving the quality of foods served, providing students with

nutrition education, and providing students with physical education and opportunities for physical activity.

4. During the 2011-2012 school year, the school meals served in the KPBSD exceeded the USDA meal pattern requirements. This achievement was recognized by the Alaska School Nutrition Association (AKSNA); the KPBSD Nutrition Director was named 2012 AKSNA Director of the Year.
5. The southern Kenai Peninsula MAPP coalition has implemented several school-based childhood obesity prevention initiatives supported by the KPBSD administration. The southern Kenai Peninsula has 12 USDA People's Garden projects on school grounds that are integrated in the health education curriculum. The southern Kenai Peninsula also initiated a school-based nutrition education pilot project to increase awareness about health and local foods in a high-risk population school. The southern Kenai Peninsula schools collaborated with a program, Nature Rocks Homer, to increase opportunities and access to affordable outdoor physical activity for children.

While none of these obesity prevention policies, programs, and practices alone could prevent obesity, taken together, these efforts could help prevent and decrease the prevalence of overweight and obesity in KPBSD. However, these are only some of the evidence-based strategies available to schools to promote healthy weight. The implementation of additional policies, programs and practices could accelerate progress in preventing and reducing obesity in the district.

#### Limitations

The findings in this report are subject to several limitations. First, 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. Because efforts were made to screen all students, a very small number of pregnant teens may have been included in the sample. In addition, it is unlikely that the prevalence of overweight and obesity was due to a selection bias that resulted in

the disproportionate selection of students from groups at higher risk for being obese. Prevalence estimates were weighted to be representative of the entire enrollment for the school year, further minimizing bias. Although school nurses conducted most of the height and weight measurements, there were some schools that had limited student measures. It is also possible that variations in students' height and weight measurements within and between schools may have occurred. Schools used a variety of measurement equipment, and multiple staff members may have been involved in the measurement process.

## CONCLUSION

The objectives of this study were to examine obesity prevalence estimates that are representative of the public school population in the KPBSD. The prevalence of childhood obesity is higher than the Healthy People 2020 goal of 14.6% and calls for continued public health and school-based interventions to improve food and physical activity environments. The results in the report provide the KPBSD administration and board a baseline prevalence that can be monitored over time. The KPBSD can use changes in student obesity prevalence to help determine effectiveness of school-based prevention policies, programs, and practices. The higher obesity prevalence among minority children suggests that obesity prevention programs, policies, and practices in the school environment may not be reaching all students. School districts developing and implementing obesity prevention measures should give consideration to the unique needs of their minority populations.

For more information about the Alaska Obesity Prevention and Control Program please visit:

[dhss.alaska.gov/dph/Chronic/Pages/Obesity/default.aspx](http://dhss.alaska.gov/dph/Chronic/Pages/Obesity/default.aspx)

To find out more about the Program's Play Every Day, Healthy Futures Challenge and Promotion go to:

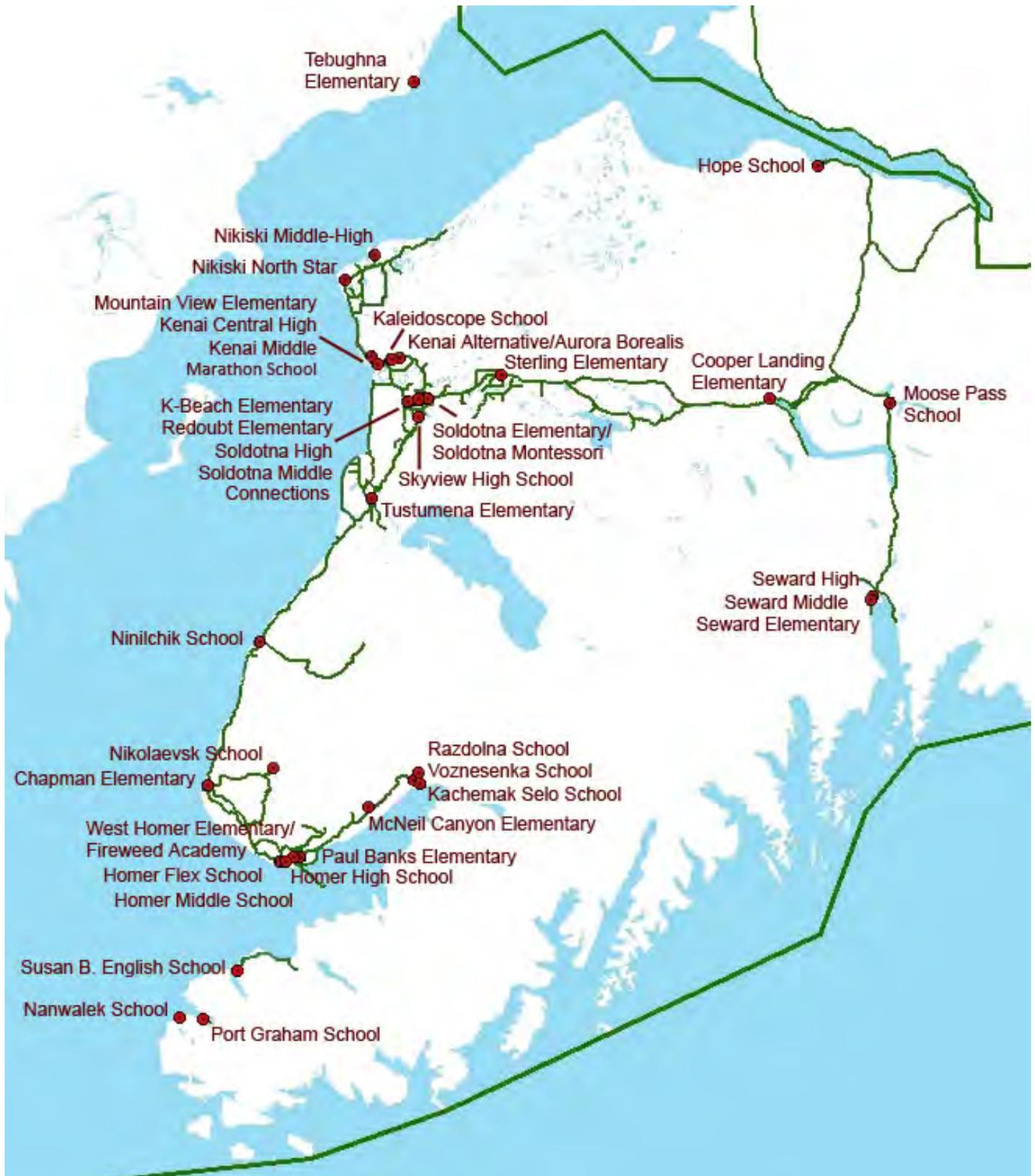
[www.PlayEveryDay.alaska.gov](http://www.PlayEveryDay.alaska.gov)

## REFERENCES

1. U.S. Department of Health and Human Services. The Surgeon General's Vision for a Healthy and Fit Nation. Rockville, MD: U.S. Department of Health and Human Services, Office of the Surgeon General. January 2010. Available at: <http://www.surgeongeneral.gov/initiatives/healthy-fit-nation/obesityvision2010.pdf>. Accessed October 29, 2012.
2. Freedman DS, Zuguo M, Srinivasan SR, Berenson GS, Dietz WH. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: the Bogalusa Heart Study. *J Pediatr* 2007;150(1):12–17.
3. Puhl RM, Latner JD. Stigma, obesity, and the health of the nation's children. *Psychol Bull* 2007;133(4):557-80.
4. World Health Organization. Population-based Prevention Strategies for Childhood Obesity Report of the WHO Forum and Technical Meeting, Geneva 2009. Available at <http://www.who.int/dietphysicalactivity/childhood/child-obesity-eng.pdf>. Accessed October 24, 2012.
5. Ogden CL, Carroll MD, Kit MK, Flegal KM. Prevalence of obesity and trends in body mass index among US children and adolescents, 1999-2010. *JAMA* 2012;307(5):483-90.
6. Centers for Disease Control and Prevention. Obesity in K-8 students – New York City, 2006-07 to 2010-11 school years. *MMWR*. 2011;60(49):1673-8.
7. HEALTHY study group, Foster GD, Linder B, Baranowski T, Cooper DM, Goldberg L, Harrell JS, Kaufman F, Marcus MD, Treviño RP, Hirst K. A school-based intervention for diabetes risk reduction. *N Engl J Med*. 2010;363(5):443-53.
8. Ogden CL, Carroll MD. Prevalence of Obesity Among Children and Adolescents: United States, Trends 1963-1965 Through 2007-2008. Available at: [http://www.cdc.gov/nchs/data/hestat/obesity\\_child\\_07\\_08/obesity\\_child\\_07\\_08.htm](http://www.cdc.gov/nchs/data/hestat/obesity_child_07_08/obesity_child_07_08.htm). Accessed October 23, 2012.
9. Alaska Department of Health and Social Services. Alaska Youth Risk Behavior Survey. Available at: [http://dhss.alaska.gov/dph/Chronic/Documents/School/pubs/2011YRBS\\_Highlights.pdf](http://dhss.alaska.gov/dph/Chronic/Documents/School/pubs/2011YRBS_Highlights.pdf). Accessed October 23, 2012.
10. Brener ND, Eaton DK, Lowry R, McManus T. The association between weight perception and BMI among high school students. *Obes Res* 2004;12(11):1866-74.
11. Boles M, Dent C, Fink K, Fenaughty A. Obesity in K-7 Students in Anchorage, Alaska Metropolitan Statistical Area, 2003-04 to 2010-11 School Years. Unpublished manuscript. 2012.
12. Nihiser AJ, Lee SM, Wechsler H, McKenna M, Odom E, Reinold C, Thompson D, Grummer-Strawn L. Body mass index measurement in schools. *J Sch Health*. 2007;77(10):651-71.
13. Linchey J, Madsen KA. State requirements and recommendations for school-based screenings for body mass index or body composition, 2010. *Prev Chronic Dis* 2011;8(5):A101. Available at: [http://www.cdc.gov/pccd/issues/2011/sep/11\\_0035.htm](http://www.cdc.gov/pccd/issues/2011/sep/11_0035.htm). Accessed September 8, 2012.
14. Mary Bell, RN, BSN, NCSN, DHSS School Health Nurse Consultant, oral communication, October 22, 2012.
15. 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. Available at: <http://dhss.alaska.gov/dph/Chronic/Documents/Publications/assets/ChroniclesV4-2.pdf>. Accessed October 24, 2012.
16. Bell, M, Fenaughty AM, Fink K, Utermohle CJ. Prevalence of Overweight and Obesity among Matanuska Susitna Borough School District Students, 2003-2010. Alaska Department of Health and Social Services, Division of Public Health, Section of Chronic Disease Prevention and Health Promotion, *Chronicles*, Volume 3, Issue 1, March 2011. Available at: <http://dhss.alaska.gov/dph/Chronic/Documents/Publications/assets/ChroniclesV3-1.pdf>. Accessed October 24, 2012.
17. Alaska Department of Education and Early Development. District Enrollment as of October 1, 2011. Available at: <http://www.eed.state.ak.us/stats/DistrictEnrollment/2012DistrictEnrollment.pdf>. Accessed October 25, 2012.
18. Kenai Peninsula Borough School District. School Information List. Available at: <https://www.kpbsd.k12.ak.us/>. Accessed October 25, 2012.
19. Centers for Disease Control and Prevention, National Center for Health Statistics. CDC Growth Charts, United States. Available at: <http://www.cdc.gov/growthcharts/>. Accessed October 25, 2012.
20. Centers for Disease Control and Prevention. About BMI for Children and Teens. Available at: [http://www.cdc.gov/healthyweight/assessing/bmi/childrens\\_bmi/about\\_childrens\\_bmi.html](http://www.cdc.gov/healthyweight/assessing/bmi/childrens_bmi/about_childrens_bmi.html). Accessed October 25, 2012.

21. Mei Z, Grummer-Strawn LM, Pietrobelli A, Goulding A, Goran MI, Dietz WH. Validity of body mass index compared with other body-composition screening indices for the assessment of body fatness in children and adolescents. *Am J Clin Nutr* 2002;75(6):978–85.
22. Barlow SE, The Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics*. 2007;120(Supple 4):S164-S192. Available at: [http://pediatrics.aappublications.org/content/120/Supplement\\_4/S164.full.pdf+html](http://pediatrics.aappublications.org/content/120/Supplement_4/S164.full.pdf+html). Accessed October 25, 2012.
23. Centers for Disease Control and Prevention. A SAS Program for the CDC Growth Charts. Available at: <http://www.cdc.gov/nccdphp/dnpao/growthcharts/resources/sas.htm>. Accessed October 25, 2012.
24. StataCorp. 2009. Stata Statistical Software: Release 11. College Station, TX: StataCorp LP.
25. Centers for Disease Control and Prevention. Obesity Among Low-Income Preschool Children. Available at: <http://www.cdc.gov/obesity/downloads/PedNSSFactSheet.pdf>. Accessed October 29, 2012.
26. Datar A, Sturm R, Magnabosco JL. Childhood overweight and academic performance: national study of kindergartners and first-graders. *Obese Res* 2004;12(1): 58-68.
27. Let's Move. Available at: [www.letsmove.gov](http://www.letsmove.gov). Accessed October 29, 2012.
28. United States Department of Agriculture, Food and Nutrition Services. HealthierUS School Challenge. Available at: <http://www.fns.usda.gov/tn/healthierus/index.html>. Accessed October 29, 2012.
29. Alaska Department of Health and Social Services, Division of Public Health, Section of Epidemiology, Health Promotion Unit. The burden of overweight & obesity in Alaska. Available at: <http://www.epi.hss.state.ak.us/pubs/obesityburden/obesityburden.pdf>. Accessed October 28, 2012.
30. Fenaughty A, Fink K, Peck D, Wells R, Utermohle C, Peterson E. The Burden of Overweight and Obesity in Alaska. February 2012. Anchorage, AK: Section of Chronic Disease Prevention and Health Promotion, Division of Public Health, Alaska Department of Health and Social Services. Available at: [http://dhss.alaska.gov/dph/Chronic/Documents/Obesity/pubs/ObesityBurdenReport\\_2010.pdf](http://dhss.alaska.gov/dph/Chronic/Documents/Obesity/pubs/ObesityBurdenReport_2010.pdf). Accessed October 29, 2012.

Figure 2. Kenai Peninsula Borough School District schools



Source: <https://www.kpbsd.k12.ak.us/>