



Section of Chronic Disease Prevention and Health Promotion

Chronicles

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Prevalence of Overweight and Obesity among Anchorage School District Students, 1998-2008

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Abstract

The Anchorage School District and the Alaska Division of Public Health collaborated to assess the prevalence of overweight and obesity among children in the Anchorage School District. We analyzed routinely collected height and weight measurements for students in preschool through grade 12. Data collected by trained school staff according to standard procedures from 46,658 students spanning ten school years were included in the analysis. A total of 122,081 individual height and weight values were used. We assessed and classified student weight status using BMI-for-age values and the categories defined by the National Center for Health Statistics. At the end of the ten-year time period in 2007-2008, 2% of students were underweight, 62% were at a normal weight, 18% were overweight, and 18% were obese. Of students entering kindergarten or first grade in the 2007-2008 academic year, 32% were overweight or obese (combined). Trend data reveal a leveling off of overweight or obese (combined) as of 2003. Analysis of the cohort of students with data from both the 1998-1999 and 2007-2008 time periods indicates that while the majority of students stayed in the same weight class, an additional 23% of those who were of normal weight in 1998-1999 had become overweight or obese by 2007-2008. Schools can play a role in helping to address childhood overweight; however, educators cannot solve this problem alone. To truly reverse the childhood obesity trend, a comprehensive, coordinated, long-term obesity prevention approach that involves and is supported by individuals, families,

communities, schools, worksites, health care providers, media, industry, and government is necessary.

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Introduction

In the United States, the increase in overweight and obesity has been so substantial and dramatic that it is commonly described as epidemic.¹ The epidemic has spread through all 50 states, within all racial and ethnic subgroups, and among all socioeconomic and age groups. According to the Institute of Medicine, "...we have learned that excess weight has significant and troublesome health consequences", yet "we nevertheless see



State of Alaska, Sarah Palin, Governor
Department of Health and Social Services
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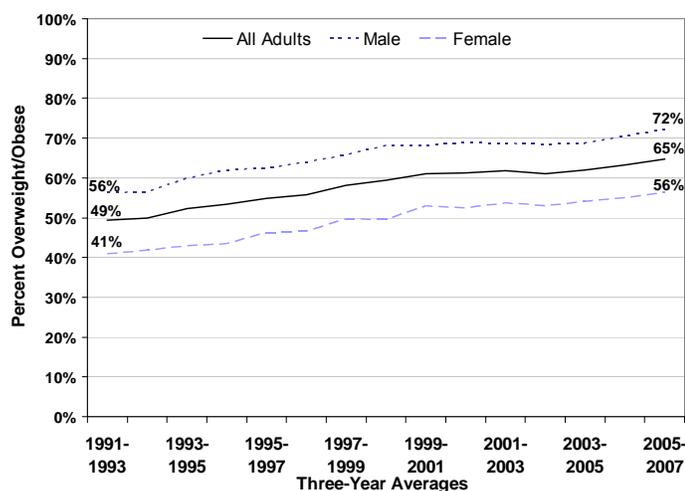
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our population, in general, and our children, in particular, gaining weight to a dangerous degree and at an alarming rate.”²

The rise in obesity among children is especially worrisome, as it threatens to negate many of the gains in children’s health that have been made in the past century. Among children, excess weight is associated with numerous health problems. High blood pressure, high cholesterol, orthopedic disorders, type 2 diabetes, and psychosocial disorders are more common among obese youth than among those with a healthy body weight.¹ In addition, children and adolescents who are overweight or obese have an increased risk of being overweight or obese as adults. Overweight and obese adults, in turn, have a higher risk of premature death than adults with normal weights. Obesity and overweight among adults are also associated with an increased risk of coronary heart disease, type 2 diabetes, musculoskeletal disorders, sleep apnea, asthma, and psychological disorders, as well as cancer of the endometrium, colon, kidney, gallbladder, and breast (postmenopausal).¹

Over the past several decades, overweight and obesity have become increasingly prevalent among adults and children in Alaska. Since 1991, the percentage of Alaskan adults who are overweight or obese (combined) has increased steadily. Three-year moving averages show that in 2005-2007 38% of Alaskan adults were classified as overweight, and an additional 26% were considered obese. When combined, these numbers indicate that 65% of Alaskan adults were above a normal weight (Figure 1).

Figure 1. Prevalence of Overweight/Obesity (BMI \geq 25.0) among Alaska Adults, by Sex, BRFSS (1991-2007)



The spread of the obesity epidemic has been equally, if not more, severe among children and adolescents. Since 1980, the national overweight and obesity rates have tripled for youth, with 34% of two to 19 year olds above a normal weight (above the 85th percentile).³ In Alaska, statewide data from the 2007 Youth Risk Behavior Survey (YRBS) indicated the number of high school students overweight or obese (combined) increased

by 8% since 2003. Nearly one-third (30%) of high school males and nearly one-quarter (24%) of high school females were above a normal weight. The 2007 YRBS data from Alaska’s largest school district—Anchorage—reveal similarly alarming rates of overweight and obesity. Among high school students in this school district, 28% reported heights and weights indicative of being above a normal weight.⁴

It is important to note that YRBS data on weight status are based on high school students’ self-reports, which have been shown to under-represent actual measured weight.⁵ A comparison of Anchorage School District objectively measured data to Anchorage YRBS self-reported data show obesity was 6% higher for females and 7% higher for males when measured versus self-reported. Thus, it is likely that the statewide overweight and obesity prevalence estimates obtained from the YRBS are underestimates.

An additional limitation of the YRBS in terms of providing youth obesity data is that currently the Alaska YRBS is administered systematically only to high school students. Thus less is known about the health risk behaviors of Alaska’s children younger than high school age, including the prevalence of overweight and obesity.

The growing problem of obesity among children and adolescents has focused much attention on body mass index (BMI) measurement programs in schools. School-based BMI measurement is widely accepted for surveillance purposes, which is used to identify prevalence, monitor trends and evaluate outcomes of interventions.⁶ Nationwide, 11 states required schools or school districts to measure or assess students’ height and weight or BMI.⁵ Arkansas passed General Assembly Act 1220 in 2003 requiring a statewide school-based BMI screening and surveillance program for all students in grades K-12, as part of a larger initiative to improve the health of young people. In 2007 the Centers for Disease Control and Prevention (CDC) issued a report, “Body Mass Index Measurement in Schools,” to provide guidance and help inform decision-making on school-based BMI measurement programs.⁶

The Anchorage School District has collected student height and weight measurements dating back to 1990-1991, but until 2004 these data had not been broadly published. To assess the scope of the obesity epidemic among children and adolescents in Anchorage, the Anchorage School District and the Alaska Division of Public Health collaborated to analyze these existing data for the 1998-1999 to 2003-2004 school years. Findings from this analysis showed 36% of kindergarten through 12th grade students were overweight or obese (combined).⁷

The current report extends the examination of Anchorage School District height and weight data through the 2007-2008 school year, thus enabling both a cross-sectional and a cohort analysis of the ten-year trend in aggregate student weight status. This report also presents a detailed analysis of the current extent of childhood overweight and obesity among Anchorage

School District students, both overall and by demographic sub group.

Methods

Sample

The sample was extracted from Anchorage School District students' health records for the period 1998-1999 through 2007-2008. The Anchorage School District is the largest district in the state, enrolling approximately 37% of the state's student population. School nursing staff routinely record height and weight measurements during school health screenings, the majority of which are conducted in kindergarten and 1st, 3rd, 5th, and 7th grades. Health information, including height and weight measurements, is recorded in student files and is entered into an electronic database. Height and weight measurements for students in grades pre-elementary through 12 were extracted from the database with all personal identifiers removed and students assigned a unique identification number. Each data point included date and age of student at time of measurement along with demographic variables of sex, age, grade, and race/ethnicity. Only a single race/ethnicity designation of American Indian/Alaska Native, Asian, Black or African American, Pacific Islander, White, Other, or Hispanic was available for each student.

Height and weight values were screened for accuracy, and values that were not biologically plausible were removed. Of the total 146,306 assessments reported, a final sample of 122,081 (94%) comprised the first biologically plausible measurements within the academic year from the study period. The height and weight values represented 28% of total student enrollment over the ten-year time period, with higher percentages for students in kindergarten and grades 1, 3, 5, and 7 (Table 1). Annual sample sizes have increased from just over 2,000 students, representing only 4% of district enrollments concentrated at the lower grade levels, in 1998-1999 to over 21,000 students and 44% of enrollments more evenly distributed across elementary, middle, and high schools in 2007-2008.

Analysis

BMI-for-age percentile values for the age in months 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 of the Centers for Disease Control and Prevention.⁸

Height, weight, and BMI percentile values for 10 school years (1998-1999 to 2007-2008) were analyzed, along with demographic information on the age, sex, grade, and race/ethnicity of the students. SPSS was used to produce mean percentages and categorical measures of underweight, normal weight, overweight, and obese along with 95% confidence intervals in which the values of each student contributed equally. Logistic regression was used in the assessment of linear trends.

Unless stated otherwise, annual summaries of weight status were based upon all individuals with valid measurements within the academic year. Of the 46,658 unique students in the sample, three-quarters had been measured in multiple years to allow analysis of changes in weight status among cohorts comprised of the same students between 1998-1999 and 2007-2008. Cohort analysis has the advantage of assessing a subset of the student population using the same individuals at multiple points in time, thereby removing much of the random variability by controlling demographic composition in terms of age, sex, and race/ethnicity.

Assessment of Overweight and Obesity

The BMI is used to estimate a person's risk of weight-related health problems and is calculated using weight and height. Because children and adolescents, ages two to 18 years, are still growing and have differences in body composition, their BMI is compared to the BMI's of other youth of the same sex and age in a reference population. BMI's for children and adolescents are evaluated by age on a sex-specific growth curve to find percentile for sex and age.⁹

Table 1. Percentage of Students Sampled by Grade: Anchorage School District Students, 1998-1999 to 2007-2008

Grade Level														
Pre-K	K	1	2	3	4	5	6	7	8	9	10	11	12	Total
4%	11%	32%	1%	5%	0%	0%	0%	0%	0%	0%	0%	0%	0%	4%
40%	56%	42%	10%	49%	1%	2%	0%	0%	0%	0%	0%	0%	0%	13%
22%	59%	41%	8%	54%	7%	6%	0%	0%	0%	0%	0%	0%	0%	14%
28%	63%	45%	9%	60%	8%	52%	1%	2%	0%	0%	0%	0%	0%	19%
43%	67%	41%	10%	63%	8%	60%	8%	6%	0%	0%	0%	0%	0%	21%
39%	67%	42%	9%	66%	8%	66%	8%	54%	1%	0%	0%	0%	0%	25%
57%	70%	60%	47%	64%	47%	66%	45%	54%	10%	2%	2%	0%	0%	36%
67%	73%	60%	19%	70%	17%	71%	17%	68%	15%	9%	7%	0%	0%	33%
77%	81%	65%	18%	79%	16%	78%	16%	78%	9%	10%	57%	2%	1%	39%
81%	91%	79%	19%	87%	17%	83%	16%	82%	9%	10%	59%	15%	1%	44%

BMI surveillance data are a reliable tool used to describe trends in weight status over time among populations and subpopulations. BMI is the most widely used measure because it is relatively easy, inexpensive, noninvasive, and quick to obtain. BMI is not a direct measure of body fat but has been shown to significantly correlate with body fat.⁹ It is important to note that BMI should not be used alone to diagnosis 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 health care provider to obtain an informed diagnosis.^{9,10}

In March 2007, the Expert Committee on the Assessment, Prevention, and Treatment of Child and Adolescent Overweight and Obesity recommended the use of the terms “overweight” and “obese” in place of the terms “at-risk for overweight” and “overweight” used for children and adolescents (Table 2).¹⁰ The cutoff points remain the same; however, the committee changed the terms to reflect more appropriate clinical descriptions, provide continuity with adult definitions, and avoid the vagueness of “at-risk for overweight”. The new terminology, “overweight” and “obese”, is used for consistency in this report.

Table 2. BMI Classification for Children 2-18 Years Old

BMI for Age Percentiles	Former Terminology	Recommended Terminology ¹⁰
<5 th	Underweight	Underweight
5 th to <85 th	Normal Weight	Normal Weight
85 th to <95 th	At-risk for Overweight	Overweight
≥95 th	Overweight	Obese

Results

Trends in Weight Status

The trend in Anchorage School District student weight status over the past 10 years is depicted in Figure 2. Over that time period, the percentage of students who were at a normal weight decreased significantly, from 68% in 1998-1999 to 62% in 2007-2008. Looking more closely, it appears that much of this reduction was due to an increase in obesity, and that this increase may have reached a plateau. Specifically, the prevalence of obesity increased significantly from 12% in 1998-1999 to 19% in 2002-2003, then remained fairly stable through 2007-2008. The prevalence of overweight increased slightly between 1998-1999 (18%) and 2002-2003 (19%), but returned to the 18% prevalence by the 2007-2008 school year. The prevalence of overweight or obese (combined) has been consistently higher for boys compared to girls (Figure 3). The trend in overweight or obese (combined) did not differ by grade level.

Figure 2. Trend in Weight Status, Anchorage School District, 1998-1999 through 2007-2008

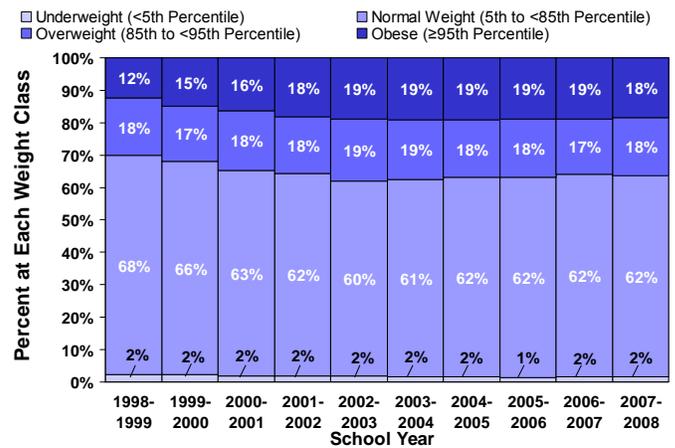
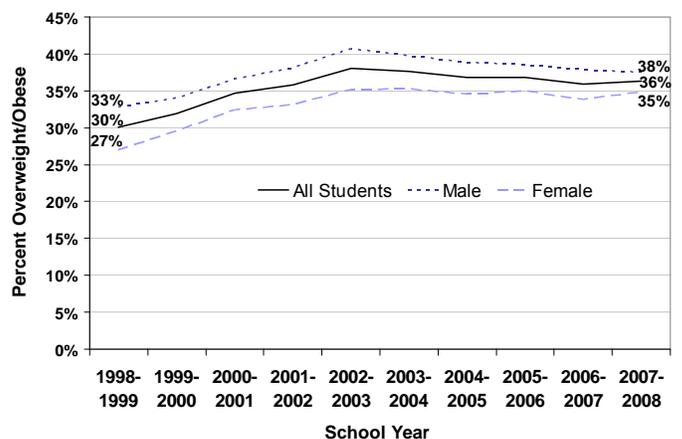


Figure 3. Prevalence of Overweight/Obesity (BMI ≥85th Percentile) by Sex, Anchorage School District 1998-1999 through 2007-2008



Current Weight Status

Considering just the most recent year of data, the prevalence of overweight or obese (combined) among Anchorage School District students of all ages was 36%; only 2% were underweight (Figure 4).

Both the prevalence of obesity and the prevalence of overweight or obese (combined) were significantly higher in students 12 years or older (20% and 38%, respectively) compared to those under six years old (16% and 34%, respectively) (Figure 5); however, it is clear that overweight and obesity are prevalent even among the youngest students. Of children entering kindergarten and 1st grade in 2007-2008, 18% were overweight and 15% were obese (Figure 6); only 66% were at a normal weight.

Overweight and obesity varied significantly by race/ethnicity (Figure 7). Pacific Islander students were significantly more likely to be overweight or obese (combined) compared to all other racial or ethnic groups. These students were also two to

Figure 4. Weight Status of Students, Anchorage School District, 2007-2008

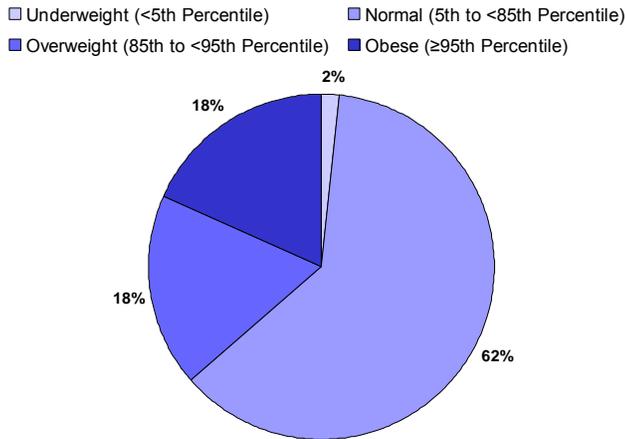


Figure 5. Prevalence of Overweight/Obesity and Obesity by Age Groupings, Anchorage School District, 2007-2008

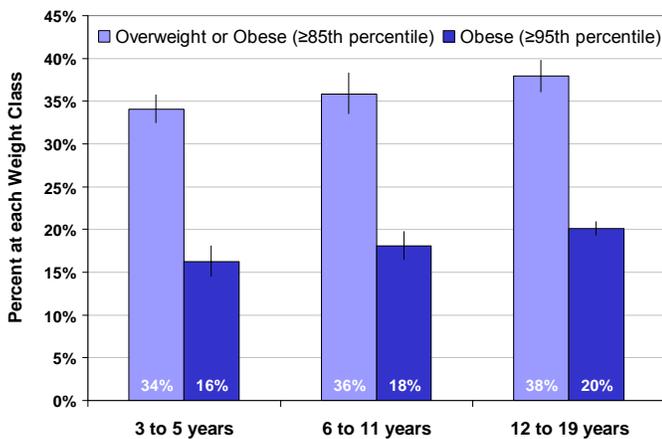


Figure 6. Weight Status of Kindergarten and First Grade Students, Anchorage School District, 2007-2008

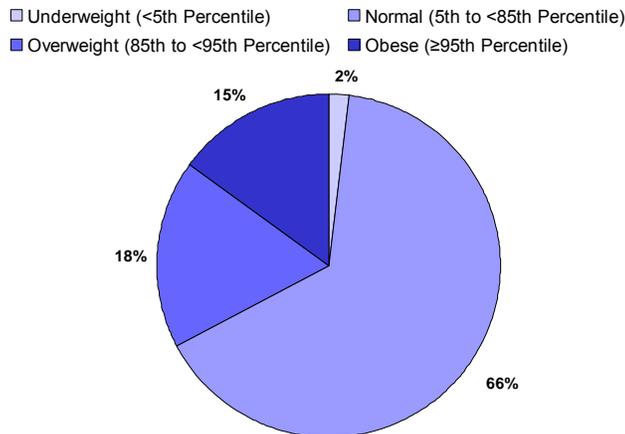
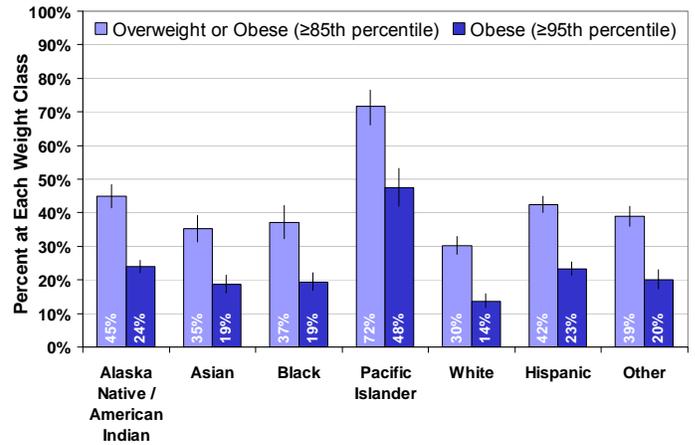


Figure 7. Prevalence of Overweight/Obesity by Race/Ethnicity, Anchorage School District, 2007-2008



three times as likely to be obese compared to all other groups. Alaska Native/American Indian students had a higher prevalence of overweight or obese (combined) compared to Asian and White students, as well as a higher prevalence of obesity than Asian, White, or Black students. The lowest prevalence of obesity was among White students, who were significantly less likely to be obese than Hispanic students and those of all other racial backgrounds.

Cohort Analysis

A total of 926 students had valid height and weight data in both the 1998-1999 and 2007-2008 school years. Tracking the BMI's of this cohort of students allows for a finer examination of changes in weight status in both directions. Among students who were at a normal weight in 1998-1999, 23% were either overweight or obese (combined) 10 years later (Figure 8). Of the students who were overweight or obese (combined) in 1998-1999, 75% were still above a normal weight in 2007-2008; only 25% had not remained overweight or obese (combined) (Figure 9).

Figure 8. Change in Weight Status Among Normal Weight Students between 1998-1999 and 2007-2008, Anchorage School District

For every 10 students of Normal Weight in 1998-1999...



by 2007-2008...



8 were still at a Normal Weight...



and 2 had become overweight or obese.

Figure 9. Change in Weight Status Among Overweight or Obese Students between 1998-1999 and 2007-2008, Anchorage School District

For every **10 Overweight or Obese** students in 1998-1999...



by 2007-2008...



only **2** were now at a
Normal Weight...



and **8** had remained
overweight or obese.

Due to the higher proportion of students in 1998-1999 being of normal weight (71%), the net changes result in an additional 9% of students being overweight or obese (combined) at the end of the 10 years (29% in 1998-1999 relative to 38% in 2007-2008). Overall, obesity prevalence nearly doubled, from 12% in 1998-1999 to 22% in 2007-2008 among this subset of students.

Discussion

Childhood overweight and obesity are significant problems in the Anchorage School District. As of the 2007-2008 school year, more than one in three students in this district was above a healthy weight. Although no demographic groups were immune to this important health issue, certain population subgroups appear to be at increased risk. In line with national data, boys had significantly higher rates of overweight or obese (combined) compared to girls.¹¹ Older students were slightly more likely to be obese than were the youngest students; however, fully one-third of students under age 6 were overweight or obese (combined). This indicates that weight status is already a concern for many students upon entering school; clearly, the solution to childhood obesity in Alaska cannot rest solely with the schools.

The largest racial/ethnic differences in overweight and obesity were found between Pacific Islanders and all other groups—nearly three-quarters of Pacific Islander students were above a normal weight. It is worth noting that the current classification system for defining youth weight status is based upon a primarily White standard population. Many factors contribute to youth height and weight, and there are undoubtedly cultural differences in the distribution of those factors. Nonetheless, because there currently are no clinically significant differences in the relationship between BMI and body composition in different racial or ethnic groups, it is recommended that the same BMI standards be applied to all racial and ethnic subpopulations.^{10,12}

The cohort analysis showed that although some students move between weight categories over time, a majority had the same weight classification in 2007-2008 as they did in 1998-1999.

Students who were overweight or obese (combined) in 1998-1999 were more likely to remain overweight or obese by 2007-2008 than to become of normal weight. Unfortunately, nearly one-quarter of students who were normal weight in 1998-1999 also became overweight or obese 10 years later. Because most students started out being of normal weight, this change reflects a net increase in overweight and obesity during this period. Alarming, among this subset the prevalence of obesity nearly doubled over this time. Results from this analysis dispel the adage that overweight or obese children will “grow out of it.”

Despite this grim picture, the data in this report also provide reason for hope and even some celebration. The trend data show that, as of 2003, rates of overweight or obese (combined) have plateaued within the Anchorage School District. This pattern appears to hold across both sexes and all age groups (data not shown). Although the lack of a reasonable control group prohibits a rigorous evaluation of the causes of this “bend in the trend,” several statewide and Anchorage-specific initiatives could plausibly have contributed to this outcome either through raising awareness of the issue of childhood obesity, or more directly through providing resources to be used in addressing the problem. These initiatives and events are outlined in Table 3, along with the responsible agency(ies) and dates.

It is important to note that subsequent to the publication of the first report on student weight status in 2004⁷, the Anchorage School District has implemented three significant policies and environmental modifications that promote health behavior change.

1. In June 2006, the Anchorage School District 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 office, school cafeteria fountain drink machines, and fundraisers. The Superintendent, Carol Comeau, announced “It is the right thing to do given the rising number of youth and adults who are overweight” referring to adoption of the Wellness Policy.¹³
2. The Anchorage School District in 2007-2008 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.¹⁴
3. The following school year the elementary student schedule was revised again to provide a 50 percent increase in the students’ physical education instruction. At that time, Comeau again noted the physical education increase is part of the battle against child obesity.¹⁵

The effectiveness of these interventions that modified school policies and the environment to support improved dietary practices and regular physical activity has not been rigorously evaluated. However, these types of strategies to combat childhood obesity are expected to make a significant impact.¹⁶ It is important to note that lack of evidence of effectiveness is

Table 3. Obesity-Related Initiatives and Events in Alaska and Anchorage, 2002 to Present.

Year	Obesity-Related Initiative/Event	Responsible Agency(ies)
2002	Alaska Obesity Prevention and Control program (OPCP) established	AK Division of Public Health (DPH)
2003	Publication of first statewide Youth Risk Behavior Survey (YRBS) obesity prevalence data for high school students (available at: http://www.hss.state.ak.us/dph/chronic/school/pubs/YRBSreport2003.pdf)	DPH; AK Department of Education and Early Development (EED)
2003	First Statewide Obesity Summit meeting held to develop Alaska-specific Obesity Prevention and Control plan. Attendees included stakeholders representing families, communities, schools, worksites, health care, media, non-profit organizations, and government.	OPCP
2004	Publication of first "Burden of Obesity in Alaska" report (available at: http://www.hss.state.ak.us/dph/chronic/obesity/pubs/obesityBurden.pdf)	OPCP
2004	Standardized scales, stadiometers and height and weight measurement training provided to school nurses within the Anchorage School District	OPCP, Anchorage School District (ASD)
2004	"Prevalence of Overweight Among Anchorage Children: A Study of Anchorage School District Data: 1998-2003" report presented to Anchorage School Board and subsequently published (available at: http://www.epi.hss.state.ak.us/bulletins/docs/rr2004_09.pdf)	OPCP, ASD
2005	"Alaska in Action: Statewide Physical Activity and Nutrition Plan" to prevent and control obesity published (available at: http://www.hss.state.ak.us/dph/chronic/obesity/pubs/AlaskaInAction.pdf)	OPCP and statewide obesity prevention partnership
2005-2006	Anchorage Mayor's Task Force on Obesity and Health convenes and published 10-year plan (available at: http://www.muni.org/healthchp/ObesityTaskForce.cfm)	Anchorage Department of Health and Human Services and municipal obesity prevention partners

not the same as evidence of ineffectiveness. Adoption of school policies and environmental approaches with concurrent evaluation is warranted, however is outside the scope of this report. Therefore, the extent to which any of these interventions may have contributed to the apparent leveling off of obesity rates thus far is unclear.

Finally, recent national data suggest that the plateau seen in Anchorage School District student overweight and obesity rates may at least in part reflect national trends. 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 2005-2006.¹⁷ More years of data are needed to provide a clearer picture of this national trend, but it indicates the first possible slowing of childhood obesity prevalence nationwide since the administration of the NHANES dating back to 1971.

Limitations

There are limitations that must be considered when interpreting these 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. The available measurements for the 10-year time period, however, represented 28% of students enrolled in all

grades. Because health examinations are conducted primarily in kindergarten, 1st, 3rd, 5th and 7th grades, height and weight measurements were available for a higher percentage of students in those grades.

Measurements were available for over half of the students enrolled in kindergarten, 1st, 3rd and 5th grades for the 10-year time frame, with recorded data for over 80% of students in some grades during an academic year. Because efforts were made to screen all students in the district, it is unlikely that the high prevalence of overweight and obesity is due to a selection bias that resulted in the disproportionate selection of students from groups at high risk for being overweight or obese.

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 that they could be responsible for systematic under- or over-estimation of weight status.

Conclusion

In spite of the study limitations, the results of this analysis indicate both cause for concern and reason for hope with regard to the weight status of children in the Anchorage School District. The apparent stabilization of rates of overweight and obesity does not signal that it is time to ease up efforts on this front, but rather that now may be the time to make a concerted effort to not only halt but *reverse* the trend in childhood obesity.

Schools, next to families, have more influence on the lives of young people than any other social institution¹⁸ and schools can promote positive health behaviors by providing education on good nutrition and physical activity. More importantly schools can give students opportunities to practice the healthy behaviors they learn about in class by: ensuring that the food and beverages available to students are nutritious; physical education courses are offered; and that students are given opportunities to be active before, during, and after school. Care must be taken to consider the cultural appropriateness of any developed intervention or policy, as well as the potentially stigmatizing nature of youth overweight. One mechanism for supporting school-based nutrition and physical activity is to develop and implement a comprehensive culturally appropriate school wellness policy.

Another important component of this effort must be continued and expanded collection, analysis, and reporting of youth BMI data. The Anchorage School District has made great strides in not only collecting these data but also using the resulting reports to facilitate policies that have great potential to effect lasting improvements in obesity-related health status. The expansion of the BMI surveillance program to other districts in Alaska would: (a) improve districts' knowledge of the health status of their student body, (b) allow for better evaluation of local obesity-prevention programs and policies, and (c) potentially catalyze improvements in local physical activity and nutrition policies.

No single intervention, in school or elsewhere, is likely to be sufficient to reverse the childhood obesity trend.¹⁶ The fact that such 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. Positive change can occur if policy and environmental changes are made that result in the healthy choice becoming the easy and affordable choice. To truly reverse the childhood obesity trend, a comprehensive, coordinated, long-term obesity prevention approach that involves and is supported by individuals, families, communities, schools, childcare centers, worksites, health care providers, media, and government is necessary. Only the synergistic work of all these stakeholders will ensure that Alaska's children have a strong and healthy future.

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