Nebraska Student BMI Surveillance Report

2016-2017

Nebraska Department of Health and Human Services

Division of Public Health

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Executive Summary

Introduction: Nationally, adult obesity rates have doubled since the 1980s, increasing the risk and prevalence of obesity-associated diseases such as diabetes and hypertension. Childhood obesity is a major risk factor for adult obesity, but overweight children are also at risk for other chronic health conditions. Body Mass Index (BMI) is a composite measure of height and weight, and is a simple and reliable indicator of healthy and unhealthy weight categories for children.

Purpose: The Nebraska School Health Program conducts periodic, statewide assessments of children's health, including weight. The 2016-2017 Student BMI Surveillance Project was designed to generate statistically valid, generalizable estimates of BMI levels of the state's 1st, 4th, 7th and 10th grade students for use in local and state-level obesity prevention activities and program evaluation.

Methods: Nebraska school administrators were requested to provide the School Health Program with de-identified screening data from the 2016-2017 school year. A statewide probability sample of schools with 10th grade classes was selected, with oversampling of non-metropolitan counties, schools with higher enrollment of racial/ethnic minority students, and with higher proportions of students receiving free or reduced lunch (FRL). Selected schools that declined or were unable to provide data were replaced with comparable responding schools. 1st, 4th and 7th grade classes were identified from the selected high schools' attendance areas.

Results: Records were analyzed for 19,516 students representing 31 school districts and 123 separate schools. BMI values were in the overweight or obese range for 34.4% of students, similar to values reported for the 2013-2014 school year. The percentage of overweight and obese students increased with grade level, and was significantly different by student race, ethnicity and sex.

Conclusions: The current work presents a solid benchmark against which to judge future change. Comparison with previous years suggests that rates of obesity and overweight are not increasing substantially, but neither are they declining. Increases appear to slow by the 7th grade, suggesting that elementary and middle school are key periods for prevention activities. These activities should be tailored to the needs of lower income and racially diverse students, as well as to the state's different geographic regions.

Introduction

The School Health Program of the Nebraska Department of Health and Human Services (DHHS) works with schools, school health professionals, families, and agencies to improve children's health. Among the monitoring functions of the program is the statewide assessment of children's health, including weight. Nationally, adult obesity rates have doubled since the 1980s, increasing the risk and prevalence of obesity-associated diseases such as diabetes and hypertension.[1] In 2016, Nebraska and Iowa were tied for the 13th highest adult rate in the country[2]. Childhood obesity is a major risk factor for adult obesity, but overweight children are also at risk for other chronic health conditions. National surveys estimate that approximately one-third (31.2%) of U.S. children ages 10-17 are overweight or obese[2], and that one-fifth (20.6%) of children ages 12-19 are obese.[3] The national Healthy People 2020 program set targets for reductions in childhood obesity at 15.7% for 6 to 11-year olds, and 16.1% for 12 to 19-year olds.[4] With widespread focus on what has been called "the obesity epidemic," there have been concerted efforts to incorporate childhood obesity prevention activities into social service-, community, and school-based programs.

Public school districts are required under Nebraska Revised Statute §79-248 to conduct annual height and weight screenings of their students. The School Health Program periodically requests the districts to voluntary submit their de-identified screening data for the statewide assessment. Body Mass Index (BMI) is a composite measure of height and weight, and is a simple and reliable indicator of healthy and unhealthy weight categories.[5] State-level student BMI levels from the 2013-2014 and 2010-2011 school years have been reported previously[6]; these results

[1] Centers for Disease Control and Prevention. 2018. Childhood Obesity Facts. www.cdc.gov/healthyschools/obesity/facts.htm

[2] Trust for America's Health. 2017. The State of Obesity: 2017.

[3] National Center for Health Statistics. 2017. Health, United States, 2016: With Chartbook on Long-term Trends in Health (Table 53.). www.cdc.gov/nchs/fastats/obesity-overweight.html

[4] Nutrition and Weight Status Objectives 10.4 and 10.2. Available at www.healthypeople.gov/2020/topics-objectives/topic/nutrition-and-weight-status/objectives.

[5] Centers for Disease Control and Prevention. 2015. Healthy weight – About Child & Teen BMI. www.cdc.gov/healthyweight/assesssing/bmi/childrens_bmi/about_childrens_bmi.html.

[6] Available at www.dhhs.ne.gov/publichealth/Pages/schoolhealth_data.aspx.

have been incorporated into obesity prevention activities and program evaluation. However, those results were only representative of the districts that submitted their screening data. The 2016-2017 Student BMI Surveillance Project was designed to generate statistically valid, generalizable estimates of BMI levels of the state's 1st, 4th, 7th and 10th grade students for use in local and state-level obesity prevention activities and program evaluation.

Methods

In March 2016 Nebraska's public school administrators were informed of the BMI study, and asked to submit their BMI screening data for the 2016/2017 school year. School personnel were provided internet access to an Excel-based data entry program that automatically calculated BMI and grade-specific BMI percentiles from student-specific demographic and screening data. Staff were requested to submit completed data entry sets for their 1st, 4th, 7th and 10th grade classes to the DHHS School Health Program. In February 2017 an email reminder was sent to all schools that had not submitted data, and that had not been identified as a school that had closed, declined to participate, or was otherwise unable to provide the requested information.

The data entry program was a modified version of the Centers for Disease Control and Prevention (CDC) Children's BMI Tool for Schools[7]. The spreadsheet computes BMI and BMI percentiles for individual students, using their height and weight measurements, sex, date of birth, and date of measurement information as entered by the school screening staff. Calculated BMI is then compared to distributions from national surveys of U.S. children, yielding sex- and age-specific percentages of children with BMI values lower than the calculated value ("percentile")[8]. Weight status categories for calculated BMI-for-age percentile ranges are outlined in Table 1.

[7] Children's BMI Tool for Schools. https://www.cdc.gov/healthyweight/assessing/bmi/chiildrens_bmi/tool_for_schools.html.
[8] What is a BMI percentile and how is it interpreted? www.cdc.gov/healthyweight/assesssing/bmi/childrens_bmi/about_childrens_bmi.html.

Table 1.	
Body Mass Index (BMI) category	Sex-specific percentile range[1]
Underweight	Less than 5th percentile
Healthy weight ("Normal")	5th to less than the 85 percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

Source: CDC weight status categories for children and teens.

Lists provided by the Nebraska Department of Education (NDE) identified all Nebraska schools with at least 15 students enrolled in the 10th grade ("high schools"). A representative sample of high schools was selected using systematic sampling with probability proportional to 10th grade enrollment[9], with over-representation of schools from non-metropolitan ("non-metro") counties, with higher proportions of minority students, and/or with higher proportions of students receiving Free or Reduced Lunch (FRL). School districts in seven large counties (Douglas, Sarpy, Lancaster, Washington, Saunders, Seward, and Cass) were designated as metropolitan ("metro"), with the rest labeled non-metro[10]. "High minority" schools were those with greater than 50% non-White students.

Seven school districts formally declined to provide their screening results. The sampling process identified 43 target 10th grade schools, with corresponding 1st, 4th and 7th grade classes selected at random from each high school's attendance area. In order for results to be representative of the 2016-2017 school year, data were restricted to measurements with screening dates between March 1, 2016 and June 30, 2017. Data from schools that did not submit data despite repeated requests, or that were only able to provide school-level aggregated results, were replaced by data from the most comparable responding school. The final data were weighted by the probability of the school having been selected for the sample, and the number of valid screening results they submitted. The weighting process allows the survey data to be generalized to 1st, 4th, 7th and 10th grade public school children statewide.

[9] Association of State and Territorial Dental Directors (ASTDD). 2015. Guidance on Selecting a Sample for a School-Based Oral Health Survey. https://www.astdd.org/docs/bsic-screening-survey-tool/

[10] "Metropolitan and "non-metro" should be considered statistical terms, and not necessarily representative of students' actual communities.

Results

The analysis dataset of 19,516 student records represented 31 school districts and 123 separate schools. Demographic characteristics of surveyed students are similar to those reported by the Nebraska Department of Education (NDE) for the 2016/2017 school year (Table 2).

Table 2.		
Characteristics of 1st, 4th, 7th and 10th Grade Students 2016-2017 School Year	BMI Survey[11] (19,516 Students)	NDE (91,556 Students)
Sex		
Male	51.4%	51.4%
Female	48.6%	48.6%
Race		
White[12]	84.5%	67.0%
African-American	7.3%	6.6%
American Indian	3.3%	1.1%
Asian/Pacific Islander	2.5%	3.8%
Other/Multiracial	2.4%	3.7%
Ethnicity / Race		
Hispanic[12]	18.4%	18.9%
School Characteristics		
Metropolitan county	50.3%	59.6%
FRL percentage (school-level)	46.3%	44.1%
FRL percentage >75th percentile (school-level)[13]	27.8%	28.9%
Minority percentage > 50% (grade-level)	22.4%	24.6%

Students' BMI values were in the overweight or obese range for 34.4% of students (Table 3). The percentage of overweight and obese students was similar to values reported for the 2013/2014 school year.

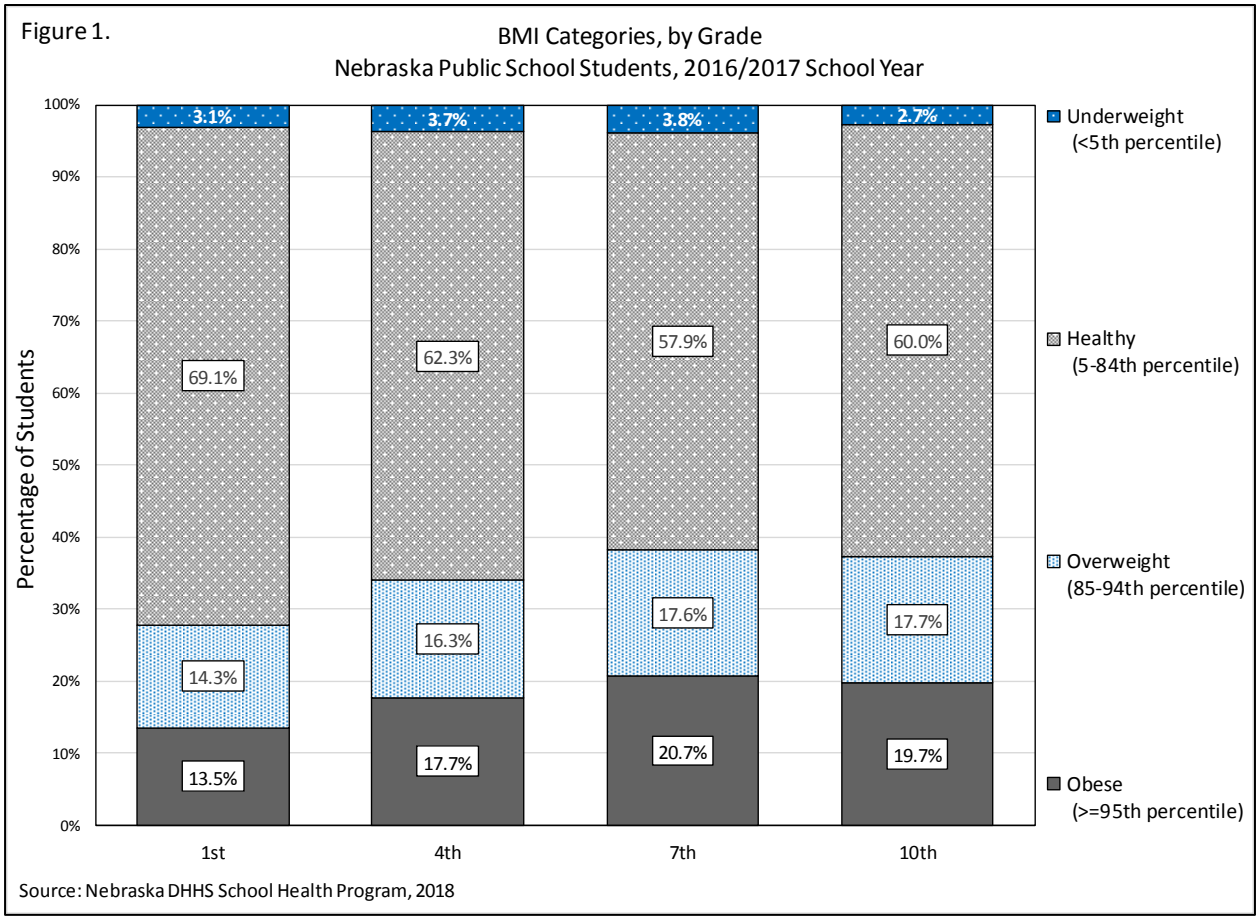
[11] Results are from weighted data.

[12] Hispanic is treated as an ethnicity by DHHS, but as a racial category by NDE. The five race categories sum to 100% for the BMI survey results, but need to include Hispanic for the NDE total.

[13] Based on the 75th percentile of the FRL rate for the sampled schools, 57.6%.

Table 3.				
BMI Category	School Year			
	2016-2017 (95% Confidence Interval)		2013-2014	2010-2011
Underweight	3.3%	(3.26 - 3.37)	3.1%	2.2%
Healthy weight	62.3%	(61.7 - 62.9)	62.6%	62.1%
Overweight	16.5%	(16.2 - 16.8)	16.3%	17.1%
Obese	17.9%	(17.6 - 18.2)	18.0%	18.7%
Overweight or obese	34.4%	(33.8 - 35.0)	34.3%	35.8%

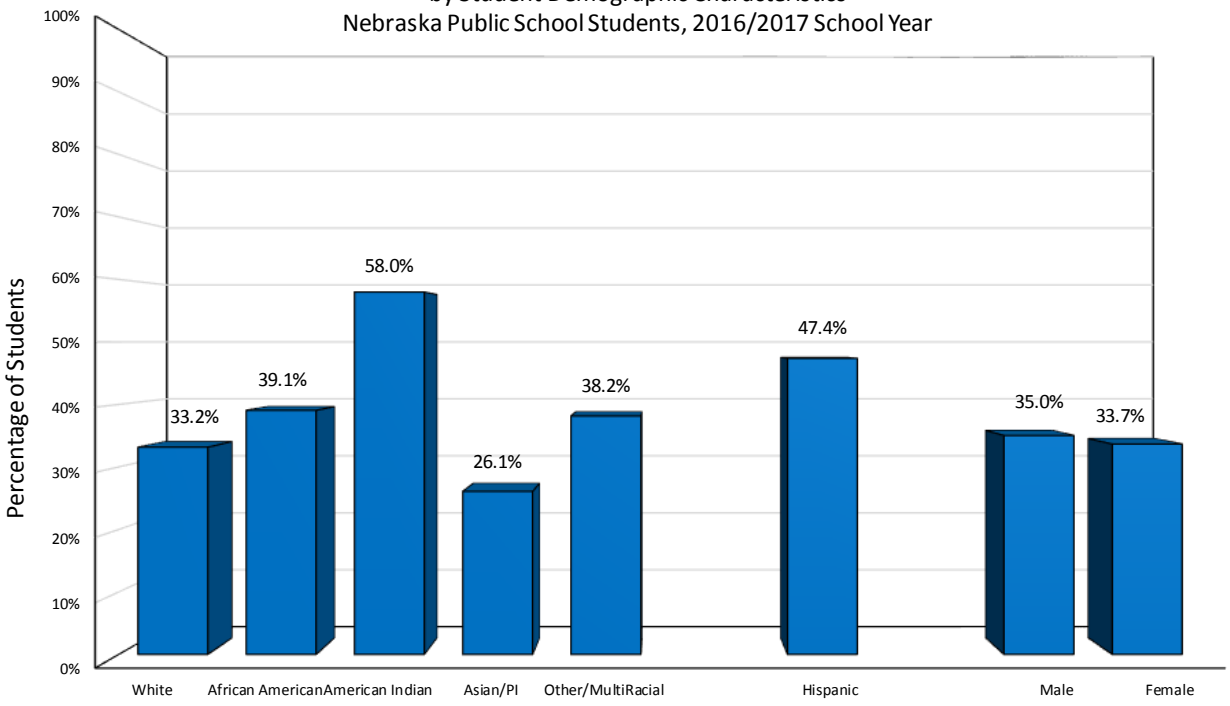
The percentage of overweight and obese students increased as the grade level increased (Figure 1). Seventh grade students had the highest percentages of both underweight (3.8%) and obese (20.7%) students, while the highest percentage of non-obese overweight occurred in the 10th grade.



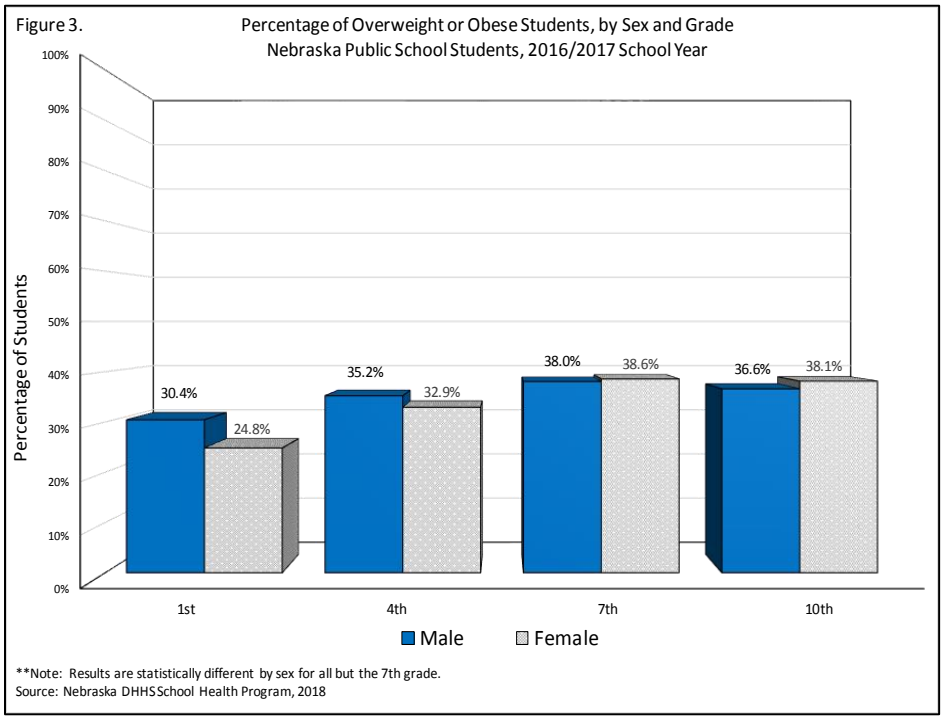
The percentages of overweight and obese students were also significantly different by student race, ethnicity and sex (Figure 2). Because not all school districts identify Hispanic students the same way, their result should be interpreted with caution.

Figure 2.

Percentage of Overweight or Obese Students in Grades 1, 4, 7 and 10, by Student Demographic Characteristics
Nebraska Public School Students, 2016/2017 School Year

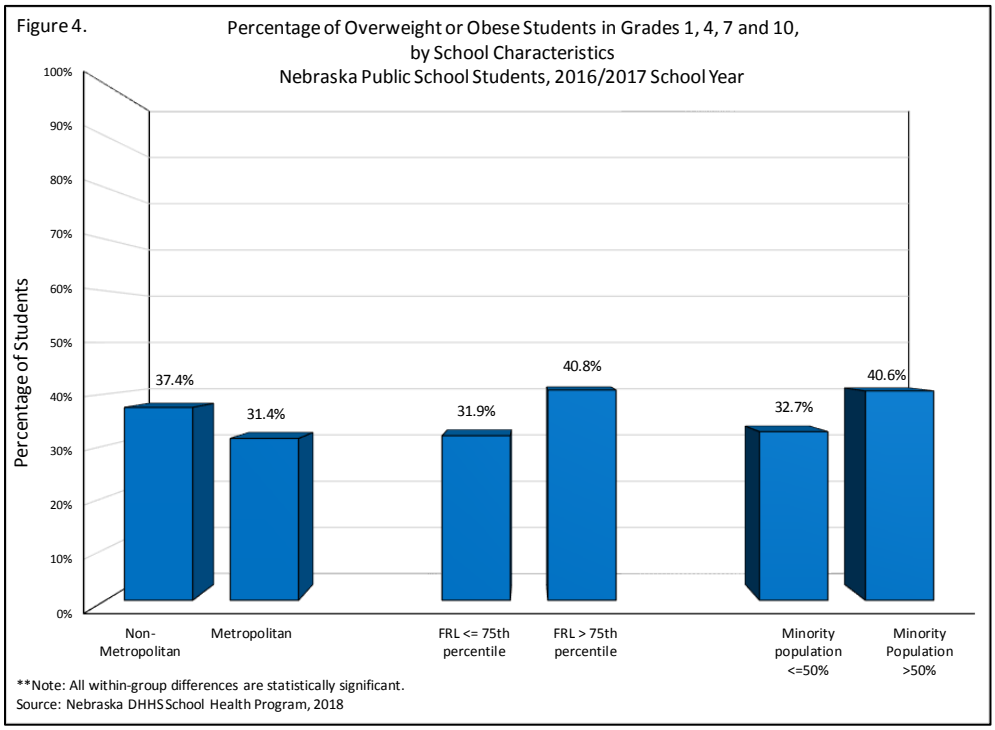


**Notes: Hispanic students were identified inconsistently, and results should be interpreted with caution. Results for African-American and Other/Multiracial students are not significantly different. All other within group comparisons are significantly different.
Source: Nebraska DHHS School Health Program, 2018



Looking at patterns of BMI change by sex (Figure 3), male students were more likely to be overweight in the 1st and 4th grades. This difference was largely erased by 7th grade.

Differences in BMI were also apparent at the school level (Figure 4). Students in non-metropolitan counties, in classes with higher rates of Free or Reduced Lunch, or with higher proportions of minority students were significantly more likely to be overweight or obese.



Conclusions

The prevalence of overweight and obesity found in this study is similar to values reported for the 2010-2011 and 2013-2014 school years. However, those results were based on responses from all districts and schools voluntarily submitting data and are thus not strictly generalizable to the entire state. With the rigorous study methodology, large sample size, and comparability of the final sample with NDE statistics (Table 2), the current results provide a solid benchmark against which to judge future change. Nonetheless, the similarity of results suggests that rates of obesity and overweight are not increasing substantially, but neither are they declining.

Although children's weight is influenced by multiple factors such as family income, community resources, and cultural norms, there is evidence that targeted intervention programs can make a difference. School-based physical activity interventions have been highlighted as particularly effective.[14] Data from this statewide survey showed increases in overweight and obesity slowing by the 7th grade. With only younger grades meeting the Healthy People 2020 targets for childhood obesity (15.7% for 6 to 11-year olds; 16.1% for 12 to 19-year olds) [4], the elementary and middle school years appear to be key periods for prevention activities. Results also suggest that obesity and overweight are not limited to specific regions of the state, and that there is a need for programs tailored to the needs and circumstances of lower income and racially diverse students.

Acknowledgements

Dr. Kathy Phipps, Data and Surveillance Coordinator for the Association of State and Territorial Dental Directors, was generous with her time and expertise with the technical aspects of the study.

[14] Wang, Y., L, Cai., Y. Wu et al. 2015. What childhood obesity prevention programmes work? A systematic review and meta-analysis. Obesity Reviews 16(7):547-565. Available at www.ncbi.nlm.nih.gov/pmc/articles/PMC4561621/#_ffn_sectitle.

And, the study would not have been possible without the dedication and hard work of Nebraska's school nurses and other staff, in carrying out the student measurements, recording the data, and submitting results to the School Health Program. Their contributions are greatly appreciated.