

# Overweight youth in Minnesota, their eating habits and physical activity

Data from 2007 Minnesota  
Student Survey

October 2008



Minnesota Department of **Human Services**  
Performance Measurement and Quality Improvement Division

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and physical activity:

Data from 2007 Minnesota Student Survey

By

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This is the first of a series of reports on issues related to overweight/obesity among  
Minnesota youth.

Copies of this report and the other reports, including the reports on adult obesity,  
can be printed from [www.dhs.state.mn.us/healthcare/studies](http://www.dhs.state.mn.us/healthcare/studies)

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## Background

The United States has been experiencing a growing trend in overweight and obesity among children. In connection to this trend, serious weight-related health problems have been emerging too. The rising incidence of “adult diseases,” such as hypertension and type 2 diabetes, in children and youth, and the expectation that rising obesity rates will lower by decades the age of onset for many chronic diseases, highlight the urgency of reversing this epidemic.<sup>1</sup> In addition to the emergence of weight-related medical problems, there is also a heavy psychosocial toll, such as social isolation, eating disorder, anxiety and depression associated with overweight and obesity.<sup>2</sup> The risk of dying by middle age is already two to three times higher among obese adolescent girls than among those of normal weight, even after other factors are taken into account,<sup>3</sup> and some scholars predict that pediatric obesity may shorten life expectancy in the United States by two to five years by mid-century, which is an effect equal to that of all cancers combined.<sup>4</sup> This could cause the current generation of children to become the first in U.S. history to live shorter lives than their parents.<sup>5</sup>

The federal government’s *Healthy People 2010* identified overweight and obesity as one of 10 leading health indicators and called for a reduction in the proportion of children and adolescents who are overweight or obese.<sup>6</sup> The latest data from the National Health and Nutrition Examination Survey (NHANES 2003-2004) show that the prevalence of overweight among children aged 6 to 11 more than doubled from NHANES 1976-1980, increasing from 6.5% to 18.8%; for those aged 12 to 19 it more than tripled, increasing from 5.0% to 17.4%.<sup>7</sup> These prevalence figures are more than three times the target goal of 5% set in *Healthy People 2010*.

This trend among children and teens could become even more serious through trans-generational mechanisms. Overweight children and adolescents are more likely to become obese as adults, and adult obesity appears to increase the risk of obesity in offspring.<sup>2</sup> For example, one study found that approximately 80% of children who were overweight at ages 10–15 were obese adults at age 25.<sup>8</sup> Another recent study found that maternal

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<sup>1</sup> Foerster SB, Silver LD, Kohatsu ND, Frieden TR, Bassett MT, Horton MB. Childhood obesity on the front lines. *Am J Prev Med* 2007; 33:s175-s177.

<sup>2</sup> Ludwig DS. Childhood obesity—The shape of things to come. *N Engl J Med* 2007; 357(23):2325-27.

<sup>3</sup> Van Dam RM, Willett WC, Manson JE, Hu FB. The relationship between overweight in adolescence and premature death in women. *Ann Intern Med* 2006; 145:91-97.

<sup>4</sup> Olshansky SJ, Passaro DJ, Hershow RC, et al. A potential decline in life expectancy in the United States in the 21<sup>st</sup> century. *N Engl J Med* 2005; 352:1138-45.

<sup>5</sup> American Heart Association & The Robert Wood Johnson Foundation. May 1, 2005. A nation at risk: Obesity in the United States: A statistical sourcebook. Available online at [www.rwjf.org/files/publications/other/AH\\_NationAtRisk.pdf](http://www.rwjf.org/files/publications/other/AH_NationAtRisk.pdf)

<sup>6</sup> U.S. Department of Health and Human Services. *Healthy People 2010*. 2nd edition. 2 volumes. Washington, DC: U.S. Department of Health and Human Services, 2000.

<sup>7</sup> NHANES data on the Prevalence of Overweight Among Children and Adolescents: United States, 2003–2004. CDC National Center for Health Statistics, Health E-Stat. [www.cdc.gov/nchs/products/pubs/pubd/hestats/overweight](http://www.cdc.gov/nchs/products/pubs/pubd/hestats/overweight)

<sup>8</sup> Freedman DS, Khan LK, Dietz WH, Srinivasan SR, Berenson GS. Relationship of childhood overweight to coronary heart disease risk factors in adulthood: The Bogalusa Heart Study. *Pediatrics* 2001; 108:712–718.

hyperglycemia during pregnancy strongly predicted body mass index (BMI) in offspring at ages 5 to 7, after adjustment for maternal weight gain and birth weight.<sup>9</sup> Assessment and intervention efforts in early life stages are critical to reverse the obesity epidemic.

### Minnesota youth

This report examines the prevalence of overweight and obese youth in Minnesota as well as their eating habits and physical activities.<sup>10</sup> This is the first of a series of reports on body weight problems among youth in Minnesota. Subsequent reports will cover perception of body weight, and weight-control behaviors of overweight and obese youth.

Data are from the Minnesota Student Survey (MSS) conducted in spring 2007. MSS is administered statewide every three years to public school students in grades 6, 9, and 12. All public school districts are invited to participate and student participation is voluntary. In 2007, 309 of the 338 public school districts (91%) participated with an overall student participation of 72%.<sup>11</sup> In the 2007 survey, students in grades 9 and 12 were asked about their height and weight. This report is based on the data from 50,713 9th graders and 36,755 12th graders, excluding the 6th graders who were not asked about height and weight.

The table below shows the socio-demographic distribution of participating students. Gender is evenly divided in both grades. Overall, about one in five students are members of a minority population or of mixed racial/ethnic background. The proportion of minority students is higher in grade 9 than in grade 12. About 23.5% of 9th graders and 17.1% of 12th graders reported receiving a free or reduced-price lunch at school. This is used as a proxy measure for low-income status.

**Socio-demographic characteristics of survey participants**

		Grade 9	Grade 12	Total
Gender	Female	50.7%	50.4%	50.6%
Race/ethnicity	White	77.3%	83.8%	80.0%
	American Indian	1.4%	.8%	1.1%
	Black	5.2%	3.7%	4.6%
	Hispanic	3.8%	2.6%	3.3%
	Asian or Pacific Islander	5.3%	4.7%	5.0%
	Mixed	7.1%	4.4%	5.9%
Low Income Status	Currently get a free or reduced-price lunch at school	23.5%	17.1%	20.8%

<sup>9</sup> Hillier TA, Pedula KL, Schmidt MM, Mullen JA, Charles, MA, Pettitt DJ. Childhood obesity and metabolic imprinting: The ongoing effects of maternal hyperglycemia. *Diabetes Care* 2007; 30:2287-92.

<sup>10</sup> For information on adult obesity in Minnesota, go to [www.dhs.state.mn.us/healthcare/studies](http://www.dhs.state.mn.us/healthcare/studies)

<sup>11</sup> For more detailed information about MSS, please check the DHS Web page for MSS at [www.dhs.state.mn.us/id\\_007196](http://www.dhs.state.mn.us/id_007196)

Based on the self-reported height and weight information, a BMI score is computed for each student using the standard formula of weight/height<sup>2</sup> (kg/m<sup>2</sup>). The BMI scores are then compared with age- and sex-specific reference data from the 2000 Centers for Disease Control and Prevention growth charts.<sup>12</sup> Among children and adolescents, a child’s weight status is determined based on age- and sex-specific percentiles for BMI, because children’s body composition varies by age and gender. Obese is defined as a BMI score at or above the 95<sup>th</sup> percentile for children of the same age and sex. Overweight is defined as a BMI score at or above the 85<sup>th</sup> percentile but below the 95<sup>th</sup> percentile.<sup>13</sup>

**Body weight status categorization**

<b>Weight Status Category</b>	<b>Percentile Range</b>
Underweight	Less than the 5th percentile
Healthy weight	5th percentile to less than the 85th percentile
Overweight	85th to less than the 95th percentile
Obese	Equal to or greater than the 95th percentile

**About 9.1% of 9th and 12th grade students in Minnesota are obese, with an additional 13% being overweight. In each grade, males are more likely than females to be obese.**

Among Minnesota students in grades 9 and 12, 9.1% are obese and 13.0% are overweight. About three quarters of the students are within the healthy weight range and 2.4% are underweight. Compared to estimates among youth nationwide, Minnesota students have a lower prevalence of overweight problems. The 2007 Youth Risk Behavior Surveillance System (YRBSS), a national survey of 9th through 12th grade students in public and private schools in the United States, estimated that 13.0% of students were obese and 15.8% were overweight.<sup>14</sup>

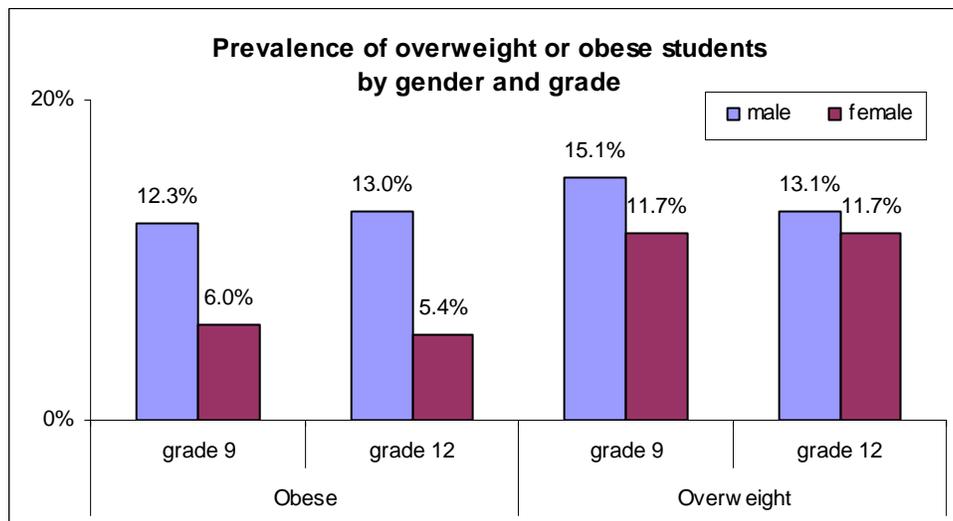
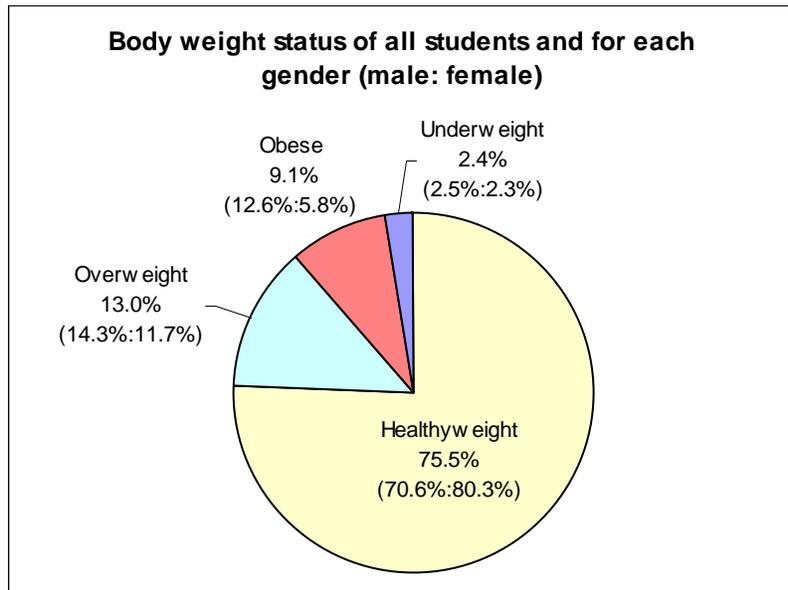
Overall, Minnesota’s male students are more likely to be obese or overweight than female students (26.9% vs. 17.5%). A similar pattern appears when each grade is examined separately. Male students in each grade are more than twice as likely to be obese than their female counterparts: 12.3% of 9th-grade males compared to 6.0% of 9th-grade

<sup>12</sup> Kuczmarski RJ, Ogden CL, Guo SS, Grummer-Strawn LM, Flegal KM, Mei Z, et al. 2000 CDC growth charts for the United States: methods and development. *Vital Health Stat* 11 2002; 246:1–190.

<sup>13</sup> Previous CDC reports used the terms “overweight” and “at risk of overweight” instead of “obese” and “overweight,” respectively. However, this report uses the new terms, in accordance with the 2007 recommendations from the Expert Committee convened by American Medical Association, Health Resources and Services Administration and CDC. Barlow SE, Expert Committee. Expert committee recommendations regarding the prevention, assessment, and treatment of child and adolescent overweight and obesity: Summary report. *Pediatrics* 2007; 120:S164-S192.

<sup>14</sup> Centers for Disease Control and Prevention. Youth Risk Behavior Surveillance — United States, 2007. *Surveillance Summaries* June, 2008. *MMWR* 57 (SS-4). Available online at [www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07\\_mmwr.pdf](http://www.cdc.gov/HealthyYouth/yrbs/pdf/yrbs07_mmwr.pdf)

females, and 13.0% of 12th-grade males compared to 5.4% of 12th-grade females are obese. In addition, higher proportions of male students than female students in each grade are overweight (15.1% vs. 11.7% among 9th graders; 13.1% vs. 11.7% among 12th graders).



**Fewer than half of Minnesota students in grades 9 and 12 exercise for at least 20 minutes on 5 or more days a week. While physical inactivity and unhealthy eating habits are related to obesity for both genders, female students across all weight categories are less likely to be physically active than their male counterparts.**

Physical inactivity and unhealthy eating habits are closely related to childhood obesity. Our children spend more and more of their free time in front of a TV or computer. The MSS has two questions asking about physical activities: “On how many of the last 7 days did you exercise or participate in sports or other activities that made you sweat or breathe hard for at least 20 minutes?” and “On how many of the last 7 days were you physically active for a combined total of at least 30 minutes?” In addition, the survey asked “How many servings of fruits, fruit juices, or vegetables did you eat yesterday?” and “How many glasses of pop or soda did you drink yesterday?”

Overall, 43.6% of the students exercise or participate in activities that make them sweat or breathe hard for at least 20 minutes on 5 or more days during the last 7 days, and about half (50.3%) are physically active for a total of at least 30 minutes on 5 or more days during the last 7 days.

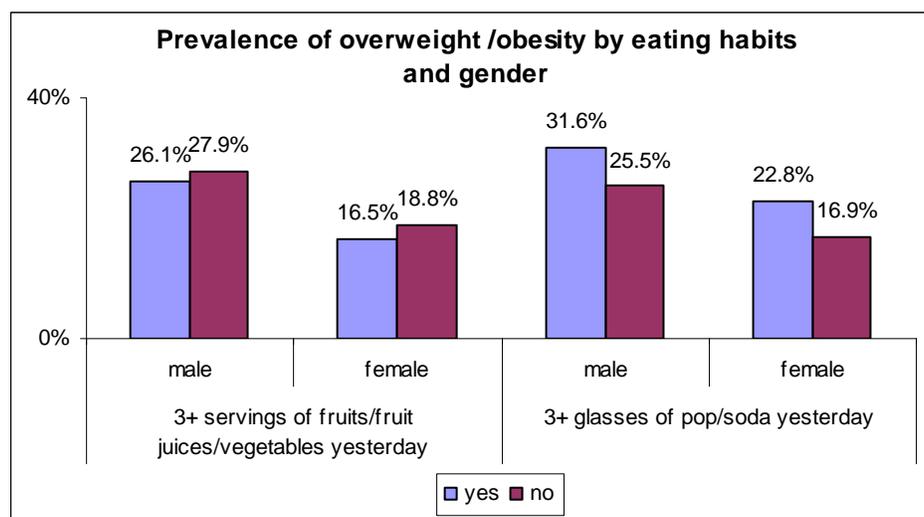
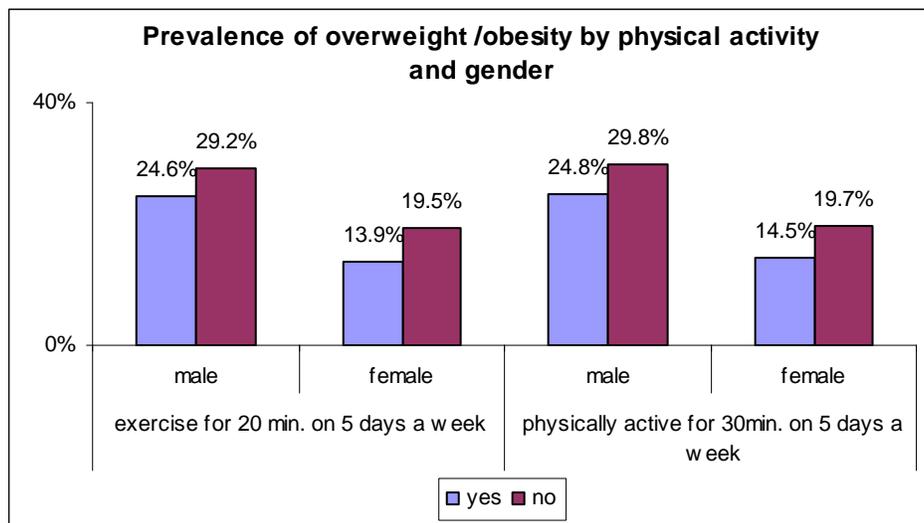
The following table summarizes the prevalence of physical activity and eating habits among students in each body weight category, separately for each gender. In general, females in each weight category are less likely to exercise or to be physically active than their male counterparts. For example, 38.5% of underweight males, 52.8% of healthy-weight males, 50.2% of overweight males and 42.1% of obese males exercised or participated in sports or other activities that made them sweat or breathe hard for at least 20 minutes on 5 days of the last 7 days (the percentages for females are 32.8%, 38.5%, 30.1% and 27.5% respectively).

**Physical activity and eating habits among students in each body weight category by gender**

		Underweight	Healthy weight	Overweight	Obese
Exercised making you sweat or breathe hard for at least 20 minutes on 5+ days of last 7 days	Male	38.5%	52.8%	50.2%	42.1%
	Female	32.8%	38.5%	30.1%	27.5%
Physically active for a combined total of at least 30 minutes on 5+ days of last 7 days	Male	46.2%	60.8%	58.5%	49.1%
	Female	39.1%	43.9%	35.8%	33.1%
Ate 3+ servings of fruits, fruit juices, or vegetables yesterday	Male	53.6%	58.3%	57.5%	54.2%
	Female	59.7%	59.3%	56.3%	53.9%
Drank 3+ glasses of pop or soda yesterday	Male	26.9%	20.3%	22.7%	29.2%
	Female	11.4%	9.0%	11.4%	15.2%

In terms of eating habits, females are less likely to drink pop or soda than their male counterparts in each weight category. About 20.3% of healthy-weight males and 29.2% of obese males, for example, drank 3 or more glasses of pop or soda the day before whereas only 9% of healthy-weight females and 15.2% of obese females did so. There is little difference between males and females in terms of eating fruits or vegetables.

In addition to the gender difference described above, it appears that heavier students are less likely to be physically active and more likely to have unhealthy eating habits. To examine this association further, the following two charts compare the prevalence of overweight or obese students across the healthy and less healthy groups based on physical activities and eating habits.



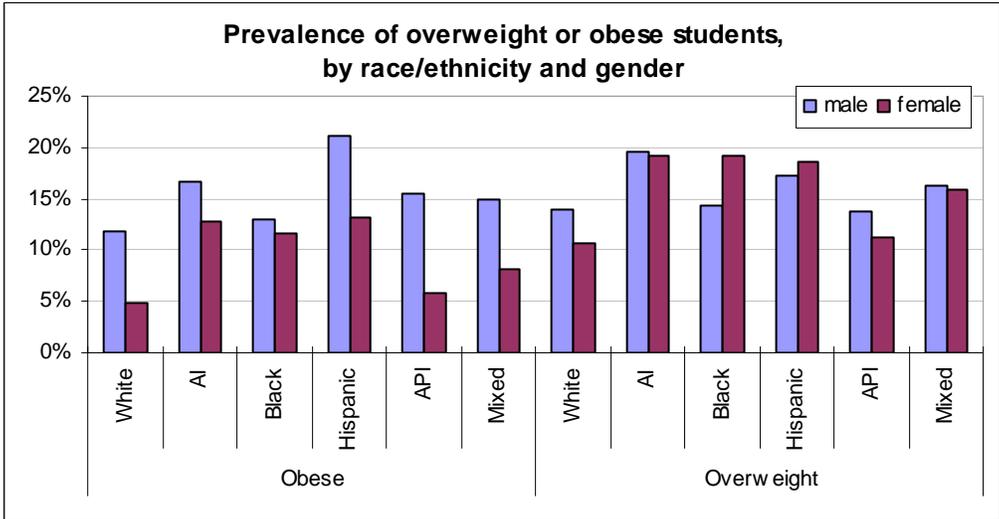
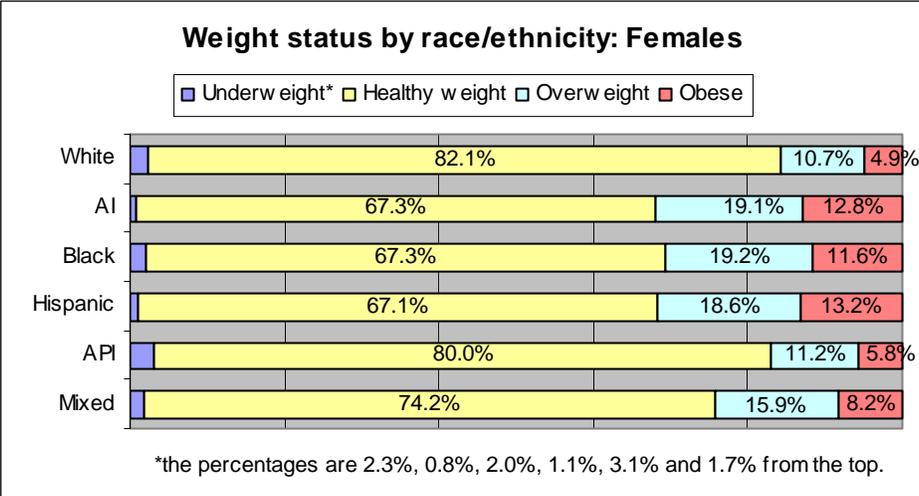
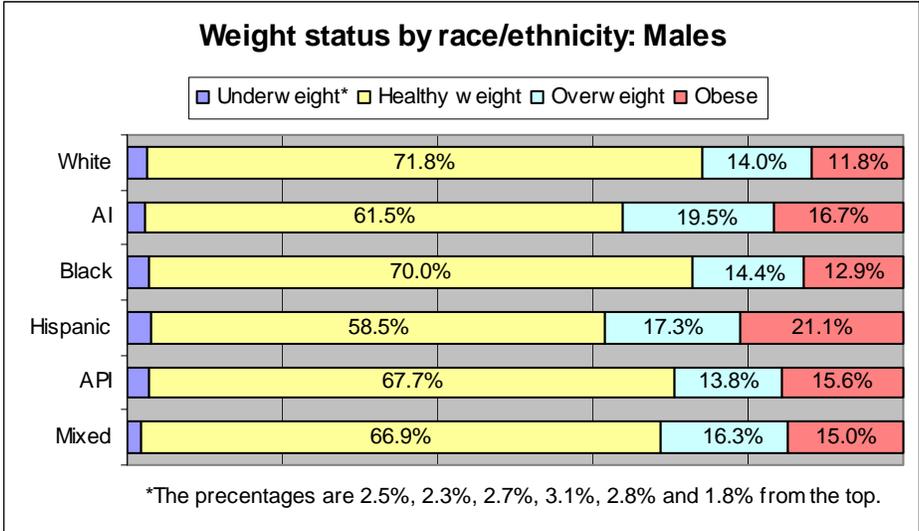
For both genders, students who are physically active are less likely to be overweight or obese. For example, of male students who exercised or participated in sports/other activities that made them sweat or breathe hard for at least 20 minutes on 5 or more days during the past 7 days, 24.6% were either overweight or obese, compared to 29.2% of their less active counterparts (the prevalence among females was 13.9% vs. 19.5%). A similar pattern appears among those reporting being physically active for a total of at least 30 minutes on 5 or more days during the past 7 days: Of males, 24.8% of those who are physically active vs. 29.8% of their less active counterparts are overweight or obese, and the prevalence among females is 14.5% vs. 19.7%.

Similarly, those who drink more pop or soda are more likely to be overweight or at risk of being overweight: 31.6% of male students who drank “3 or more glasses of pop or soda yesterday” were overweight or at risk of being overweight, compared to 25.5% of the others (the prevalence among females was 22.8% vs. 16.9%). Students who eat fruits, fruit juices or vegetables more often are less likely to be overweight or at risk of being overweight, but the difference is not as pronounced.

**Minority students, with the exception of black males and Asian/Pacific Islander females, are more likely to be obese than their white counterparts. Students from low-income households are more likely to be obese than others, and this gap is more pronounced among females. Students in the non-metro area are more likely to be obese than those in the metro area.**

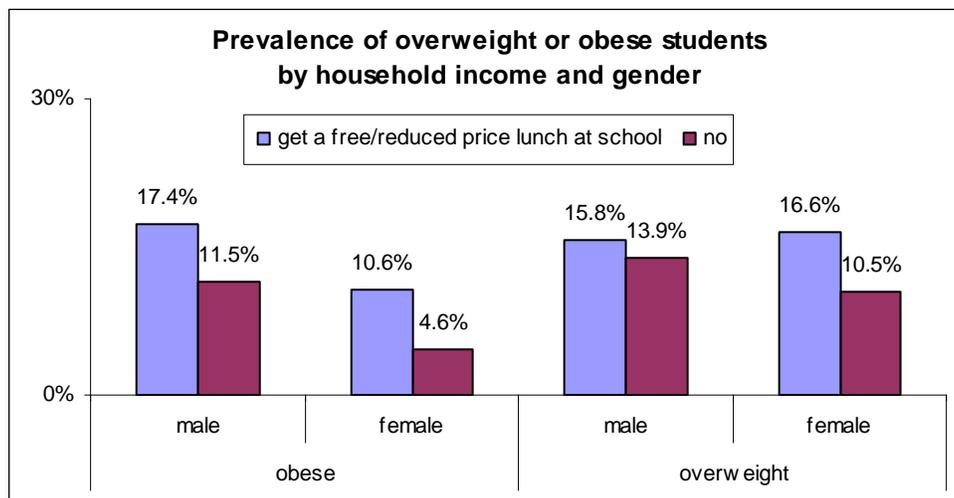
The structure of social inequities in childhood overweight/obesity based on race/ethnicity and socioeconomic status is well documented in research. Minnesota data show similar gaps in the prevalence of body weight problems between students of racial/ethnic minority groups and their white counterparts and between students from low-income households and their more affluent counterparts.

Of all racial/ethnic subgroups, white students, both males and females, have the lowest prevalence of obesity (11.8% and 4.9% respectively). Among male students, Hispanics (21.1%), American Indians (16.7%), Asian/Pacific Islanders (API) (15.6%), and students with a mixed racial/ethnic (15.0%) have higher proportions of obesity than whites. Among females, Hispanics (13.2%), American Indians (12.8%) and blacks (11.6%) are more than twice as likely to be obese as white females (4.9%). Hispanics and American Indian students have higher prevalence of obesity than whites regardless of gender, but black males and API females have a proportion of obesity similar to their white counterparts. A similar pattern is observed in the nationwide student population. The 2007 YRBSS reported that Hispanic students, both male and female, had a significantly higher prevalence of obesity than their white counterparts, while among black students, only females had a significantly higher rate of obesity than their white counterparts.



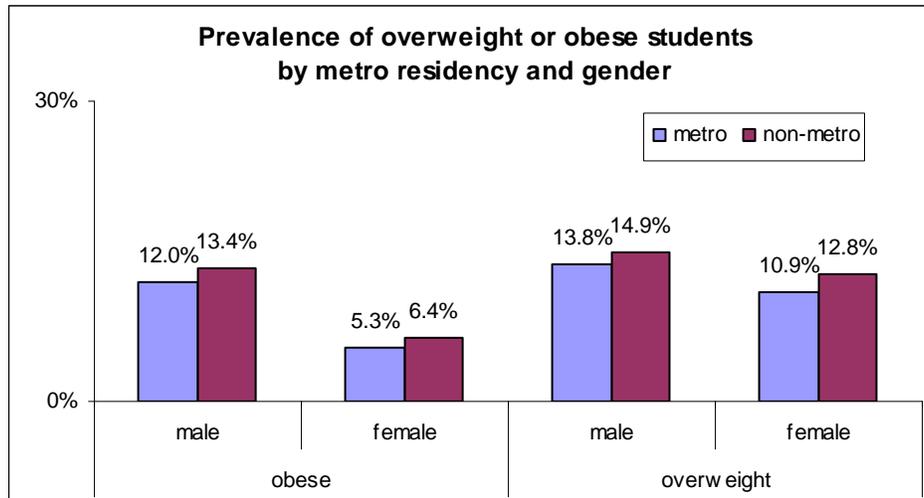
While male students are more likely to be obese than female students across all race/ethnicity sub-groups, the gender gap is smallest among blacks (12.9% vs. 11.6%) and largest among API students (15.6% vs. 5.8%). The gender difference in the prevalence of students who are overweight is not as consistent across race/ethnicity categories. Among whites and APIs, for example, males have a higher proportion of overweight students, while among blacks, females have a higher proportion of overweight students. When the overweight and obese students are examined together, blacks are the only group in which the male students have a lower proportion of overweight/obesity than females (27.3% vs. 30.9%).

Overall, students from low-income households (measured by whether one currently gets a free or reduced-price lunch at school) are more likely to be overweight or obese (13.8% vs. 8.0% being obese; 16.2% vs. 12.2% being overweight). The gap based on household income is more pronounced among females than males. Female students from low-income households are more than twice as likely to be overweight as their more affluent counterparts (10.6% vs. 4.6%).



When race/ethnicity and household income are examined together, Hispanic male students from low-income households had the highest proportion of overweight/obesity (43.3%), followed by American Indian males (40.3%), American Indian females (36.7%), Hispanic females (35.8%), and male students with a mixed race/ethnicity (35.0%). On the other hand, Asian/Pacific Islander females and white females who do not get a free or reduced-price lunch at school are the two groups with the lowest prevalence of overweight/obesity (12.7% and 14.3% respectively being either overweight or obese).

Finally, area of residence is examined in relation to body weight problems. Students in schools located in the seven metro counties (Hennepin, Ramsey, Anoka, Carver, Scott, Dakota, and Washington), as well as in Stearns and St. Louis counties, are defined as metro residents. Students in the non-metro area, both males and females, are more likely to be overweight or obese than their metro-area counterparts.



### Findings from multivariate analyses

To examine whether the associations observed so far would still hold when all factors were considered together, multivariate logistic regressions were conducted. All of the independent variables — gender, grade, race/ethnicity, household income, metro residency, as well as physical activity and eating habits — were entered into a model predicting body weight status (being either overweight or obese) in three sets of regression analyses (for the whole sample and for each gender separately).

The major findings of this analysis are as follows:

Even when all the other factors in the model are taken into consideration,

- male students are more likely to be overweight or obese than female students;
- American Indians, Hispanics, and those with a mixed racial/ethnic background are more likely to be overweight or obese than their white counterparts;
- black females, but not black males, are more likely to be overweight or obese than their white counterparts;
- students from low-income households are more likely to be overweight or obese than their more affluent counterparts;
- students in the metro area are less likely to be overweight or obese than those in the non-metro area.

### Odds ratios from multivariate logistic regressions

Dependent variable: Being overweight or obese (1=yes; 0=no)			
Independent variables (reference category)	Total (n=73,538)	Males (n=35,724)	Females (n=37,814)
Gender (male) female	.563***		
Grade (9th) 12th grader	.934***	.918**	.955
Race/ethnicity (white)			
American Indian	1.542***	1.381**	1.733***
Black	1.309***	.939	1.897***
Hispanic	1.723***	1.587***	1.903***
Asian/Pacific Islander	1.000	1.096	.899
Mixed	1.348***	1.240***	1.469***
Low income status (no) Currently get free/reduced price lunch at school	1.482***	1.310***	1.681***
Residency (non-metro) Metro <sup>a</sup>	.856***	.902***	.795***
Physical activity <sup>b</sup>	.933***	.939***	.929***
Number of servings of fruits/fruit juices/vegetables ate yesterday	1.007	1.013	1.001
Number of glasses of pop/soda drank yesterday	1.136***	1.128***	1.147***

<sup>a</sup> Metro area is defined as the 7 metro counties (Hennepin, Ramsey, Anoka, Carver, Scott, Dakota, Washington), as well as Stearns and St. Louis counties.

<sup>b</sup> Physical activity is a computed variable of mean scores on the two questions (days out of the last 7 days when one exercised for 20+ minutes to sweat or breathe hard; days out of the last 7 days when one was physically active for a combined total of 30+ minutes).

Early childhood and youth are strategic life stages for forming long-term health related behaviors. Many behavioral risk factors, such as poor diet and physical inactivity, appear early in life, become more pronounced through adolescence, and may result in adverse health outcomes in adulthood. These risk factors are preventable, and reversing the rising trend of overweight/obesity among our children and teens will require a concerted effort from individuals, families, schools, communities and government at all levels.

There are many barriers that prevent children and teens from engaging in healthy lifestyles, and some of these barriers are supported by public policies or by lack of appropriate policies. For example, 2006 national data show that only 4% of elementary schools, 8% of middle schools, and 2% of high schools provided their students daily physical education or its equivalent.<sup>15</sup> Our children spend too much time watching TV or being engaged in other sedentary activities, where they expose themselves to

<sup>15</sup> Lee S, Burgeson C, Fulton J, Spain C. Physical education and physical activity: Results from the School Health Policies and Programs Study 2006. *J School Health* 2007; 77:435-63.

advertisements for foods that are high in fat, sugar, or sodium.<sup>16</sup> The U.S. Women, Infants, and Children program subsidized eggs and cheese for poor children, but it was not until 2007 that vegetables, fruits and whole grains were added.

Families in communities with lower household income, where higher proportions of people with racial/ethnic minority backgrounds live, face heightened obstacles. They have limited access to healthy foods and safe places where they can be physically active, such as parks, green space, bike paths, walking trails, sports facilities and public pools.<sup>17</sup> Changing public policies and community environments to make healthy choices a realistic option for all families is critical for addressing the obesity epidemic. Extra attention should be focused on those at higher risk.

All of these efforts should be accompanied by a system for accurately monitoring trends in overweight and obesity among youths. Routine measurement of heights and weights of children and adolescents should be a vital means of monitoring the obesity epidemic as well as judging the effectiveness of various prevention efforts and policies to reverse the trends. There should be a more systematic review of the feasibility and the estimated cost of an ongoing measurement of weights and heights of children and adolescents through primary and secondary schools and primary care clinics.

A weakness of the data used for this report should be mentioned. The height and weight information is self-reported by students instead of being directly measured. While many estimates of overweight and obesity including YRBSS rely on self-reported data, it is possible that there is some systematic error in the height and weight information reported by the students. A literature review<sup>18</sup> on the accuracy of adolescent self-report of height and weight found that female adolescents underestimated weight more than males.

Finally, it is important to remember that BMI is only a tool. While it is a reliable indicator for adiposity and is generally considered the only practical and noninvasive measure of relative body size, it does not always accurately describe an individual's weight classification. A health care professional should make the final determination after considering all the other relevant information.

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<sup>16</sup> Powell LM, Szczypka G, Chaloupka FJ. Adolescent exposure to food advertising on television. *Am J Prev Med* 2007; 33(4S):S251-6.

<sup>17</sup> Powell LM, Slater S, Chaloupka FJ. The relationship between community physical activity setting and race, ethnicity, and socioeconomic status. *Evidence-Based Prev Med* 2004; 1:135-44.

<sup>18</sup> Sherry B, Jeffers ME, Grummer-Strawn LM. Accuracy of adolescent self-report of height and weight in assessing overweight status: A literature review. *Arch Pediatr Adolesc Med* 2007; 161(12):1154-61.