



The Center for  
Health and Health  
Care in Schools  
School of Public Health  
and Health Services  
The George Washington University  
Medical Center

# Childhood Overweight

## What the research tells us

Updated March 2005

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#### Overview

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### Overview

**The rapid increase in overweight among children and adolescents is generating widespread concern.** Since the 1970s, the prevalence of overweight among children has more than doubled for preschoolers ages 2-5 and adolescents ages 12-19, and it has more than tripled for children 6-11 years.<sup>1</sup> Nearly one-third of children and adolescents, of both sexes, aged 6-19 years (31.0%) are considered to be either at risk for overweight or overweight, defined as at or above the 85th percentile of the sex-specific BMI-for-age growth chart, and 16% are overweight or at or above the 95th percentile of the sex-specific BMI-for-age growth chart.<sup>2</sup>

**On average, rates of overweight for boys and girls remain similar.** Although the percentage of overweight children and adolescents increased from the 1960s to 2002, the rates remain similar for boys and girls. For the years 1999-2002, among boys ages 6-19, 29.2% are at risk for overweight or were overweight. Among girls ages 6-19 during the same time period, 27.0% were at risk for overweight or were overweight.<sup>2</sup>

**Some groups of children are more affected by overweight than others.** Among boys and young men, risk of overweight and overweight is a particular burden among those of Mexican American descent, with 42.8% of Mexican Americans ages 6-19 either at risk of overweight or overweight compared with 31.0% of non-Hispanic black boys and adolescents and 29.2% of non-Hispanic white boys and adolescents. Among girls and young women, 40.1% of non-Hispanic black young people are at risk of overweight or overweight, compared to 36.6% of Mexican American girls and young women and 27.0% of non-Hispanic white girls and young women.<sup>2</sup>

### Definitions

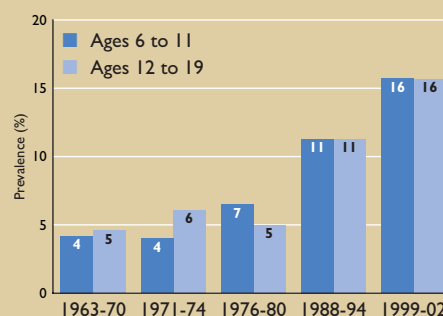
The CDC uses the following definitions for measuring childhood overweight:<sup>4</sup>

- At risk of overweight:** BMI-for-age > 85<sup>th</sup> percentile to < 95<sup>th</sup> percentile
- Overweight:** BMI-for-age > 95<sup>th</sup> percentile

Body mass index (BMI) is the ratio of weight-to-height, a formula in which a person's body weight in kilograms is divided by the square of his or her height in meters—wt/(ht).<sup>2,5</sup> For children ages 2–20 years, BMI is plotted on a growth chart specific for age and gender.<sup>6</sup>

Overweight in children and adolescents cannot be measured or discussed in the same terms used with adults. Because of uncertainty about the meaning of weight tables for growing children and a concern about the stigmatizing potential of the term “obesity,” some

### Prevalence of Overweight\* Among Children and Adolescents ages 6-19 years<sup>3</sup>



\*Gender- and age-specific BMI ≥ the 95th percentile  
Data from NHANES studies for years cited.

researchers use the CDC terminology. Other researchers use the term “childhood obesity.” Regardless of definition, the increase in the number and percent of children who are overweight is not disputed nor is the concern for its health consequences.

Researchers commonly use definitions developed for adult obesity by an NIH Expert Panel: overweight is a BMI of 25-29.9 kg/m<sup>2</sup>, and obesity is a BMI of 30 kg/m<sup>2</sup> or greater. Severe obesity is defined as having a BMI > 40, or > 35 with comorbid conditions.<sup>7</sup> However, overweight and obesity are not mutually exclusive, since people who are obese are also overweight.<sup>8</sup>

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## Health Consequences of Childhood Overweight

Overweight and obesity are major risk factors for chronic diseases, including type 2 diabetes, cardiovascular disease, hypertension, osteoporosis, and some cancers.<sup>9</sup> Some children may develop sleep apnea, mature early, have increased LDL cholesterol, and run the risk of liver and gall bladder diseases.<sup>10</sup>

**Asthma** – The risk of new-onset asthma is higher among children who are overweight, with boys having an increased risk in comparison with girls. Paradoxically, the effect is greater in nonallergic children.<sup>11</sup> One study of children with asthma found that obese children used more medicine, wheezed more, and made more visits to emergency rooms than their non-obese peers.<sup>12</sup>

**Type 2 diabetes** – Impaired glucose tolerance is highly prevalent among children and adolescents with severe obesity, irrespective of ethnic group.<sup>13</sup> Studies link obesity in youth to an increase in type 2 diabetes, which can lead to blindness, heart disease, kidney disease, and loss of limbs.<sup>13,14,15</sup>

**Cardiovascular risk** – Overweight children and adolescents are at a substantially increased risk for adverse levels of several cardiovascular disease (CVD) risk factors.<sup>15</sup> In a population-based sample, approximately 60% of obese children aged 5 to 10 years had at least one CVD risk factor such as elevated total cholesterol, triglycerides, insulin, or blood pressure and 25% had two or more risk factors.<sup>16</sup>

**Sleep apnea** – Obstructive sleep apnea (OSA) is a breathing disorder characterized by episodes of stopped breathing during sleep. Loud snoring, mouth breathing, frequent awakening, daytime sleepiness, and hyperactive behavior in children are all indicators of possible OSA.<sup>17</sup> Consequences of untreated OSA include failure to thrive, bedwetting, attention-deficit disorder, behavior problems, poor academic performance, and cardiopulmonary disease.<sup>18</sup> Studies suggest that obstructive sleep apnea occurs in approximately 17% of obese children and adolescents, and that many of these children are academically compromised as a result.<sup>19</sup>

**Psychosocial consequences** – Certain young people are at risk of developing serious psychosocial burdens related to being overweight in a society that stigmatizes this condition.<sup>16</sup> The likelihood of a severely obese child or adolescent having impaired, health-related quality of life was 5.5 times greater than a healthy child or adolescent, and similar to a child diagnosed as having cancer.<sup>20</sup> Overweight children and youth with decreased levels of self-esteem reported increased rates of loneliness, sadness, and nervousness, and were more likely to smoke and consume alcohol.<sup>21</sup> Overweight adolescents are more likely to be socially isolated and to be peripheral to social networks than normal-weight adolescents.<sup>22</sup> Adolescent boys and girls who experience teasing from two sources (such as family and peers) have a higher prevalence of emotional health problems.<sup>23</sup>

### What Do Parents Think?

According to two national surveys, parents support school efforts to strengthen exercise and nutrition programs. In surveys,<sup>34,35</sup> parents indicated they believe:

- Educating students about nutrition and exercise is important (96%)
- Physical education should be part of a school curriculum for all students in grades K-12 (95%)
- More school physical education could help control or prevent childhood obesity (76%)
- Regular, daily physical activity helps children do better academically (95%)
- Parents and school officials should work together to make decisions about what students should eat and drink at school (73%)

Finally, 85% of parents said they would support programs in schools to help fight childhood obesity.

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By promoting healthier eating and encouraging exercise, parents are key in reducing child and adolescent overweight.<sup>24</sup> Recent studies have demonstrated the benefits of adolescents of eating family meals, including better nutritional intake, decreased risk of unhealthy weight control practices, and decreased risk of substance use, engaging in sexual intercourse, and suicidal involvement.<sup>25</sup>

**Adult overweight** – The probability of childhood overweight persisting into adulthood increases from approximately 20% at 4 years of age, to between 40% and 80% by adolescence.<sup>26</sup> It is also probable that the diseases associated with overweight will persist into adulthood, as well.<sup>27</sup> Adult overweight is a risk factor for major health conditions, including diabetes, heart disease, high blood pressure, stroke, gallbladder disease, cancer (endometrial, colon, kidney, gallbladder, and postmenopausal breast cancer), and osteoarthritis.<sup>15,21,28,29</sup>

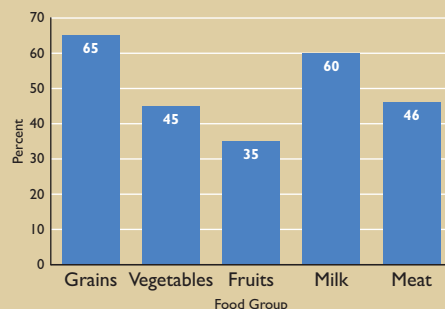
**Ethnicity, family and gender factors** – In a study of high schoolers conducted by the CDC, self-perception of weight was found to be incongruent with measured BMI, and differed across racial and ethnic lines. In the group with normal weight, girls were more likely than boys to perceive themselves as overweight, and white, black, and Hispanic students were less likely than students in other racial/ethnic categories to consider themselves overweight. Among students at risk for overweight, according to their measured BMI, 53.7% perceived themselves to be about the right weight, but nearly a quarter of the at-risk students perceived themselves to be underweight.<sup>30</sup>

By ages 13 and 14, overweight boys, overweight Hispanic girls, and overweight white girls have been found to have significantly lower self-esteem levels compared with their counterparts, but overweight African-American girls did not show a similar decline. There were no significant racial differences in the effects that overweight had on changes in self-esteem among boys.<sup>21</sup> In an Ohio study of teenagers, the association of school social status with overweight was strongest among white girls, intermediate for white and black boys, and absent for black girls.<sup>31</sup>

Genetics is a factor in excess weight but does not explain the recent epidemic of overweight. While having overweight parents more than doubles a child's risk of being obese, genetic characteristics of human populations have not changed in the last two decades, while the prevalence of obesity among children and adults has approximately doubled.<sup>16</sup>

**Potential health care costs** – Future health care costs associated with pediatric obesity, especially adolescent obesity, are substantial.<sup>32</sup> Hospitalizations among children and adolescents (6-17 years of age) for diseases associated with obesity increased sharply between 1979 and 1999.<sup>33</sup>

**Percentage of School-Aged Children Meeting Minimum Food Group Targets, 1994-1996 CSFII**



\*Minimum Pyramid Target in servings: Grains=6, Vegetables=3, Fruits=2, Milk=2, Meat=2.  
Source: US Department of Agriculture. Food and Nutrition Service. Children's diet in the mid-1990s: dietary intake and its relationship with school meal participation. 2001.

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## Nutrition and Schools

### Food consumption by school-age children

Almost 80% of high school students do not eat the recommended servings of fruits and vegetables each day.<sup>36</sup>

Children who eat fast food, compared with those who do not, consume more total energy (calories), more energy per gram of food, more total fat, more total carbohydrate, more added sugars, more sugar-sweetened beverages, less fiber, less milk, and fewer fruits and non-starchy vegetables.<sup>37</sup>

Children age nine and older are heavy consumers of sodas. By the time they are 14 years of age or older, 32% of young women and 52% of young men are consuming three or more servings of soda a day.<sup>38</sup> A

Missouri study suggested that other sweet drinks, such as fruit juices and fruit drinks, when consumed by those at risk of being overweight, increased the odds of becoming overweight and of remaining overweight.<sup>39</sup>

Reducing easy access to energy-dense foods may help to limit opportunities for over-eating.<sup>40</sup>

### School foods and what schools can do to improve student nutrition

Each day, 28 million school-aged children receive lunch and an estimated 8 million receive breakfast in the National School Lunch Program and the School Breakfast programs supported by the US Department of Agriculture (USDA).<sup>41</sup>

Efforts to increase students' consumption of nutritious food may be hindered by the availability of junk foods, the strong impact of advertising on youth's food choices, and private fund-raising efforts that sell high calorie/low nutrition foods to support athletic and extracurricular activities. To address this problem, some states and school districts are limiting the sale of such foods and soft drinks during school hours.<sup>42</sup>

Schools, which are required to follow the USDA's Dietary Guidelines for the school lunch program, are not required to use those standards for foods sold à la carte, food sold in snack bars, and food sold through vending machines.<sup>43</sup> Schools can promote healthy eating by providing more nutritious food and beverages through the à la carte programs and limiting sweetened drinks and high fat and high sugar snacks in vending machines.<sup>44</sup>

School food service managers and other school officials report that expanding the number and variety of healthy food choices increased the likelihood that students will select them.<sup>45</sup> This is important because, except for meals provided to students eligible for free and reduced-price breakfast or lunch, school food programs are not subsidized and food service managers must sell enough food to cover expenses.

Dietary practices should be fostered that encourage moderation rather than overconsumption, and emphasize healthful choices rather than restricting eating patterns.<sup>31</sup>

#### Children Consuming Three or More Servings\* of Soft Drinks Per Day<sup>38</sup>

Age	Females	Males
6-8 Years	3%	7%
9-13 Years	21%	21%
14-18 Years	32%	52%

\*One serving equals one eight ounce cup.

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## Physical Activity and Schools

**Current physical activity levels.** A 2002 national survey reports 38.5% of children aged 9-13 participated in organized physical activity and 77.4% of children engaged in free-time physical activity during non-school hours.<sup>49</sup>

**Organized physical activity appears less accessible to some groups of children.**

Hispanic (25.9%) and non-Hispanic black (24.1%) children were significantly less likely to participate in organized physical activity compared to non-Hispanic white children (46.6%). Children of parents with lower incomes and educational levels were less likely to participate in organized physical activity. However, nearly three-quarters of all groups participated in some level of free-time physical activity.<sup>49</sup>

**Physical education and recess.** 71.4% of elementary schools provided "regularly scheduled recess" for kindergarten through 5th grade. Nationally, 96.8% of elementary schools, and the same percentage of middle or junior high schools, require students to take physical education.<sup>50</sup>

Over half (51.7%) of US students in grades 9-12 were enrolled in a physical education (PE) class and one-third (32.2%) of them had daily PE. Black male students (67.4%) were significantly more likely than white male students (52%) to be enrolled in a PE class. Of the enrolled students, 83.4% reported exercising at least 20 minutes during an average class. Overall, male students (87.7%) were significantly more likely than female students (78.8%) to have exercised >20 minutes during an average PE class.<sup>51</sup>

About half (49%) of all schools reported offering intramural activities or physical activity clubs for students.<sup>52</sup>

**Physical education standards and guidelines.** More than half (60.8%) of the states require schools and school districts to follow national or state physical education guidelines while nearly a quarter of the states encourage schools and school districts to follow national or state guidelines.<sup>52</sup>

According to the CDC survey, 84.0% of elementary, 77.4% of middle/junior high, and 79.5% of senior high schools follow national or state physical education standards or guidelines.<sup>50</sup>

More than 80% of the states and nearly three-quarters of school districts required schools to provide adapted physical education, to include physical education in individualized education plans (IEPs), and to mainstream students into regular physical education, as appropriate.<sup>52</sup>

## MAKE THE HEALTHY CHOICE THE EASY CHOICE<sup>46</sup>

### Calories In, Calories Out

Although the origin of childhood overweight or obesity is complex and relates to both genetics and environmental factors, overweight or obesity ultimately results from an imbalance of energy intake (diet) relative to energy expenditure (physical activity).<sup>48</sup>

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## Schools Can Help

The primary goal for obesity prevention and treatment should be healthy eating and increased physical activity. An expert committee, convened by the US Department of Health and Human Services, recommends that treatment begin early, involve the family, and initiate permanent changes in a stepwise manner. Successful interventions use gradual increases in activity and targeted reductions in high-fat, high-calorie foods.<sup>53</sup>

**Families play a key role in successful weight loss or healthy lifestyle programs.** A British pilot study demonstrated that school may be a suitable setting for the promotion of healthy lifestyles in children, but interventions require replication in other social settings, including the family. Successful efforts are likely to be long-lasting, multi-faceted, and sustainable, involving all children in a school, target the whole environment, and be behaviorally focused.<sup>54</sup>

**School nurses frequently have expertise in nutrition, weight maintenance, and exercise that enables them to develop prevention and intervention programs for students.** The school nurse can identify students who are at risk for being overweight or overweight by screening for height and weight, skinfold testing, and measuring BMI. The school nurse can also refer and follow up with students who may not be seeing a health care provider on a regular basis.<sup>55</sup>

**A California school-based intervention targeting sedentary adolescent girls increased physical activity and prevented a decline in cardiovascular fitness.** The intervention, that included a separate, females-only PE class, specific activities agreed to by the participants, and classes on the health benefits of physical activity, resulted in more non-class lifestyle activity, such as walking instead of driving and taking the stairs instead of the elevator.<sup>56</sup>

**Students working with researchers from the University of Minnesota made recommendations for effective school-based weight management programs.** One group of students asked for weight control programs that are fun, interactive, accessible, convenient, low in cost, sensitive to the needs of adolescents, include multiple physical activity options, and are offered to all students, regardless of their weight.<sup>57</sup> Another group stressed the importance of having a program leader who understands the difficulties that overweight youth face, preferring someone who is currently overweight or has been overweight in the past.<sup>58</sup>

### Effective Health Education

Health education curricula are more likely to be effective in improving student health behaviors when they teach skills needed to adopt healthy behaviors, provide ample opportunities to practice those skills, and focus on helping students overcome barriers to adopting behaviors.<sup>48</sup>



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