



# Body Mass Index Measurement in Schools

$$\text{BMI} = \frac{\text{weight(kg)}}{\{\text{height(m)}\}^2}$$

# BMI

## Executive Summary

Centers for Disease Control and Prevention



Journal citation of full article:

Nihiser AJ, Lee SM, Wechsler H, McKenna M,  
Odom E, Reinold C, Thompson D, Grummer-Strawn L.  
Body mass index measurement in schools.  
J Sch Health. 2007;77:651-671.

To access full journal article and executive summary,  
please visit CDC's website:  
[www.cdc.gov/healthyyouth/npao/publications.htm#10](http://www.cdc.gov/healthyyouth/npao/publications.htm#10)

For more information on the role of schools in  
preventing childhood obesity, please visit CDC's website:  
[www.cdc.gov/healthyyouth/npao/strategies.htm](http://www.cdc.gov/healthyyouth/npao/strategies.htm)

As the United States continues to search for answers to the growing problem of obesity among children and adolescents, much attention has focused on body mass index (BMI) measurement programs in schools. The BMI is the ratio of weight to height squared. It is often used to assess weight status because it is relatively easy to measure and it correlates with body fat.<sup>5-9</sup>

In 2005, the Institute of Medicine called on the federal government to develop guidance for BMI measurement programs in schools.<sup>10</sup> With guidance from an expert panel, the Centers for Disease Control and Prevention (CDC) developed a report to help inform decision-making on school-based BMI measurement programs. This Executive Summary presents an overview of the report, which was published in the December 2007 issue of the *Journal of School Health*. The report describes the purposes of BMI measurement programs, examines current practices, reviews existing research, summarizes the recommendations of experts, identifies concerns about school-based programs, and provides guidance on BMI measurement programs, including a list of safeguards and ideas for future research.

BMI measurement programs in schools may be conducted for surveillance and screening purposes. BMI surveillance programs assess the weight status of a specific population (e.g., students in an individual school, school district, or state) to identify the percentage of students who are potentially at risk for weight-related health problems. Surveillance data are typically anonymous and can be used for many purposes, including identifying population trends and monitoring the outcomes of interventions. BMI screening programs assess the weight status of individual students to identify those at risk and provide parents with information to help them take appropriate action.

Some states have initiated BMI measurement programs in recent years. Arkansas, for example, implemented a statewide BMI screening and surveillance program in 2003 (State of Arkansas, 84th General Assembly, Regular Session. Act 1220 of 2003. HB 1583. 2003). In California, students participate in physical fitness testing that assesses BMI along with other fitness-related variables.<sup>11</sup>

From 1980 to 2012, the percentage of youth who were obese\* increased from 7% to nearly 18% in children (6-11 years) and 5% to nearly 21% in adolescents (12-19 years).<sup>1-4</sup>

\* These youth were classified as "overweight" in the articles cited; the classification was changed to "obesity" to reflect the June 2007 recommendations from the Expert Committee on the Assessment, Prevention, and Treatment of Child and Adolescent Overweight and Obesity.



# BMI



Little is known about the outcomes of BMI measurement programs, including effects on weight-related knowledge, attitudes, and behaviors of youth and their families.



Little is known about the outcomes of BMI measurement programs, including effects on weight-related knowledge, attitudes, and behaviors of youth and their families. As a result, no consensus exists on the utility of BMI screening programs for young people. The U.S. Preventive Services Task Force concluded that insufficient evidence exists to recommend for or against BMI screening programs for youth in clinical settings as a means to prevent adverse health outcomes;<sup>12</sup> however, the American Academy of Pediatrics (AAP) recommends that BMI should be calculated and plotted annually on all youth as part of normal health supervision within the child's medical home.<sup>13,14</sup> The Institute of Medicine recommends annual school-based screening.<sup>10</sup>

BMI screening meets some of the criteria established by the AAP for determining whether school-based screening should be implemented for any pediatric health condition:<sup>15</sup> obesity is an important and highly prevalent condition;<sup>3,4</sup> BMI is an acceptable measure;<sup>6,8</sup> and schools are a logical measurement site because they reach virtually all youth.<sup>16</sup> However, BMI screening programs typically do not meet other AAP criteria: effective treatments for obesity are not available,<sup>9,17,18</sup> research has not established the effectiveness and cost-effectiveness of BMI screening programs, and communities typically do not have resources in place to help at-risk individuals access treatment services.<sup>10</sup> More evaluation is needed to determine whether BMI screening programs are a promising approach for addressing obesity among children and adolescents.



# BMI

American Academy of Pediatrics Criteria<sup>15</sup>

## Criteria for a Successful Screening Program in Schools

<b>Disease</b>	Undetected cases must be common or new cases must occur frequently and the disease must be associated with adverse consequences.
<b>Treatment</b>	Effective treatment must be available and early intervention must be beneficial.
<b>Screening Test</b>	The test should be sensitive, specific, and reliable.
<b>Screeener</b>	The screener must be well trained.
<b>Target Population</b>	Screening should focus on groups with high prevalence of the condition/disease in question or in which early intervention will be most beneficial.
<b>Referral &amp; Treatment</b>	Those with a positive screening test must receive a more definitive evaluation and, if indicated, appropriate treatment.
<b>Cost / Benefit</b>	The benefit should outweigh the expenses (i.e., costs of conducting the screening and any physical or psychosocial effects on the individual being screened).
<b>Site</b>	The site should be appropriate for conducting the screening and communicating the results.
<b>Program Maintenance</b>	The program should be reviewed for its value and effectiveness.



A number of concerns have been expressed about school-based BMI screening programs, including that they might stigmatize students and lead to harmful behaviors.<sup>17,19-24</sup> Other concerns are that these programs might be ineffective, waste scarce health promotion resources, and distract attention from other school-based obesity prevention activities.<sup>25</sup> More research is needed to assess the validity of these concerns. BMI surveillance programs are less controversial, because they do not involve the communication of sensitive information to parents and do not require individualized follow-up care for students identified to be at risk. Schools that initiate BMI measurement programs should have in place a safe and supportive environment for students of all body sizes and a comprehensive set of science-based strategies to promote physical activity and healthy eating. In addition, BMI screening programs should ensure that parents receive a clear and respectful explanation of the BMI results and appropriate follow-up actions; and that resources are available for safe and effective follow-up.



To reduce the risk of harming students, BMI measurement programs should adhere to the following safeguards:<sup>19,26</sup>

- (1) introduce the program to school staff and community members and obtain parental consent,
- (2) train staff in administering the program (ideally, implementation will be led by a highly qualified staff member, such as the school nurse),
- (3) establish safeguards to protect student privacy,
- (4) obtain and use accurate equipment,
- (5) accurately calculate and interpret the data,
- (6) develop efficient data collection procedures,
- (7) avoid using BMI results to evaluate student or teacher performance, and
- (8) regularly evaluate the program and its intended outcomes and unintended consequences.

# BMI

# Reference List

- (1) Hedley AA, Ogden CL, Johnson CL, Carroll MD, Curtin LR, Flegal KM. Prevalence of overweight and obesity among U.S. children, adolescents, and adults, 1999-2002. *JAMA*. 2004;291(23):2847-2850.
- (2) National Center for Health Statistics. Prevalence of Overweight Among Children and Adolescents: United States, 1999. Hyattsville, MD: National Center for Health Statistics, 2001.
- (3) Odgen CL, Flegal KM, Carroll MD, Johnson CL. Prevalence and trends in overweight among U.S. children and adolescents, 1999-2000. *JAMA*. 2002;288(14):1728-1732.
- (4) Ogden CL, Carroll MD, Kit BK, Flegal KM. Prevalence of childhood and adult obesity in the United States, 2011-2012. *JAMA*. 2014;311(8):806-814.
- (5) Barlow SE, Dietz WH. Obesity evaluation and treatment: expert committee recommendations. *J Pediatr*. 1998; 102(3): e29.
- (6) Dietz WH, Bellizzi MC. Introduction: the use of body mass index to assess obesity in children. *Am J Clin Nutr*. 1999;70(suppl):1235-1255.
- (7) Himes JH, Dietz WH. Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services. Guidelines for overweight in adolescent preventive services: recommendations from an expert committee. *Am J Clin Nutr*. 1994;59(2):307-316.
- (8) Mei Z, Grummer-Strawn LM, Pietrobelli A, Goulding A, Goran MI, Dietz WH. Validity of body mass index compared with other body-composition screening indexes for assessment of body fatness in children and adolescents. *Am J Clin Nutr*. 2002;75(6):978-985.
- (9) Whitlock EP, Williams SB, Gold R, Smith PR, Shipman SA. Screening and interventions for overweight in children and adolescents: a summary of evidence for the U.S. preventive Services Task Force. *Pediatrics*. 2005;116(1):e125-e144.
- (10) Institute of Medicine. Preventing childhood obesity: health in the balance. Washington (DC): The National Academies Press; 2005.
- (11) California Department of Education. 2005 California physical fitness test: report to the governor and legislature. Sacramento, CA: California Department of Education; 2005.
- (12) U.S. Preventive Services Task Force. Screening and interventions for overweight and children and adolescents: recommendations statement. *Pediatrics*. 2005;116(1):205-209.
- (13) American Academy of Pediatrics. Policy statement: prevention of pediatric overweight and obesity. *Pediatrics*. 2003;112(2):424-430.
- (14) Murray R. Response to "Parents' Perceptions of Curricular Issues Affecting Children's Weight in Elementary Schools". *J Sch Health*. 2007;77(5):223.
- (15) American Academy of Pediatrics, Committee on School Health. *School health: policy & practice*. 6th edition. Elk Grove, IL: American Academy of Pediatrics; 2004.
- (16) U.S. Department of Commerce, Census Bureau Historical Statistics of the United States, colonial times to 1970. Current population reports, series P-20, various years, and current population survey, unpublished data. 2005. Available at: [nces.ed.gov/programs/digest/d04/list\\_tables1.asp#c1\\_2](http://nces.ed.gov/programs/digest/d04/list_tables1.asp#c1_2). Accessed November 5, 2007.
- (17) Ikeda JP, Crawford PB, Woodward-Lopez G. BMI screening in schools: helpful or harmful. *Health Educ Res*. 2006;21(6):761-769.
- (18) Summerbell CD, Ashton V, Campbell KJ, Edmunds L, Kelly S, Waters E. Interventions for treating obesity in children. *Cochrane Database Syst Rev*. 2003;3(CD001872).
- (19) Crawford PB, Woodward-Lopez G, Ikeda JP. Weighing the risks and benefits of BMI reporting in the school setting. *Center for Weight and Health*; 2006. Available at: [nature.berkeley.edu/cwh/PDFs/BMI\\_report\\_cards.pdf](http://nature.berkeley.edu/cwh/PDFs/BMI_report_cards.pdf). Accessed August 7, 2006.
- (20) Scheier LM. School health report cards attempt to address the obesity epidemic. *J Am Diet Assoc*. 2004;104(3):341-344.
- (21) Society for Nutrition Education. Guidelines for childhood obesity prevention programs: promoting healthy weight in children. *J Nutr Educ Behav*. 2003;35(1):1-4.
- (22) Kantor J. As obesity fight hits cafeteria, many fear a note from school. *New York Times*; January 9, 2007.
- (23) The Associated Press. Arkansas to flunk obesity report cards. *The Associated Press*; February 5, 2007.
- (24) Scheier LM. Potential problems with school health report cards. *J Am Diet Assoc*. 2004;104(4):525-527.
- (25) Lobstein T, Baur L, Uauy R. Obesity in children and young people: a crisis in public health. *Obes Rev*. 2004;5(Suppl 1):4-85.
- (26) Haller EC, Petersmarck K, Warber JP, editors. *The role of Michigan Schools in Promoting a Healthy Weight*. Lansing, MI: Michigan Department of Education; 2001.







Centers for Disease Control and Prevention  
National Center for Chronic Disease Prevention and Health Promotion  
Division of Population Health

[www.cdc.gov/healthyyouth](http://www.cdc.gov/healthyyouth)