

## CDC Grand Rounds: Childhood Obesity in the United States

### The magnitude of the problem

In the United States, childhood obesity affects approximately 12.5 million children and teens (17% of that population) (1). Changes in obesity prevalence from the 1960s show a rapid increase in the 1980s and 1990s, when obesity prevalence among children and teens tripled, from nearly 5% to approximately 15% (Figure 1) (1). During the past 10 years, the rapid increase in obesity has slowed and might have leveled. However, among the heaviest boys, a significant increase in obesity has been observed, with the heaviest getting even heavier. Moreover, substantial racial/ethnic disparities exist, with Hispanic boys and non-Hispanic black girls disproportionately affected by obesity (Figure 2) (1). Also, older children and teens are more likely to be obese compared with preschoolers (1).

In the short term, obesity in children can lead to psychosocial problems and to cardiovascular risk factors such as hypertension, high cholesterol, and abnormal glucose tolerance or diabetes. In one study, 70% of obese children had at least one additional cardiovascular risk factor, and 30% had two or more

(2). Although the prevalence of type 2 diabetes in teens is very low, a recent report estimated that 15% of new diabetes cases among children and adolescents are type 2 diabetes (3). In the 1980s, type 2 diabetes in teens was virtually unheard of.

The prevalence of obesity among U.S. adults (34%) is twice that observed in children and translates into nearly 73 million adult men and women (4). On average, U.S. adults weigh 24 pounds more than they did in 1960 (5), and they are at increased risk for health conditions such as diabetes, cardiovascular disease, and certain cancers. Although obesity prevalence has remained mostly flat in the past 10 years, the costs associated with obesity have increased substantially during the same period. One study estimated that approximately 9% of all medical costs in 2008 were obesity-related and amounted to \$147 billion, compared with \$78.5 billion 10 years before (6).

### Challenges and strategies to combat the problem

**Identification of effective interventions.** Environmental determinants of childhood obesity in the United States include shifts in food consumption, changes in physical activity levels, and higher levels of television viewing, with the consequent inactivity and marketing of food to children. CDC is focusing on best available evidence to implement intervention programs. For maximum population impact, the focus should be on strategies that alter the food and physical activity environments in places where persons live, learn, work, play, and pray.

*This is another in a series of occasional MMWR reports titled CDC Grand Rounds. These reports are based on grand rounds presentations at CDC on high-profile issues in public health science, practice, and policy. Information about CDC Grand Rounds is available at <http://www.cdc.gov/about/grand-rounds>.*

FIGURE 1. Prevalence of obesity among children and adolescents, by age group — United States, 1963–2008

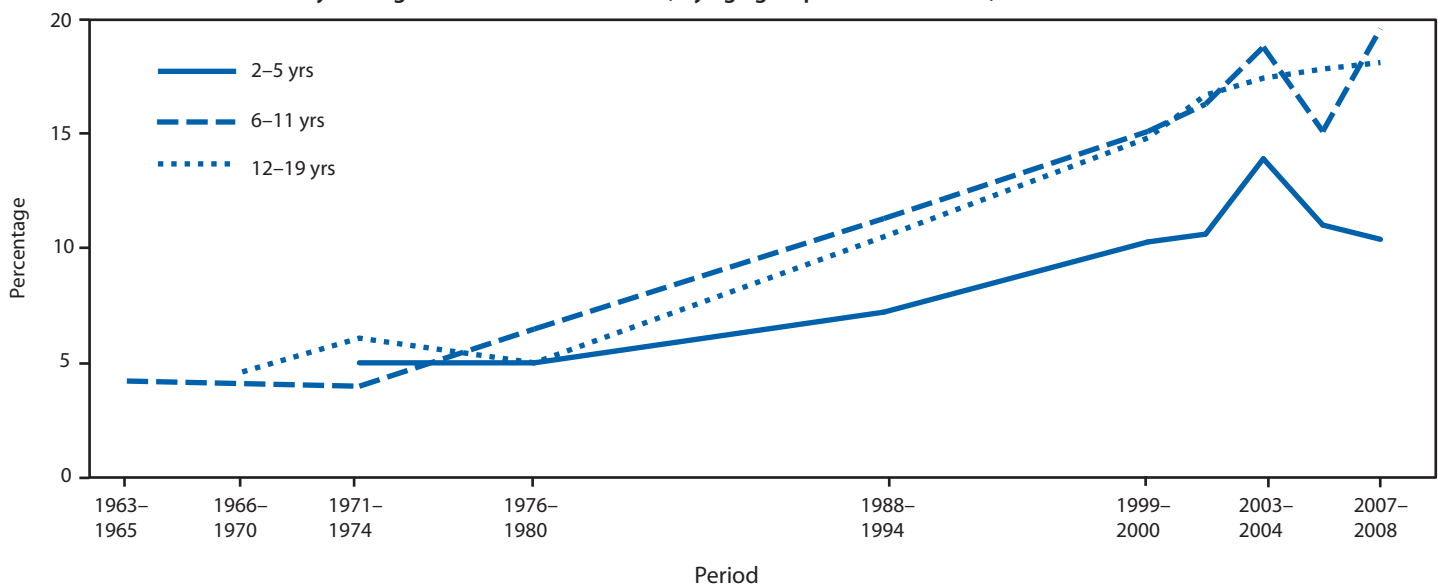
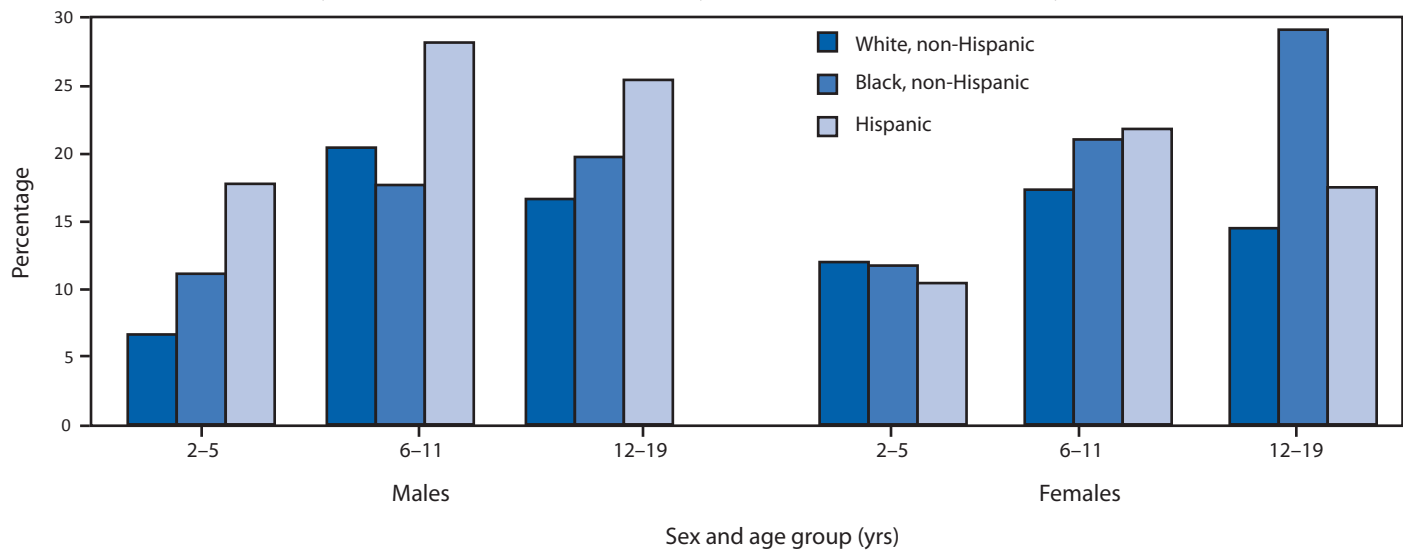


FIGURE 2. Prevalence of obesity among children and adolescents, by sex, age group, and race/ethnicity — United States, 2007–2008



Interventions aimed at single behavioral targets are unlikely to have a substantial impact, and both evidence-based practice and practice-based evidence should be considered.

Breastfeeding has been shown to have substantial health benefits for children, who consequently might be at reduced risk for childhood obesity (7). The most recent data show that nearly 30% of mothers do not breastfeed, and only approximately 40% of children are still breastfed at age 6 months (the recommended duration of exclusive breast feeding is to age 4–6 months) (8). A study of mothers' experiences during their stay at maternity-care hospitals found that duration of breastfeeding increased when the number of baby-friendly steps the mother experienced increased (e.g., initiating breastfeeding early, exclusive breastfeeding, rooming in, on-demand feedings, no pacifiers, and providing information to new mothers) (9). Interventions that encourage breastfeeding in workplaces also would increase the chances of working mothers continuing to breastfeed longer.

Strategies to reduce energy intake include decreasing consumption of high energy-density foods, increasing consumption of fruits and vegetables, decreasing consumption of sugar-sweetened beverages, and decreasing time spent watching television and exposure to food marketed to children. A substantial proportion of all money spent on food consumed outside the home is spent on fast food (10). Institutions such as child-care facilities and schools should alter their purchasing strategies to reduce the availability of high-calorie foods. Approaches to reducing energy intake through decreasing consumption of sugar drinks (sodas and 100% juice-containing beverages) include 1) enacting regulations and policies that eliminate availability of such drinks, including sports drinks, in child-care settings and schools and at school events and

after-school programs, 2) increasing availability of fresh water in parks and recreational facilities, and 3) eliminating sugar drinks in school vending machines. Reducing the amount of time children spend watching television, and thus reducing exposure to food marketed to them, can be accomplished by limiting television time at home and in child-care settings and removing televisions from children's bedrooms.

Increasing energy output through increased physical activity plays an important role in preventing and reducing obesity-related illnesses and conditions such as hyperlipidemia, hyperinsulinemia, and elevated blood pressure, even if weight is not reduced (11). Activity levels can be increased by making it safer to walk or bike to school. Quality school physical education programs that keep children moving the majority of their time in physical education class should be implemented. Providing a safe environment for physical activity and establishing habits (e.g., regular physical activity) that will lead to activity into and throughout adulthood must become priorities.

An example of a comprehensive school-based program was one that was implemented in Philadelphia, Pennsylvania, aimed at 4th, 5th, and 6th graders, which included reducing television time, increasing physical activity, and increasing fruit and vegetable intake (11). This intervention was based on CDC's *School Health Guidelines for Nutrition* (12) and included changes in the school food supply to meet the *Dietary Guidelines for Americans* (13). The 2-year intervention resulted in a 50% reduction in the incidence of overweight and a 10% reduction in prevalence of overweight. Physical inactivity and television viewing also declined (14).

**Policies and systems changes in action.** Changing policy often is the most effective way to implement and sustain these kinds of environmental changes. Policies not traditionally thought

of as health policies (e.g., involving transportation, land use, education, agriculture, and economics) can affect health and obesity rates. The following two examples of major policy-driven initiatives requiring system changes focus on access to healthy foods and improving the built environment, respectively.

According to the U.S. Department of Agriculture, approximately 23.5 million persons in urban and rural areas of the United States live in “food deserts” (i.e., low-income areas without access to healthy foods) (15). Improved access to healthy foods might improve eating habits and decrease obesity. The Fresh Food Financing Initiative (FFFI) in Pennsylvania is a public-private partnership that has improved access to healthy foods using one-time loans and grants; as of September 2009, it had committed \$59.7 million to projects across the state (16). As a result of FFFI, approximately 500,000 persons now have access to healthy foods who did not have it before, nearly 5,000 jobs have been created or retained, and approximately 1.5 million square feet of retail space has been created or saved (16). Eighty-three projects have been implemented, ranging from large supermarkets in urban settings to small stores in small town/rural settings, farmers markets, and community-supported agriculture. Replication of FFFI is under way in California, Colorado, Illinois, Louisiana, New Jersey, and New York. The President’s proposed 2011 budget includes support for a Healthy Food Financing Initiative (HFFI), which combines \$345 million from the U.S. Department of Agriculture, U.S. Department of Health and Human Services, and U.S. Treasury Department for loans, grants, and tax credits to support a range of projects designed to increase access to healthy foods.\*

Supporting HFFI and other policies to increase access to healthy foods through different food and farm policy innovations, and improving the built environment through strategies for walkable, bikeable, and safe neighborhoods, parks, and playgrounds, particularly in underresourced communities, are the focus of the Convergence Partnership, a collaborative of six major funding organizations and CDC.† PolicyLink, a national research and policy institute serves as the Convergence Partnership program lead, providing guidance about policy and strategy.§ Local strategies for enhancing the built environment to support healthy eating and active living include walkable and bikeable neighborhoods, public transit, joint use of school yards, and health impact assessments. Public education and advocacy efforts already have increased awareness of the connection between health and transportation and have altered policy proposals.

**Implementation at the state level: the Maine experience.** In Maine, the pediatric community partnered with community groups, the Maine-Harvard Prevention Research Center, and the state Center for Disease Control and Prevention to develop simple steps clinicians could follow in their practices to reduce childhood obesity. These partnerships led to formation of the Maine Youth Overweight Collaborative (MYOC) in 2004.¶ It started with a simple message: 5-2-1-0: five or more fruits and vegetables per day, 2 hours or less screen time per day, 1 hour or more of physical activity per day, and zero sugar drinks coupled with more water and low fat milk consumption. This message provided clinicians with basic steps to take to combat the childhood obesity epidemic. Before MYOC, clinicians documented body mass index for age and sex approximately 25% of the time; after 24 months of MYOC in action, approximately 90% of encounters resulted in a documented body mass index.

In 2006, a group of local businesses and health-care leaders in Portland, Maine, formed a unique profit/nonprofit partnership called Let’s Go! that used lessons learned and tools and resources developed in MYOC to take the 5-2-1-0 message to additional settings: schools, child-care centers, communities, workplaces, after-school programs, and health-care settings.\*\* The core principles of Let’s Go! affirm that 1) environmental and policy changes influence behavior change, 2) interconnectivity across sectors is essential, and 3) strategies should be evidence-based and continuously evaluated. Let’s Go! has a robust evaluation plan that focuses on qualitative and quantitative data. Because changes in obesity rates take years, progress is tracked through environmental and policy changes as well as behavioral data as precursors to changes in population weight status (Figure 3). Parents already are more likely able to identify all four healthy behaviors correctly, and a 27% increase in perceived behavior change was observed among children in three of four of the 5-2-1-0 targeted behaviors. Let’s Go! has begun to expand statewide, and by June 2010, involved nearly 85,000 students in 262 schools, 40 child-care sites caring for thousands of children, approximately 50 physician practices, numerous after-school programs supporting approximately 2,500 youths, six of Portland’s largest employers, and eight regions across Maine. Since June 2010, Let’s Go! has been disseminated statewide to seven additional regions in Maine.

**Other initiatives.** The efforts already under way for obesity prevention and control are further strengthened by Let’s Move, the First Lady’s initiative to end childhood obesity in a generation, by empowering parents, encouraging healthier foods in

\* Additional information available at <http://www.letsmove.gov/healthycommunity.php>.

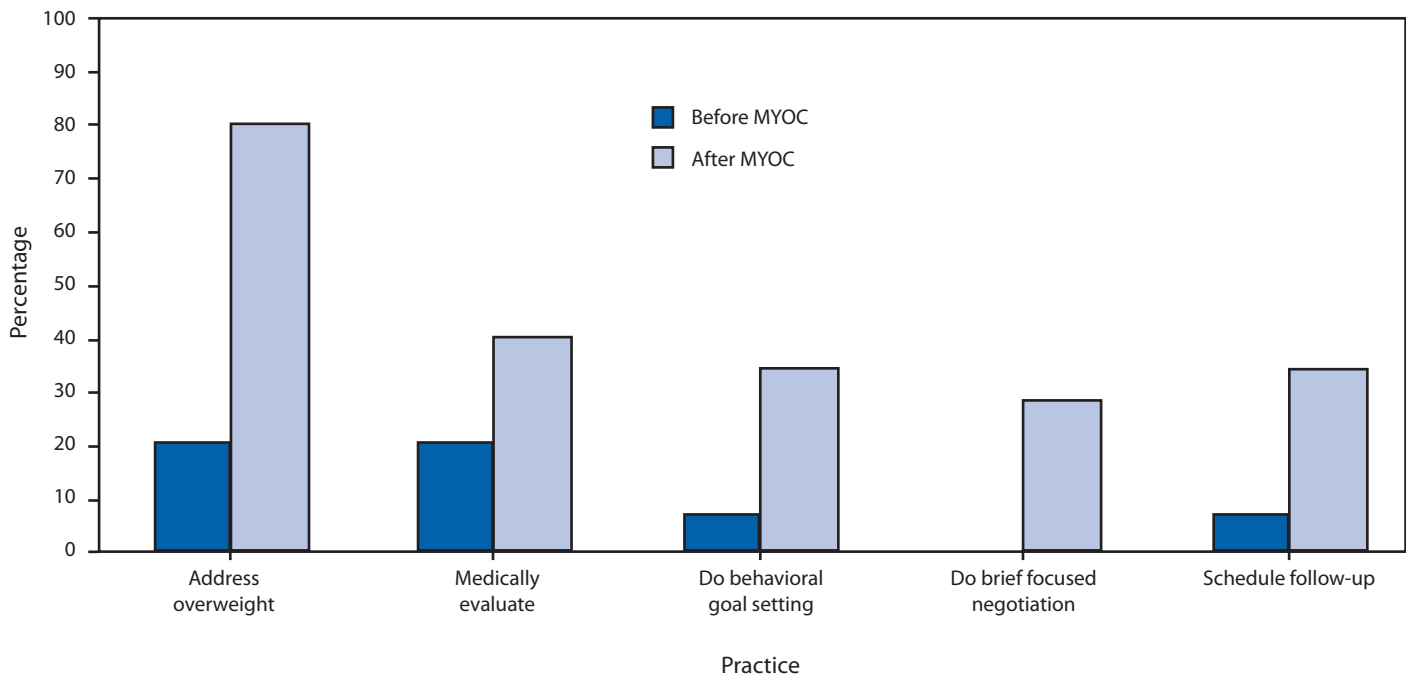
† Additional information available at <http://www.convergencepartnership.org>.

§ Additional information available at <http://www.policylink.org>.

¶ Additional information available at <http://www.letsmove.org/resources/MYOC.php>.

\*\* Additional information available at <http://www.letsmove.org>.

**FIGURE 3. Percentage of clinicians reporting that they “strongly agreed” with the use of selected practices to counter childhood obesity among their patients, before and after implementation of the Maine Youth Overweight Collaborative (MYOC) — Maine, 2004–2006**



schools, increasing physical activity, and increasing access to affordable healthy foods.<sup>††</sup> Let's Move includes establishment of the intergovernmental Childhood Obesity Task Force and, in the U.S. Department of Health and Human Services, a Healthy Weight Task Force is developing broad approaches in multiple sectors. Other key programs include those instituted by the Convergence Partnership and programs initiated by CDC with funds from the American Recovery and Reimbursement Act of 2009.

### Summary

Policy and environmental interventions show early evidence of improving environments that will lead to lower rates of obesity. Nonetheless, more studies of impact and effectiveness are needed, as are identification and evaluation of promising approaches from around the country. The high visibility accorded to childhood obesity by the Let's Move initiative and the funding provided to states and communities through the American Recovery and Reinvestment Act provide unparalleled opportunities to reverse the obesity epidemic.

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### References

- Ogden CL, Carroll MD, Curtin LR, Lamb MM, Flegal KM. Prevalence of high body mass index in US children and adolescents, 2007–2008. *JAMA* 2010;303:242–9.
- Freedman DS, Mei Z, Srinivasan SR, Berenson GS, Dietz WH. Cardiovascular risk factors and excess adiposity among overweight children and adolescents: The Bogalusa Heart Study. *J Pediatr* 2007;150:12–7.
- SEARCH for Diabetes in Youth Study Group. The burden of diabetes mellitus among US youth: prevalence estimates from the SEARCH for Diabetes in Youth Study. *Pediatrics* 2006;118:1510–8.
- Flegal KM, Carroll MD, Ogden CL, et al. Prevalence and trends in obesity among US adults, 1999–2008. *JAMA* 2010;303:235–41.
- Ogden CL, Fryar CD, Carroll MD, Flegal KM. Mean body weight, height, and body mass index, United States 1960–2002. *Adv Data* 2004;347:1–17.
- Finkelstein EA, Trogon JG, Cohen JW, Dietz W. Annual medical spending attributable to obesity: payer- and service-specific estimates. *Health Aff (Millwood)* 2009;28:w822–31.
- Harder T, Bergmann R, Kallschnigg G, Plagemann. Duration of breastfeeding and risk of overweight: a meta-analysis. *Am J Epidemiol* 2005;162:397–403.

<sup>††</sup> Additional information available at <http://www.letsmove.gov>.

8. CDC. Racial and ethnic differences in breastfeeding initiation and duration by state—National Immunization Survey, United States, 2004–2008. *MMWR* 2010;59:327–34.
9. Philipp BL, Merewood A, Miller LW, et al. Baby-friendly hospital initiative improves breastfeeding initiation rates in a US hospital setting. *Pediatrics* 2001;108:677–81.
10. The Keystone Forum on Away-from-Home Foods. Opportunities for preventing weight gain and obesity. Washington, DC: The Keystone Center; 2006.
11. Gutin B, Barbeau P, Owens S, et al. Effects of exercise intensity on cardiovascular fitness, total body composition, and visceral adiposity in obese adolescents. *Am J Clin Nutr* 2002;75:818–26.
12. CDC. Guidelines for school health programs to promote lifelong healthy eating. *MMWR* 1996;45(No. RR-9).
13. US Department of Health and Human Services, US Department of Agriculture. Dietary guidelines for Americans. Washington DC: US Government Printing Office; 2005. Available at <http://www.healthierus.gov/dietaryguidelines>. Accessed January 18, 2011.
14. Foster GD, Sherman S, Borradaile KE, et al. A policy-based school intervention to prevent overweight and obesity. *Pediatrics* 2008;121:e794–802.
15. Economic Research Service, US Department of Agriculture. Access to affordable and nutritious food. Measuring and understanding food deserts and their consequences: report to Congress. Washington, DC: US Department of Agriculture; 2009. Available at <http://www.ers.usda.gov/publications/ap/ap036>. Accessed January 13, 2011.
16. Karpyn A, Manon M, Treuhaft S, Giang T, Harries C, McCoubrey K. Policy solutions to the 'grocery gap'. *Health Aff (Millwood)* 2010;29:473–80.

## Announcement

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### Environmental Public Health Tracking 101

A new CDC online course, Environmental Public Health Tracking 101, provides an overview of the major components of environmental public health tracking. The course is divided into 12 modules within three sections. Topics include how to use the National Environmental Public Health Tracking Network (<http://www.cdc.gov/ephttracking>), surveillance and epidemiology, types of tracking data, and geographic information systems.

The online course is available at <http://www.nehacert.org>. The course can be accessed by entering “Tracking 101” in the search box. Continuing education credit is available at no charge for nurses, health educators, and other health professionals.