

The Response of the US Centers for Disease Control and Prevention to the Obesity Epidemic

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Abstract

The recognition of the obesity epidemic as a national problem began in 1999 with the Centers for Disease Control and Prevention's (CDC's) publication of a series of annual state-based maps that demonstrated the rapid changes in the prevalence of obesity. Increasing rates of obesity had been noted in earlier CDC studies, but the maps provided evidence of a rapid, nationwide increase. The urgent need to respond to the epidemic led to the identification of state targets and the first generation of interventions for obesity prevention and control. The CDC's role was to provide setting- and intervention-specific guidance on implementing these strategies, and to assess changes in targeted policies and behaviors. The CDC's efforts were augmented by Congressional funding for community initiatives to improve nutrition and increase physical activity. Complementary investments by Kaiser Permanente, the Robert Wood Johnson Foundation, and the Institute of Medicine improved the evidence base and provided policy recommendations that reinforced the need for a multisectoral approach. Legislative, regulatory, and voluntary initiatives enacted by President Obama's administration translated many of the strategies into effective practice. Whether current efforts to address obesity can be sustained will depend on whether they can be translated into greater grass-roots engagement consistent with a social movement.

INTRODUCTION

The epidemic of obesity poses a grave threat to the health of the people of the United States. Recent data indicate that during 2011–2012, approximately 35% of adults and 17% of children and adolescents were affected by obesity (75). Significant differences exist by ethnicity and sex, with respect to the prevalence of both obesity and severe obesity. The US Centers for Disease Control and Prevention (CDC), which constitutes the nation's prevention agency, located within the US Department of Health and Human Services (DHHS), has been intimately involved in recognizing the epidemic, developing and promoting population-based strategies to control the epidemic, and monitoring the impact of interventions based on those strategies. This article chronicles the steps that the CDC has taken to address the epidemic and to document the progress that has occurred. In contrast to other social movements, such as civil rights, and tobacco and seatbelt use, the response to obesity has been characterized by a top-down approach rather than being led by grass-roots efforts. Because the constellation of federal efforts to address obesity may be ephemeral, the response to obesity may not be sustainable unless it generates a greater level of spontaneous community engagement.

EARLY FEDERAL EFFORTS TO ADDRESS OBESITY

The earliest federal efforts to address obesity consisted of bringing together expert committees to provide recommendations on assessment and treatment. In 1993, an Expert Committee on Clinical Guidelines for Overweight in Adolescent Preventive Services was convened by the Maternal and Child Health Bureau of the US Health Resources and Services Administration to develop guidelines for assessing obesity in adolescents (47). The report by this committee made the first recommendation in the United States that the body mass index (BMI) should be used to assess and categorize obesity in children and adolescents. The committee suggested the use of a category known as at risk of overweight for children and adolescents with BMIs between the 85th and 95th percentiles, and the category of overweight to define children and adolescents with BMIs \geq 95th percentile for youth of the same age and sex. A second notable federal effort was the report in 1998 by an expert panel convened by the National Heart, Lung, and Blood Institute of the National Institutes of Health on *Clinical Guidelines on the Identification, Evaluation and Treatment of Overweight and Obesity in Adults* (72). Their recommendations reflected a rigorous review of the evidence for the assessment, risks, and benefits of therapy for adult obesity, including a highly useful algorithm for providers.

THE PUBLIC HEALTH RESPONSE TO THE OBESITY EPIDEMIC

The CDC's efforts to respond to the obesity epidemic began in 1999 based on the results of its periodic surveys of population health. One of these surveys is the National Health and Nutrition Examination Survey (NHANES) (Table 1) (25). Although the 1988–1994 NHANES survey documented an increase in the prevalence of obesity, the epidemic became highly visible with the publication in 1999 of an issue of the *Journal of the American Medical Association* devoted to obesity. That issue included an article that graphically depicted the rapidly increasing prevalence of obesity on a state by state basis in the United States (70) using data from the Behavioral Risk Factor Surveillance System (BRFSS) (20), which is an annual state-based telephone survey conducted by the CDC. In addition, the journal included an editorial authored by the director of the CDC that recognized that obesity was epidemic in the United States, acknowledged the environmental determinants of obesity, and called for a focus on prevention that promoted environmental

Table 1 Surveillance systems used in the United States to track the obesity epidemic and related behaviors

Survey	Survey targets	Dates
National Health and Nutrition Examination Survey (NHANES)	Representative sample of US children and adults; measures heights and weights	1960–1962, 1971–1974, 1988–1994, annually since 1999; data analyzed in 2-year increments
Behavioral Risk Factor Surveillance System (BRFSS)	US adults; telephone survey; data provide state-based estimates of self-reported health risk behaviors	Annually nationwide since 1993; methods revised in 2011
Pediatric Nutrition Surveillance System (PedNSS)	Public health programs serving low-income children 0–5 years old; sample comprises predominantly WIC participants; measured heights and weights	Began in 5 states in 1973; data collection ended 2012
Youth Risk Behavior Survey (YRBS)	Ninth- to twelfth-grade students; school-based survey; self-reported height, weight, and behaviors	1990–present; conducted every 2 years
School Health Policies and Practices Study (SHPPS)	State-level and district-level populations in schools and classrooms; survey of schools' health practices	State, district, school, and classroom data collected: 1994, 2000, 2006; state and district data collected: 2012; school and classroom data collected: 2014
School Health Profiles	Schools' health policies in states; large, urban school districts; territories; and tribal governments	Every other year since 1996
Infant Feeding Practices Study	Mail survey of infant feeding practices conducted in collaboration with the Food and Drug Administration	1993–1994, 2005–2006
Maternity Practices in Infant Nutrition and Care (mPINC)	Hospital and birth centers; data collected on practices that promote breastfeeding	Conducted every 2 years since 2007

Abbreviation: WIC, Special Supplemental Nutrition Program for Women, Infants, and Children.

solutions (62). Both the article and editorial had the profound effect of increasing the visibility of the obesity epidemic and directing research toward effective environmental and policy solutions that addressed changes in diet and physical activity. For example, for years after the BRFSS state maps (26) became available on the CDC's Division of Nutrition and Physical Activity's (DNPA's) website [later renamed the Division of Nutrition, Physical Activity, and Obesity (or DNPAO)], many speakers began presentations with a sequential display of the maps. It seems likely that no other publication did as much to increase the visibility of the epidemic, at least to medical and scientific audiences. The timeline for the CDC's efforts in the prevention and control of the obesity epidemic, beginning with the development of the state maps, is shown in **Table 2**.

ASSESSING AND TRACKING THE PREVALENCE OF OBESITY

The CDC played a major part in the development of population metrics for obesity. The aforementioned 1998 panel convened by the National Heart, Lung, and Blood Institute had already provided the cut points for the identification of overweight and obesity in adults. Prior to 2000, although BMI was being used to identify children at risk for overweight and obesity, no BMI growth charts were commonly used. In 2000, the CDC provided the first BMI growth charts for children and adolescents (77), and retained the term at risk of overweight for children and adolescents with

Table 2 The US Centers for Disease Control and Prevention's (CDC's) involvement in activities to prevent and control obesity

Year	Activities
1998	Developed state obesity maps
1999	Publication of <i>JAMA</i> issue devoted to obesity. Issue included CDC's state obesity maps Director of the CDC published an editorial in the same issue of <i>JAMA</i> declaring that obesity was epidemic
2000	First six state programs funded to address nutrition, physical activity, and obesity Release of the CDC's growth charts, which included body mass index Release of US DHHS Blueprint for Breastfeeding
2001	Publication of <i>The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity</i> 12 states funded for nutrition, physical activity and obesity interventions Release of community guide "Recommendations to Increase Physical Activity in Communities" for physical activity Release of the National Blueprint, Increasing Physical Activity Among Adults 50 and Older
2002	The CDC's Healthier Worksite Initiative begins VERB—It's What You Do campaign begins; aimed at increasing physical activity in children 9–13 years old
2003	20 states funded for nutrition, physical activity, and obesity programs; 4 behavioral strategies established (increasing fruit and vegetable intake, encouraging breastfeeding, encouraging physical activity, and limiting television time)
2004	28 states funded; National Business Group on Health's Institute on the Costs and Health Effects of Obesity begins Physical activity recommendations for children and adolescents released
2005	Release of the <i>CDC Guide to Breastfeeding Interventions</i> Launch of Infant Feeding Practices Study Physical Activity Policy Research Network established by the CDC
2006	Convergence Partnership formed World Health Organization's growth charts released; CDC recommends adoption in 2010
2007	Release of <i>Expert Committee Recommendations Regarding the Prevention, Assessment, and Treatment of Child and Adolescent Overweight and Obesity: Summary Report</i> First Maternity Practices in Infant Nutrition and Care (mPINC) survey conducted First breastfeeding report card released
2008	23 states funded for nutrition, physical activity, and obesity interventions Nutrition and Obesity Policy Research and Evaluation Network established by the CDC <i>2008 Physical Activity Guidelines for Americans</i> released
2009	25 states funded for nutrition, physical activity, and obesity interventions Publication of <i>Recommended Community Strategies and Measurements to Prevent Obesity in the United States</i> Completion of state guidance documents for screen time, fruit and vegetable intake, physical activity, and sugar drink interventions Publication of White House Task Force on Childhood Obesity report US DHHS established Task Force on Healthy Weight First meeting hosted by the CDC and the Nemours Children's Health System focusing on early care and education
2010	American Recovery and Reinvestment Act of 2009 funds 58 communities as part of the CDC's Communities Putting Prevention to Work program Publication of indicator reports on the intake of fruits and vegetables, physical activity, and breastfeeding
2011	Procurement policy for healthful foods and beverages adopted by United States; DHHS Community Transformation Grants initiated by the CDC Surgeon General's Call to Action to Support Breastfeeding
2012	Procurement policy rolled out across agencies with support of US General Services Administration <i>The Weight of the Nation</i> documentary on obesity produced by HBO

Abbreviations: DHHS, Department of Health and Human Services; *JAMA*, Journal of the American Medical Association.

BMIs between the 85th and 95th percentiles, and the term overweight for children and adolescents with BMIs \geq 95th percentile. In 2007, an expert committee recommended the use of the terms overweight and obesity for children, corresponding to a BMI between the 85th and 95th percentiles, and a BMI \geq 95th percentile, respectively (2). However, differences in opinion across DHHS agencies about the impact that the use of new terminology might have on changing BMI from a screening tool to a diagnostic tool, and its potential to induce eating disorders, meant that the recommendations of the expert panel were not adopted. In 2009, the Assistant Secretary for Health broke the stalemate by deciding that DHHS should adopt the new terms.

A second important metric was the adoption of new growth standards for children 0–2 years old. The CDC's growth charts had been based on cross-sectional data from a representative population of children and adolescents in the United States. Because the data were cross-sectional, the growth charts did not necessarily reflect the growth of healthy children. In 1997, the World Health Organization (WHO) initiated the Multicentre Growth Reference Study to follow the growth of more than 8,000 healthy, ethnically and genetically diverse children in Brazil, Ghana, India, Norway, Oman, and the United States (98). Children were selected based on optimal dietary conditions, including exclusive breastfeeding for 4 months, introduction of complementary foods after 4 months but before 6 months, absence of maternal smoking, and socioeconomic conditions that promoted optimal growth. Sequential growth measurements were collected from 0–59 months of age. In contrast to the prior US reference curves for infants 0–24 months of age, the growth data from WHO's multicenter study provided standards that specified optimal growth as opposed to reference standards based on the US cross-sectional data. In 2010, WHO's standards were adopted by the CDC for children 0–24 months of age (44). One consequence of adopting the new standards was that later data on the prevalence of obesity in children in this age group that were based on the new standards could not be compared with earlier data derived from the US population. However, the CDC's growth charts retained the reference curves for children and adolescents 2–19 years of age because the methods used by WHO and the CDC for children who were older than 2 years were comparable and because, in contrast to WHO's standards, the CDC's growth curves could be used beyond 59 months of age.

SURVEILLANCE SYSTEMS

The framework for the CDC's response to the obesity epidemic is illustrated in **Figure 1**. Although the figure suggests that the agency's response was logical and linear, the reality was that the process was one of continuous learning. To the extent possible, the CDC's activities relied on research to inform interventions and to develop guidelines and relied on partnerships and technical assistance to inform policy and environmental change. These efforts served to build capacity at multiple levels that would ultimately change behavior and reduce risk factors, and thereby reduce rates of chronic diseases and mortality.

Surveillance systems were the cornerstone of the CDC's activities (**Table 1**). At the national level, NHANES (25), conducted by the CDC's National Center for Health Statistics, provided invaluable data from a representative sample of the US population. Measured heights and weights enabled the calculation of BMIs, and data on diet and physical activity, coupled with the measurement of risk factors—such as blood pressure, lipid levels, and glucose and insulin levels—became vital resources for assessing the impact of obesity. The NHANES surveys confirmed the increases in obesity that had been observed with the BRFSS (37, 38), as well as increases of overweight and obesity in children and adolescents (76).

One of the limitations of the NHANES surveys was that they provided only national and regional data. In contrast, the BRFSS provided state and local data, but only on adults. Limitations

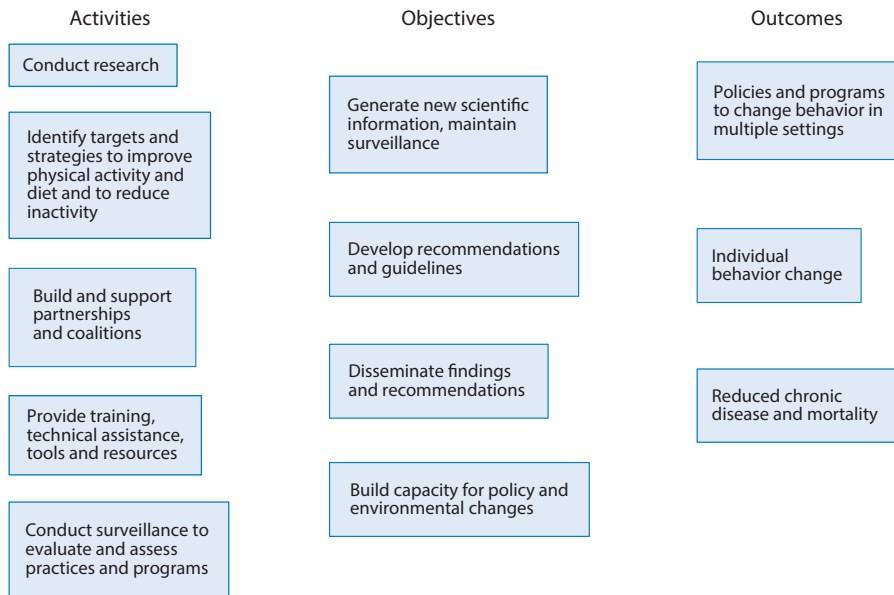


Figure 1

Logic model for nutrition and physical activity interventions.

of the BRFSS include the fact that heights and weights were self-reported, which provided underestimates of the true prevalence of obesity. Furthermore, the ability of the BRFSS to capture detailed information about diet and physical activity was limited by the length of the survey and competition across the CDC to include measures of other behaviors. In 2011, because the response rate to the BRFSS was declining, due in part to the extensive replacement of landlines with cell phones, data collection was extended to include cell phone numbers. The change in the composition of the population sampled, as well as the use of a new weighting method, meant that the state maps generated after 2011 could no longer be compared with those based on data collected before 2011. The change in methods created a disjunction between the earlier BRFSS surveys and those after 2011, so that the tracking of prevalence had to begin anew.

In addition to the NHANES surveys, the CDC conducted a number of surveys that captured information related to childhood obesity. The DNPA conducted an annual survey known as the Pediatric Nutrition Surveillance System (PedNSS) (**Table 1**) (27). Because 50% of US infants and approximately 30% of 1–4-year-old children (58) are enrolled in the Special Supplemental Nutrition Program for Women, Infants, and Children (WIC), the PedNSS provided BMI data on a large sample of a highly vulnerable group of children. These data enabled state and local analyses of the prevalence of overweight and obesity. Because data from PedNSS overlapped with data collected by the US Department of Agriculture (USDA), and because of budgetary pressures, the DNPAO discontinued the PedNSS in 2012.

The CDC’s Division of Adolescent and School Health (DASH) instituted the Youth Risk Behavior Survey (YRBS) in 1990 and has conducted it every other year since (31). The YRBS provides a nationwide assessment of a range of behaviors in ninth- to twelfth-grade adolescents, including tobacco use, diet, and physical activity. The YRBS also collects self-reported height and weight data that are used to identify the percentage of students who are overweight and obese.

However, a crucial gap that remains is the absence of data from children between the ages of 5 and 14 years. One of the CDC's most recent efforts has been to explore whether electronic health records from pediatric practices and health insurance plans can be used to monitor the prevalence of obesity and its complications, and also to monitor progress in obesity prevention and control across all age groups. The advantage of this approach is that it can provide critical local data that could inform community decision making. For example, Kaiser Permanente (KP) has used data from electronic health records in northern California to track the progress of their obesity prevention efforts in children and adolescents enrolled in their health plan (40).

DEVELOPING TARGETS AND STRATEGIES

Formal DHHS recommendations for the response to obesity began in 2001 with the publication of *The Surgeon General's Call to Action to Prevent and Decrease Overweight and Obesity* (91), informed in part by the CDC's participation. This document presaged many of the subsequent targets and strategies that were implemented during the next decade. For example, the Call to Action (CTA) asked for environmental changes as well as public-private partnerships to help prevent and reduce obesity and increase access to healthful foods. The report also focused on strategies to reduce obesity, including increasing fruit and vegetable intake, encouraging breastfeeding, reducing time spent watching television and engaging in other sedentary behaviors, and increasing physical activity. Consistent with the earlier recognition of the environmental determinants of physical activity, the report also called for public policies to improve infrastructure for physical activity, such as installing sidewalks and paths for walking and bicycling. Many of the recommendations focused on specific settings, including homes, schools, worksites, and communities. The CTA also recognized the importance of the health-care system, and called for improving the training of providers, as well as building partnerships with schools, communities, and other organizations to address the social and environmental causes of overweight and obesity.

In 2000, the CDC began funding state health departments to help them address obesity, with 6 states funded by the DNPA; by 2003, funding had expanded to 20 state programs. Because the development of state programs prompted the need to identify targets for obesity prevention and control, the CDC focused on strategies to increase physical activity, encourage breastfeeding, increase the intake of fruits and vegetables, and decrease the time spent viewing television by children. Several of these early targets for obesity prevention and control were based on empirical data or a few randomized trials, rather than on systematic reviews of a large body of evidence (3, 34, 36, 42, 46, 85, 94). The one exception was a systematic review by the CDC's Community Preventive Services Task Force, which established a number of strategies for increasing physical activity (89). These included using informational approaches, such as point-of-decision prompts to encourage stair use and community-wide campaigns; behavioral and social approaches, such as introducing school-based physical education and social support interventions in community settings; individually adapted programs to change health behaviors; and environmental approaches, such as creating or enhancing access to places for physical activity.

The DNPA's strategies were pragmatic. As recommended by the US Institute of Medicine's report *Preventing Childhood Obesity: Health in the Balance*, the urgency of a response to the epidemic required relying on the best available evidence, rather than on the best possible evidence (63), and generating evidence-based practice from practice-based evidence (43). As with a number of other diseases, the identification of effective interventions received more emphasis than the search for a cause. For example, substantial improvements in the treatment of acute lymphocytic leukemia in children had occurred without the identification of a cause. As the response aimed at controlling the obesity epidemic progressed, the CDC focused on policy-driven population-based interventions

that changed the food and physical-activity environments. Based on experience with tobacco control, it appeared that interventions aimed at a single target were less likely to be effective than multilayered, multisectoral approaches.

One of the earliest population-based interventions occurred when Congress funded a national campaign to increase physical activity among youth. Between 2001 and 2005, Congress allocated almost \$340 million to support the VERB campaign (“VERB—it’s what you do”), a paid media campaign using television, radio, and print ads that were accompanied by promotional activities designed to increase regular physical activity in children 9–13 years of age (97). The campaign was unique insofar as it engaged advertising agencies representing each of the major ethnic groups in the United States to design ethnic-specific ads (49). Evaluation of the campaign demonstrated that 75% of children in this age group were aware of the campaign, and that children who were aware of the campaign reported engaging in more physical activity than those who were not aware of it (50). After 2 years, a dose–response effect of the campaign on self-reported physical activity persisted (51).

The results of the VERB evaluation proved quite contentious at DHHS. Although the cost of the campaign was likely the principal (and unspoken) concern, the validity of the impact of the campaign was challenged. Despite internal disagreement about VERB’s effectiveness, the administration ended the campaign in 2005 based on the rationale that because the campaign was effective, continued funding was no longer necessary.

Over time, additional intervention targets were incorporated. Data that demonstrated the substantial caloric intake associated with sugar drinks—defined as sodas, 10% juices, and sports drinks consumed by children and adolescents (95)—led to the inclusion of a target aimed at decreasing their consumption. Similarly, the substantial intake of foods from quick-service restaurants (81) led to the inclusion of decreasing fast-food intake as a target. Evidence suggested that consuming sugar drinks (33, 35, 48) and fast food (80) contributed to excess caloric intake—i.e., their consumption was not accompanied by a consequent decrease in the consumption of other calories. These observations suggested that the lack of compensation—that is, decreasing the intake of calories from other foods—when these foods were consumed would likely lead acutely and chronically to excess weight gain.

IMPLEMENTING SETTING-SPECIFIC INTERVENTIONS

The final common pathway for the CDC’s obesity programs ran through state health departments, and evolved to focus on specific settings. The setting-specific interventions below are considered chronologically to reflect the CDC’s response to the epidemic.

Schools

DASH was established at the CDC in the 1980s to address health issues in schools. With the advent of the AIDS epidemic, the division began funding education agencies at the state level and in large cities to help schools adopt and implement HIV-prevention policies and programs. Beginning in the early 1990s, DASH started funding state education agencies to support schools in their efforts to prevent chronic disease by implementing policies and programs that promoted physical activity and healthy eating, and prevented tobacco use. DASH developed guidelines to inform school policies and practices. These included *School Health Guidelines to Promote Lifelong Healthy Eating and Physical Activity*, developed in 1996, followed in 1997 by *Guidelines for School and Community Programs to Promote Lifelong Physical Activity Among Young People*. Both guidelines were updated and combined in 2011 (11). DASH also developed a number of science-based tools

to help schools implement the guidelines, including the *School Health Index: Self-Assessment and Planning Guide 2014* (29); *Fit, Healthy, and Ready to Learn*, which was developed for DASH by the National Association of State Boards of Education (71); the *Physical Education Curriculum Analysis Tool* (6); and the *Health Education Curriculum Analysis Tool: 2012* (13).

The evolution of the school programs in DASH provided a template for what was to follow. These included a surveillance system to assess individual or setting-specific behaviors that could be used over time to characterize changes in disease-related behaviors or policies that influenced those behaviors. The YRBS and the BRFSS provided data on adolescents and adults that were used to track changes in the prevalence of obesity, physical activity, and fruit and vegetable intake. Although self-reported heights and weights in both surveys underestimated the true prevalence of obesity, that limitation was offset by the survey's ability to provide school-district-specific or state-specific estimates.

Worksites

An early DNPA investment in place-based interventions was made in worksites. In 2002, the CDC developed and implemented its Healthier Worksite Initiative (8) on the CDC's campuses. The Healthier Worksite Initiative was based on the recognition that worksites were to adults as schools were to children and adolescents, insofar as adults spend a lot of time at worksites, and worksites present opportunities to modify food choices and promote physical activity. Furthermore, if the CDC were to promote worksite interventions, it was crucial for the agency to understand how to implement them, and to become a model worksite. The worksite interventions that were initiated across the agency are shown in **Table 3**. Among the most important of these interventions was the modification of the General Services Administration (GSA) contract for the CDC's cafeteria. Renegotiation of this contract led to the development of food and sustainability standards, and the provision of healthier options in the cafeteria at the CDC's headquarters in Atlanta, Georgia. The food and sustainability standards were then implemented in the DHHS cafeteria in Washington, DC, where receipts showed an increase in cafeteria use and revenues. Including the GSA in the development and revision of the standards (22) led the GSA to decide to expand the standards to all departments and agencies within the federal government (41). Because these standards are

Table 3 Components of the US Centers for Disease Control and Prevention's (CDC's) Healthier Worksite Initiative

Component	Setting or intervention
Health promotion	Lifestyle centers for fitness and physical activity Arranging leave for preventive screenings
Food/cafeteria choices	Modify US General Services Administration contract for the CDC's cafeteria to develop food and sustainability standards Implement policy of providing healthful food at meetings Procurement standards for foods provided in vending machines and worksite cafeterias
Physical environment	Encourage the use of stairwells Provide lactation rooms Implement CDC walkability audit Encourage development of walkable campuses and walking trails Engage a fresh produce vendor
Smoke-free campus	Ban tobacco use inside and outside buildings

applied across the federal government, they are likely to improve the health of federal employees, and the demand for healthful options could improve the quality of the foods marketed to the federal government. However, no data are available to test this hypothesis.

In 2005, the work initiated at the CDC led to a liaison with the National Business Group on Health's Institute on the Costs and Health Effects of Obesity, now known as the Institute on Innovation in Workplace Well-being. The CDC's participation provided a highly credible voice on the magnitude and impact of the epidemic, which reinforced the importance of allocating corporate time and resources to the problem of obesity (LuAnn Heinen, personal communication). The CDC's focus on policy and environmental change gave considerable momentum to changing the food and physical activity environments on corporate campuses nationally. Lastly, engagement with the National Business Group on Health emphasized the importance of the corporate sector's role in reversing the epidemic. The recognition that interventions introduced in large companies were not feasible for most small and medium-size companies led the CDC to develop materials and an online tool for worksite wellness that could be used by these businesses (10).

Early Care and Education

Efforts in early care and education (ECE) settings began in 2009 when the CDC cohosted the first conference on obesity in ECE with the Nemours Children's Health System and the Maternal and Child Health Bureau. At the same time, the DNPAO initiated the first significant evaluation of a model ECE policy instituted in New York City in 2007 (4). The New York City policy (74) applied to licensed group child care centers, eliminated television and videos for children younger than 2 years, and limited viewing for children older than 2 years to 60 minutes/day of educational programs or programs that actively encouraged children to move. The policy required 60 minutes of physical activity daily, the elimination of sugar-sweetened beverages, the availability of water at all meals, and mandated use of one percent or low fat milk. The evaluation of the program indicated that the dietary changes were readily implemented and that 75% of children achieved the goal of 60 minutes of daily physical activity (65). Changes in the prevalence of obesity could not be assessed because baseline BMI data were not available (L. Kettel-Khan, personal communication). Nonetheless, the New York City policy became the core of the model policies that the CDC promoted, and were later incorporated into state and community programs, and ultimately into the Let's Move! Child Care State Challenge under President Barack Obama's administration.

An outgrowth of the 2009 conference, as well as the White House Task Force on Childhood Obesity (see below), was the implementation of an Early Childhood Health and Development Coordinating Committee at the DHHS in 2011. The committee was soon broadened to include other federal agencies that either influenced ECE policies, such as the USDA and the Department of Education, or conducted ECE programs, such as the GSA and the Department of Defense. As a result, ECE efforts began to be coordinated across the federal government.

Subsequent efforts were spurred by a growing convergence of interest in the development of guidelines on nutrition and physical activity for ECE programs (1, 39). Formal inclusion of ECE in state and community programs occurred with the advent of funding for Community Transformation Grants (CTGs) as described below. The grants promoted the translation of ECE strategies into state and local policy to improve nutrition and physical activity, and to reduce the time children spent in front of a screen. The CDC therefore turned its efforts toward the implementation of these guidelines by developing state action guides (16, 67) and major training initiatives (66). The trainings were strategically designed to bring together state leaders in ECE, including representatives from state-funded programs for obesity, child care administrators, the directors of

Head Start programs, and other attendees designated by the state. As the trainings progressed, they became regional, with the CDC providing tools, mentoring, technical assistance, newsletters, and monthly conference calls. In 2012, formal funding for learning collaboratives in six states provided intensive training for teams of state and center-based staff about the implementation of dietary and nutrition standards.

An important gap with respect to assessing the success of these ECE efforts is the inability to measure the implementation of these policy changes at the state and community levels, and to measure the degree to which nutrition and physical activity standards are being incorporated into preservice training and professional development.

Communities

In 1999, the CDC initiated Racial and Ethnic Approaches to Community Health (REACH) (28), a program of community participation approaches designed to address racial and ethnic health disparities in relation to seven designated health issues, including cardiovascular disease and diabetes. Although some REACH programs already had begun to address obesity, nutrition, or physical activity, the first explicit community funding for these risk factors began in 2010, with funding from the American Recovery and Reinvestment Act of 2009. The act included \$373 million for the CDC's Communities Putting Prevention to Work (CPPW) program, and an additional \$120 million to be used by states, tribes, and communities (19) to address these risk factors. Communities could elect to focus on nutrition, physical activity, or tobacco use, or any combination thereof. Forty-four communities were initially funded, in amounts ranging from \$0.9 million to \$32 million; more than half of these communities elected to focus on nutrition and physical activity.

Although the CPPW program represented an important and highly justifiable investment, implementation posed major challenges. The appropriation came late in the fiscal year. As a result, the development and circulation of the funding opportunity announcement, the submission and review of proposals, and the funding of communities occurred rapidly, with almost no opportunity to specify the focuses of the nutrition and physical activity strategies. Although the program was under substantial pressure to demonstrate success, no time was allocated to take baseline measurements. Furthermore, many of the communities had never previously received such substantial financial resources, lacked the infrastructure to address the targeted behaviors, and therefore had substantial difficulty developing and implementing coherent strategies for addressing the targeted behaviors. As a result, many of the interventions lacked a sound rationale, reached only a limited population, or had difficulty demonstrating their impact.

In 2011, with funding from the 2010 Affordable Care Act (ACA) Prevention and Public Health Fund, the CDC initiated Community Transformation Grants (CTGs) (21). The CTGs reached 4 of 10 Americans in 36 states through the \$103 million that was awarded to 61 state and local government agencies, tribes and territories, and nonprofit organizations. The goals of the CTGs differed somewhat from those of the CPPW. Like the CPPW grants, the CTGs sought to encourage tobacco-free living and engagement in active living and healthful eating, but they also added high-impact clinical preventive services, such as screening and referral for hypertension and hypercholesterolemia, and could also address social and emotional wellness, as well as how to develop a healthy and safe physical environment. Because the funding process was not as hurried as that for the CPPW, the funding opportunity announcement was more deliberate and prescriptive in specifying the nutrition and physical activity strategies to be used. For example, language that allowed states and communities to target ECE programs was included. Although the level of support for each funded state or community was considerably lower than that for the CPPW program, tiered funding permitted one level of support for states and communities with an

established infrastructure and the ability to implement interventions, and another level of funding for capacity building. As a result, the CTG program was more focused, deliberate, and more likely to achieve success.

For the first time, the Prevention and Public Health Fund of the ACA provided what appeared to be stable funding for community interventions that included the goals of improving nutrition and encouraging physical activity to reduce obesity. However, the 2014 Omnibus Appropriations Bill eliminated funding for CTGs, and substantially reduced funding for the CDC's Division of Nutrition, Physical Activity, and Obesity (30). Despite the reduction in funding, the bill included funding for many of the setting-specific programs initiated by the DNPAO: \$4 million for ECE collaboratives, \$8 million for baby-friendly hospitals, and \$10 million for worksite wellness. One interpretation of why funding for institutions was preserved but funding for communities was eliminated is that institutional policy change does not carry the same threat to companies that manufacture fast food and sugar drinks as community-based policy initiatives that might include taxes or restrictive zoning.

DEVELOPING GUIDELINES

Because there was a lack of federal guidelines, the CDC began to develop guidelines for states and local health departments, as well as for institutions. The guidelines developed by DASH for school programs were one of the first sets of such guidelines; these were followed by *The CDC Guide to Breastfeeding Interventions* (87). In 2007, the DNPAO began to develop guidance documents for state and local health departments about the intake of fruits, vegetables, and sugar drinks, the appropriate amount of screen time, and physical activity. Because evidence that supported specific interventions was often lacking, the guidance documents pointed to examples of policies or environmental initiatives that seemed promising. As with many such documents, the guidance documents required review and clearance prior to their release. Because of a heightened sensitivity on the part of the DHHS, and perhaps the White House, and because the CDC was becoming increasingly sensitive to the political ramifications of its recommendations, particularly those related to the intake of sugar drinks, the guidance documents required review by the DHHS. Personnel changes and other concerns within the DHHS delayed the release of the guidance documents for several years, and the document on sugar drinks was never cleared for release. The guidance on sugar drinks provides a particularly useful example of risk aversion. The document seemed relatively harmless and uncontroversial to those at the CDC. It recognized the association of sugar drinks with childhood obesity, and pointed to strategies that could reduce the intake of sugar drinks. Water was promoted as a healthful alternative, and taxes were never mentioned. Nonetheless, the DNPAO was never allowed to distribute the document.

As the promotion of breastfeeding evolved, so did surveillance measures and the CDC's guidelines. *The CDC Guide to Breastfeeding Interventions* (87) provided an early example of the shift from the promotion of breastfeeding to baby-friendly policy initiatives within hospitals that supported breastfeeding as the default strategy for feeding newborns and infants. The shift was accompanied by funding to support the implementation of the Baby-Friendly Hospital Initiative as well as more sophisticated monitoring tools to assess rates of breastfeeding and selected changes in these hospital practices (18, 12). Monitoring the rates of breastfeeding began in 2005–2006 in collaboration with the Food and Drug Administration's Infant Feeding Practices Study II (23), but that survey included few questions regarding hospitals' policies. In 2007, the CDC initiated the Maternity Practices in Infant Nutrition and Care survey to assess hospital practices that fostered the initiation of breastfeeding (24) (**Table 1**). Results since 2007 have shown a steady increase in most hospital practices associated with the baby-friendly initiative (17).

Physical activity measures were captured by the YRBS in adolescents and by the BRFSS in adults. However, no national recommendations existed to specify the level of physical activity necessary for health. In 1995, the CDC partnered with the American College of Sports Medicine to develop the first recommendations for physical activity in adults (78), and in 2005, an expert committee convened by the CDC developed physical activity recommendations for children and adolescents (88). In 2006, the CDC began to push for federal guidelines on physical activity, akin to the Dietary Guidelines for Americans (DGAs). Because the DHHS leadership distrusted the CDC's assertion that sufficient evidence existed to warrant guidelines on physical activity, the DHHS funded a workshop at the Institute of Medicine (IOM) to determine whether there was adequate evidence for guideline development. The workshop concluded that there was strong evidence to support the beneficial effects of physical activity on chronic diseases, such as cardiovascular disease and diabetes; on several mental or neurological conditions; and on weight gain, weight loss, and the maintenance of weight after weight loss. The strength of the evidence for children and adolescents was weaker (73). The IOM workshop allowed the DHHS to release the first physical activity guidelines (PAGs) for Americans in 2008 (92). The DNPAO played a major part in abstracting the literature for the guidelines on physical activity, participating in the PAG steering committee, and providing staff support for the PAG advisory committee.

The development of national PAGs represents a significant milestone in the recognition that physical activity should be a focus for health promotion and disease prevention. Like the DGAs, the intent is to update the PAGs every 5 years. However, because the evidence base did not grow appreciably between 2008 and 2012, the DHHS chose to release a midcourse report that focused on strategies to increase physical activity among youth (93). In contrast to the DGAs, which are legislatively mandated to be updated every 5 years, no such mandate exists for the PAGs. One of the benefits of the DGAs is that federal nutrition policy must align with the guidelines. Without a legislative mandate, federal policy on physical activity will depend on the discretion of the administration, which may or may not find the need for PAGs compelling.

Another set of guidelines focused on community strategies to prevent and control obesity (60). These interventions grew out of an evidence-based review, and were broadly divided into strategies that increased the availability of healthy and affordable food and beverages, and strategies to encourage physical activity among children and youth. Strategies to improve nutritional choices included many of those that had emerged from the setting-specific work, including promoting breastfeeding, improving choices in ECE, and providing healthier food at retail outlets. Strategies to encourage physical activity included improving the quality of physical education at school, promoting physical activity during out-of-school time, and changing zoning and community infrastructure to promote physical activity. The guidelines also suggested appropriate measures that could be used to track progress. An independent, parallel effort conducted by the IOM made many of the same recommendations (57).

ASSESSING POLICY AND ENVIRONMENTAL CHANGES

A unique survey instituted by DASH was the School Health Policy and Programs Study (SHPPS), now known as the School Health Policy and Practices Study (**Table 1**) (14). The SHPPS survey was initiated in 1994 to assess school practices that influence students' health behaviors. The survey provides nationally representative data on schools' policies and practices, such as the frequency of recess, the quality of physical education programs, and the sales of unhealthy foods and beverages. Since 1996, DASH also has implemented every other year the School Health Profiles survey, which measures a subset of the policies and practices covered by SHPPS but does so for states and large, urban school districts (15).

As the CDC's strategies shifted to focus on policy and environmental changes within other settings, the DNPAO began to capture state-based data on breastfeeding (18), the intake of fruit and vegetables (7), and physical activity (9) in the form of indicator reports, which aggregated data from multiple sources. However, the ability to capture setting-specific policy and environmental changes in settings like ECE, worksites, and communities remains limited, and poses a major barrier to assessing the success of policies and environmental strategies targeting nutrition and physical activity (56).

KAISER PERMANENTE, THE ROBERT WOOD JOHNSON FOUNDATION, AND THE INSTITUTE OF MEDICINE

The CDC's efforts did not occur in isolation but were augmented and expanded by several other key organizations. Kaiser Permanente (KP) was a pioneer in developing a broad-based approach to obesity prevention and control, as well as being the earliest health plan to consider how to respond to the epidemic. In November 2002, KP worked closely with the CDC to host a meeting in Denver, Colorado, to explore how to develop effective clinical services to prevent and control obesity. Shortly thereafter, KP introduced a cluster of simple messages for children and adolescents related to engaging in physical activity, limiting their amount of television time, consuming fruits and vegetables, and drinking water rather than juice. Recognizing that the successful prevention of obesity would require both clinical and population-based approaches, KP's Institute for Health Policy convened a meeting in Washington, DC, in August 2003 to develop a broad series of partnerships focusing on population-based strategies. In 2004, KP became the earliest group to fund community-based interventions as part of the Healthy Eating Active Living (HEAL) campaign (59) in four communities in northern California. In these settings, KP attempted to link clinical and population-based approaches. These efforts by KP made it a logical partner for subsequent foundation and media initiatives.

In 2007, the Robert Wood Johnson Foundation (RWJF) announced that it would allocate \$500 million, the largest investment in its history, to reverse the childhood obesity epidemic by 2015. The RWJF's targeted investments in research, community programs, and partners' efforts had a profoundly positive effect on the field. An early step in the foundation's efforts was to become a member of the Convergence Partnership (CP) (32), which included KP, the Kellogg Foundation, the California Endowment, Nemours Health and Preventive Services, and the CDC as a technical adviser. The partnership was later joined by the Rockefeller Foundation, the Kresge Foundation, and Ascension Health. The focus of CP was to nurture healthy people in healthy places by focusing on environmental and policy initiatives. An important consequence of the CP was the growth of synergies and the establishment of common targets and strategies for ECE, schools, worksites, and communities.

In addition to the RWJF's investments in partnerships, research, and interventions, its investments in consensus committees and the creation of a Standing Committee on Childhood Obesity Prevention at the IOM resulted in a substantial increase in the evidence base for obesity prevention and control. Representative publications that span most of the strategies and interventions that members of the CP and the CDC were addressing are shown in **Table 4** (52–57, 63, 64). These reports provided an independent assessment of the field and helped secure the evidence base for interventions.

THE OBAMA ADMINISTRATION AND LET'S MOVE!

Despite building broad partnerships with states, communities, and organizations to implement policies to prevent and control obesity, government agencies do not implement regulations or

Table 4 Selected publications from the US Institute of Medicine related to preventing obesity

Year	Publication	Reference
2005	<i>Preventing Childhood Obesity: Health in the Balance</i>	63
2007	<i>Progress in Preventing Childhood Obesity: How Do We Measure Up?</i>	64
2009	<i>Local Government Actions to Prevent Childhood Obesity</i>	57
2010	<i>Bridging the Evidence Gap in Obesity Prevention: a Framework to Inform Decision Making</i>	52
2011	<i>Early Childhood Obesity Prevention Policies</i>	53
2012	<i>Accelerating Progress in Obesity Prevention</i>	54
2013	<i>Educating the Student Body: Taking Physical Activity and Physical Education to School</i>	55
2013	<i>Evaluating Obesity Prevention Efforts: a Plan for Measuring Progress</i>	56

promote national legislation without the full engagement of the White House. The administration of President George W. Bush was reluctant to take a policy-based approach to the epidemic. The election of President Obama in 2008 changed the landscape of obesity prevention efforts. One of the first efforts was to impanel an interagency Task Force on Childhood Obesity, which was charged with analyzing opportunities for prevention and control. The report engaged many federal agencies concerned about childhood obesity, and reiterated many of the focus areas and multisectoral strategies that the CDC had developed for interventions in early childhood; to empower parents and caregivers; to ensure healthy food in schools and access to healthy, affordable food; and to increase physical activity (96). The report also provided the backdrop for First Lady Michelle Obama's Let's Move! initiative, and became the blueprint for the administration's legislative and regulatory activities aimed at implementing the task force's recommendations.

An important first step for Let's Move! was the agreement with the Healthy Weight Commitment Foundation to lower the calories in the food supply. The agreement engaged companies that supplied more than 30% of the calories in the US food supply to reduce 1.5 trillion calories in the daily food supply by 2015. In early 2014, the companies announced that they had achieved a reduction of 6.4 trillion calories (83). The availability of healthy food was enhanced by an agreement between the DHHS, the USDA and the US Treasury to provide funding for the Healthy Food Financing Initiative to encourage retailers to build grocery stores in neighborhoods that lacked grocery stores (food deserts) (82). Subsequently, the creation of the Partnership for a Healthier America enabled direct contractual commitments to be made between PHA and different types of industries. As shown in **Table 5**, strategies for implementing opportunities for obesity prevention and control described in the task force's report included legislative mandates, such as including in the ACA support for breastfeeding in businesses with more than 50 employees, menu labeling, and developing standards for meals, which was included in the Healthy Hunger-Free Kids Act.

First Lady Michelle Obama's Let's Move! initiative had a number of positive consequences that would likely not have occurred without her personal involvement. Her ability to personalize and articulate the challenges parents face in providing a healthy diet and opportunities for physical activity, and the press coverage accorded to her statements, further increased the visibility of the epidemic and the urgent need to respond to it. The multiple, voluntary agreements made with a variety of stakeholders also broadened the base of engagement in the obesity epidemic, and the administration's engagement provided the political support necessary for the legislative and regulatory successes shown in **Table 5**.

Table 5 Legislative, regulatory, and voluntary Let's Move! initiatives aimed at implementing the White House Task Force on Childhood Obesity's report to the President (96)

Goal or Target Behavior	Strategy	Examples of Interventions
Early childhood	Breastfeeding	Baby-Friendly Hospital Initiative Worksite lactation support included in the ACA
	Early care and education	Let's Move! Child Care standards for nutrition and physical activity PHA agreement with group child care centers to provide healthful foods and beverages, and to promote physical activity
Empowering parents and caregivers	Making nutrition information useful	Menu labeling included in the ACA Revision of nutrition facts panel on processed foods
	Health care	AAP implements universal BMI screening PHA implements the Hospital Healthier Food Initiative
Healthy food in schools	High quality school meals	Healthy Hunger-free Kids Act 2010 implemented Let's Move! implements Salad Bars to Schools Chefs Move to Schools initiated
	Other foods in schools	Food standards set for foods served in competition with the school lunch
Access to healthy affordable food	Physical access to food	Healthy Food Financing Initiative (since 2009) to provide low interest loans to build supermarkets in underserved areas Let's Move! Drink up! campaign to promote water consumption
	Food reformulation	Let's Move! agreement with the Healthy Weight Commitment Foundation to reduce calories in the US food supply
Increasing physical activity		Let's Move! Active Schools campaign to increase physical activity Let's Move! Outside (parks and recreation) to increase use of parks and recreation facilities for physical activity

Abbreviations: AAP, American Academy of Pediatrics; ACA, Affordable Care Act 2010; BMI, body mass index; PHA, Partnership for a Healthier America.

SUMMARY

The CDC's role in the obesity epidemic began with its efforts to increase the visibility of the epidemic, and progressed to identifying targets for interventions and guidance, and providing technical support for the implementation of setting-specific interventions directed at those targets. Critical support for the development of a broader evidence base, community investments, and policy initiatives was provided by KP, RWJF, and multiple IOM reports. The efforts of First Lady Michelle Obama and President Obama's administration enshrined many of the CDC's strategies in legislation, or regulatory or voluntary agreements.

As a result of these efforts, data from several national surveys suggest that the United States may be at the corner or turning the corner on the obesity epidemic. A recent NHANES study (75) reported a decrease in the prevalence of obesity among children 2–5 years old during 2003–2004 and 2011–2012, and a plateau in the prevalence of obesity among older children, adolescents, and adults. The decrease in the prevalence of obesity among the youngest children has been supported by observations from the PedNSS surveys that showed a statistically significant decrease among children aged 2–4 years between 2008 and 2011 (69), and by decreases in the prevalence of childhood obesity in 14 communities and 6 states (84). Although specific data are lacking, several shifts may help account for these decreases. The increased attention given to obesity by First Lady Michelle Obama, the CDC, the CP, and others has increased awareness of the epidemic. For

example, 55% of Americans now believe that childhood obesity is the most significant national health concern (5). As with tobacco use, where increased awareness appears to have accounted for a plateau in per capita cigarette consumption before the initiation of any policy or environmental change (90), increased awareness of the adverse consequences of obesity may have prompted changes in behavior that have contributed to both the decrease and plateau in the prevalence. In addition, declines in the consumption of sugar drinks (61) and fast foods (80) may indicate decreases in caloric intake. Finally, the announcement by companies that supply more than one-third of the calories in the United States that they have removed 6.4 trillion calories from the food supply may also have contributed to these shifts (83).

Although these trends are promising, it remains uncertain whether they can be sustained. Unlike other social movements, which began at and spread from the local level, efforts to reduce obesity began at the national level. The spread of initiatives to improve nutrition and encourage physical activity to control obesity was fostered by funding from programs such as CTGs and CPPW, as well as support from foundations such as the RWJF, the California Endowment, and progressive managed care organizations, such as KP and Minnesota-based HealthPartners.

It is also uncertain whether the next administration will be as concerned with and committed to addressing the obesity epidemic as President Obama's administration has been, and whether First Lady Michelle Obama's leadership will continue after she and the President leave the White House. In addition, obesity may not be the most appropriate frame to use to generate engagement. Obesity is a pejorative term, and although the public is concerned about obesity, adults often fail to recognize that they (79) or their children (68) share this problem. Thus, obesity is not seen as a personal threat, which is one of the characteristics that is likely to prompt action. Wellness may be a more acceptable and broader framework that encompasses nutrition, physical activity, and a variety of other domains related to obesity, such as mental health. Obesity could also be linked with other social movements, such as national security or health equity (86).

Whether future efforts continue to focus on obesity, or address obesity in an alternative frame, the long-term solution to obesity will require elements that ensure collective impact (45). These elements include a common agenda, shared measurements, mutually reinforcing activities, continuous communicating and backbone support. An important challenge is that the constituencies that support increased physical activity are not the same constituencies that promote increased breastfeeding or the decreased consumption of sugar drinks. As a consequence, their activities often are not mutually reinforcing, and communication is limited to specific constituencies rather than directed across constituencies. In addition, as indicated above, for the most part, backbone support for obesity initiatives has been provided by the federal government, foundations, and some managed care organizations. Furthermore, some obesity-prevention strategies, such as encouraging people to reduce their intake of sugar drinks, have mobilized powerful political opposition. Because the continued support of foundations and managed care organizations is not assured, and because the efforts of government may be challenged or reversed by industry, the future of efforts to address obesity remains uncertain.

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The author is a member of the Board of the Partnership for a Healthier America, which negotiates contracts with companies to provide healthier choices. The Partnership for a Healthier America works closely with Let's Move! on such agreements. The author is not aware of any other affiliations, memberships, funding, or financial holdings that might be perceived as affecting the objectivity of this review.

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